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SUMMER 2022

SOFTWARE ACQUISITION

From Cloud to Combat

THE IMPERATIVE

A software-intensive Army requires a massive reform of our institutional processes

THE MAGIC GLOVE

MTEC gives traction to promising technology for healing Soldier injuries

BEYOND THE BASICS

The Army Acquisition Workforce is now working under a new and improved framework

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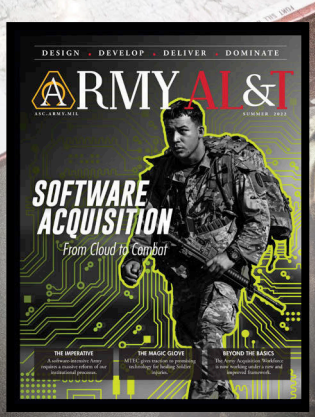
SUMMER 2022

FROM THE AAE

SOFTWARE ACQUISITION



ON THE COVER

This issue examines the many complexities of software acquisition—from funding and development to testing and roll-out. Software requires a new and innovative approach and the Army is determined to get it right.

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ARMY AL&T

SPRING 2022

FEATURE ARTICLES

COMMENTARY

WORKFORCE

From the Editor-in-Chief

Welcome to the "dog days of summer" and another issue of Army AL&T. This issue focuses on software acquisition, how important it is to do it right, and the various systems that rely on it.

Alan Turing is credited with being the first person to come up with a theory for software, in 1935, which led to the two academic fields of computer science and software engineering. The first independent company founded to provide software products and services was Computer Usage Company in 1955. The software industry expanded in the early 1960s, almost immediately after computers were first sold in mass-produced quantities to universities, government and business.

But it wasn't until the commercial availability of the microprocessor—basically a computer on a single microchip—in 1971 that software transformed how we live. Today, software and the products it drives are ubiquitous in our daily lives. IPhones, cars, the computer I'm using now, even toasters all have a massive amount of software driving them. And the military—well, the unique and custom-designed products the Army Acquisition Workforce produces have more than most. The venerable Abrams M1A2 System Enhanced Package version 3 main battle tank has an amazing amount of software with more than 1.4 million lines of code (and counting) driving it and its weapons systems. Let's not even get into the artificial intelligence, cyber, autonomy, space and other "Star Trek" (or "Star Wars") items we have or are working on. Suffice it to say, we rely on software both to create and run our systems, and to maintain an overmatch with any near-peer competitor.

And, in a nutshell, that is why software acquisition, the rapid and iterative delivery of software capability to the user, is so vital. Just as important as the software itself are the funding streams provided by Congress, regulations, contracting and the software acquisition pathway used to develop products.

All these issues and more are touched on in this edition: Learn about how the Army is applying an Agile software system in the acquisition of new munitions, communications, and interoperability updates to High Mobility Artillery Rocket System; see how the Army is modifying its simulations program to keep pace with rapidly changing operational environment with the advent of modeling and simulation as a service and the challenges of migrating to this new paradigm. Finally, it's all about modernization.

Email Nelson McCouch III
@ armyalt@army.mil

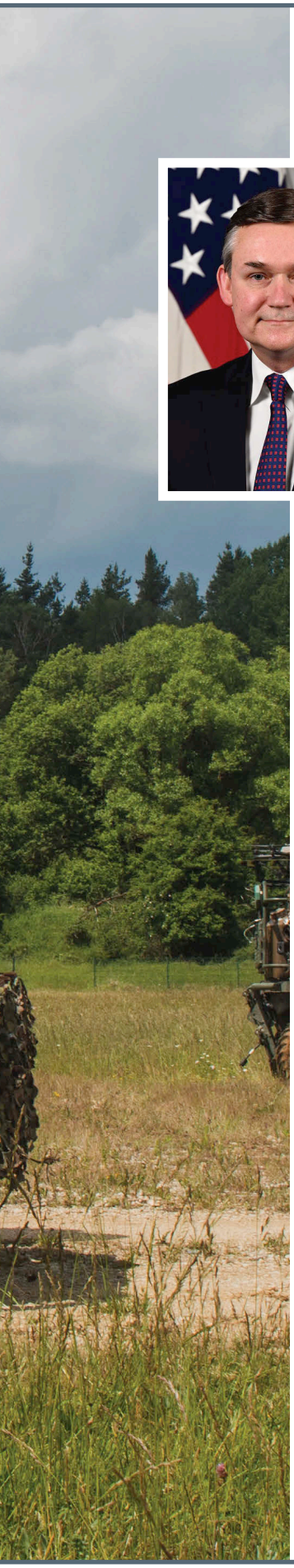
We are at the perfect inflection point to make needed changes in numerous processes now. As I said at the beginning of this column, it's important to get software acquisition right, and there is nobody better to hear from on that subject than the Army chief information officer, Raj Iyer, Ph.D. Turn to his article on Page 8 and find out what he sees as the challenges and risks are for the future of software acquisition. Finally, it's déjà vu all over again. Read "Then and Now: Before Software, There Were Computers," Page 114, to learn about how the Army's need for calculations led to the computer industry and its evolution from the first antiquated mechanical computers and firing-table calculations to today's simplified streamlining of services and pathway to software acquisition—interesting reading!

As always, comments, complaints and especially article submissions are always welcome. Please contact us at **armyalt@army.mil**. We look forward to hearing from you.

Nelson McCouch III
Editor-in-Chief

ROBOTIC RESOLVE

U.S. Soldiers assigned to 1st Battalion, 4th Infantry Regiment receive instruction on the use of the Project Origin robotic combat vehicle in the Hohenfels Training Area, Germany, June 6. Project Origin is being demonstrated during exercise Combined Resolve 17 as part of the Army's modernization and emerging technologies initiatives. (Photo by Spc. Christian Carrillo, 7th Army Training Command)



SOFTWARE ACQUISITION

The Army is improving and modernizing its software acquisition process to get Soldiers the technological advantages they need—fast.

As the Army moves toward an agile acquisition system in sync with the information age, one of my top priorities is to improve the Army's policies and practices regarding the acquisition of software. Software is now central to almost every major program we have, and is often the most important element of our many programs. All of these "smart" systems—from Soldier-carried targeting systems to tanks and aircraft—need sophisticated software to process data and to function. This will take on increased importance as we develop and field future systems, including unmanned and optionally manned ground and air vehicles.

Acquiring the right software is a top priority in the Army and throughout the Department of Defense. But established acquisition models, developed during the industrial era, have not kept pace with the development of software, which undergoes rapid and constant improvement and upgrades. With strong Congressional support, the Army has begun improving and modernizing its software acquisition processes.

Congress has given the Army more tools and authorities so it can acquire software in a fundamentally different way. We published our software acquisition policy last year to take advantage of the new software acquisition pathway. This pathway moves us away from the relatively linear waterfall approach to an integrated, agile and more modern approach to software—trying to take advantage of the way industry is developing software.

Currently, six Army programs are using the new software acquisition pathway. We have a good variety of programs, ranging in size from an Acquisition Category (ACAT) I-D program (Army Integrated Air and Missile Defense) to smaller ACAT III-equivalent

programs. In order for the software acquisition pathway to be successful, we have to ensure that all associated processes are being tailored to improve the speed and quality of software delivery. Four programs are already in the execution phase and planning software deliveries that meet the required annual delivery timeframes. We're hoping to learn from these efforts.

In the area of budgeting for software, we have an opening from Congress in terms of how we adjust our approach, which is an area where we are far out of date. Under standard acquisition procedures, the Army separates research and development, procurement and sustainment funding for software and handles them as distinct categories. However, when it comes to software, the private sector often manages all these activities simultaneously. So, I plan to have an ongoing discussion with members of Congress to ensure they're comfortable with how we're proposing to use the authorities and to see if they can think differently about how we budget for software (e.g., Budget Activity 08)—which will be critically important.

ASSESSING RISKS, RECOMMENDING REFORMS

Lt. Gen. John B. Morrison Jr., deputy chief of staff for G-6, highlighted Army risk management framework reforms during keynote remarks at the three-day Armed Forces Communications Electronics Association's TechNet Cyber event at the Baltimore Convention Center on April 26. (Photo by Edward Loomis, Headquarters Department of the Army G-6)

This effort will take several years to implement. So, at present, I am bringing more software talent into Army acquisition, right at the top. Young Bang, my principal deputy, comes to the Army with extensive private sector software, data, artificial intelligence (AI) and cyber experience, and is my partner in these efforts. We have also brought on Jennifer Swanson as our new chief systems engineer, who also brings a wealth of Army experience and expertise in software, data and engineering.

It is important to have the right kind of people with knowledge about software who can do appropriate oversight, and run software development and sustainment programs. We have a lot of software talent within the Army. Our acquisition officers are among the most highly educated, but we need to leverage all the talent across the Army to get better software. There's a people side to software development. There's an authority side, and there's a money side. We are working to develop software, data and AI correctly and with the right people and color of money, legally, with the statutory authority across

Software is now central to almost every major program we have, and is often the most important element of our many programs.

the Army, all while accelerating and innovating how we do it.

Of course, improving how the Army does software is a team effort. My team and I are collaborating closely with other elements of the Army, in particular the Army's Chief Information Officer Raj Iyer, Ph.D.; Lt. Gen. John B. Morrison Jr., deputy chief of staff, G-6; and Lt. Gen. Jim Richardson, acting commanding general at Army Futures Command, on this important work.

As we modernize the Army, everything we do is underpinned by the digital transformation. We are investing in the development of cloud computing technologies, improving data access and sharing environments, and streamlining software development. Development continues on future systems that will depend upon even higher levels of software and data use, including AI technology and machine learning.

Broadly speaking, we cannot separate data and software or data and AI. We must be deliberate about software. We have to think about data before developing software or creating algorithms and AI.

In the end, we must harness the vast amount of data at our disposal to get the right information faster to commanders at echelon to give them an edge in decision-making, so our Soldiers have a competitive advantage in future conflicts. What matters most is getting equipment and secure, trusted information in the hands of our Soldiers. Army's research and development and acquisition professionals, working with America's creative and innovative entrepreneurs and industry, will ensure that our Soldiers are supported by the software and smart technology that will give them an overwhelming, decisive advantage in future conflicts.

STANDBY TO LAUNCH

Soldiers from the 10th Mountain Division wait on standby after assembling the Improved Target Acquisition System (ITAS) to fire a Tube-Launched, Optically Tracked, Wireless-Guided Missile on Range 48 at Fort Drum, NewYork, March 2. (Photo by Spc. Pierre Osias, 27th Public Affairs Detachment)

INDUSTRY INSIGHTS

CEOs engage with Army War College students, sharing their experiences and insights during industry day, held on March 29, at Carlisle Barracks, Pennsylvania. Pictured, from left, are Paul Lemmo, Charlie McGillis, Maj. Gen. Darren Werner, and Young Bang. (Photo by Robert Martin, U.S. Army War College Public Affairs)

DIGITAL TRANSFORMATION

As the keynote speaker at the 6th annual Business Analytics Symposium held at the University of Texas at Arlington in March, Iyer highlighted relevant details about digital transformation within the Army. (Photo by University of Texas at Arlington Public Affairs Office)

THE IMPERATIVE

A software-intensive Army requires a massive reform of our institutional processes.

Over the last decade, commercial industry has made radical shifts in how it manages the software life cycle from requirements through support fueled by digital transformation and new technologies, such as cloud computing and development paradigms like DevSecOps. In the consumer world, we saw the proliferation of mobile applications for all kinds of new disruptive services like ride sharing (Uber, Lyft), food delivery (DoorDash, Uber Eats), car sharing (Turo), home rentals (Airbnb) and even over-the-air software updates to cars (Tesla). Each of these disruptions in the consumer world created innovative delivery models for services using data as a strategic asset to give these companies tremendous competitive advantage over their nondigital peers. These disruptors also changed the nature of their industry as a whole, and in many cases reinvented their own companies.

The U.S. Army is on a similar path to achieve the objectives for the Army of 2030. We can draw clear analogies between digital transformation in the consumer world to the Army, which has also recognized that data is the new ammunition as we fight in new ways through our modernization efforts. Multidomain operations is how we will establish strategic deterrence against near-peer adversaries in great power competition and, if needed, fight and win decisively in a large scale combat operation. This is how the Army is transforming its "business" model—warfighting—while at the same time transforming our force structure and institutional processes to better align with how we will deliver multidomain effects in a fight.

Each of the Army's modernization programs—long range precision fires, next generation combat vehicle, future vertical lift, Soldier lethality, synthetic training environment and the unified network have one thing in common. They are all software intensive systems, and unlike traditional weapon systems platforms, it is the software enabled by artificial intelligence that powers the platform's lethality and survivability. As such, the Army is moving into a high tech, software-intensive world, one that is not compatible with all of our institutional processes like requirements development, acquisition management, planning programming budgeting and execution (PPBE),

SIGNIFICANCE OF SOFTWARE
Iyer speaks to Army Software Factory cohort students at an Army Futures Command luncheon on March 22, to impress upon them the significance of software modernization and their role in leading the change. (Photo by Army Futures Command Public Affairs Office)

test and evaluation, cybersecurity, talent management and others. The speed of technology change and the agility needed to support a software-intensive Army require a massive reform of our institutional processes that had mostly operated on timelines measured in years, and not days, and there are some challenges that we need to overcome.

REQUIREMENTS DEVELOPMENT FOR SOFTWARE

Modern commercial software has recognized that software is never done. It begins with a minimum viable product and is then incrementally deployed with new features and functions based on user feedback. While a high-level product roadmap is established, detailed requirements are not written for software. How the software is used and how well it works in the real world drives the prioritization for updates to the software.

However, in the Army we rely heavily on documented functional requirements documents that take years to write before they can be turned over to build. Such an approach assumes that we know all of the requirements upfront, when we do not, and impedes innovation in applying the right technology solution to meet the requirement. When the software being implemented is used to modernize an existing legacy system, the system requirements are heavily biased by how the legacy system operates instead of reimagining a new way to achieve the same outcomes. The Army must adopt human-centered design approaches to ensure user feedback early and often and iterate to achieve the end-state while keeping requirements at a high level and focused on mission outcomes.

SOFTWARE ACQUISITION

When requirements eventually flow into acquisition to develop and deploy new software, the Army has traditionally taken a "big bang" multi-year approach to build

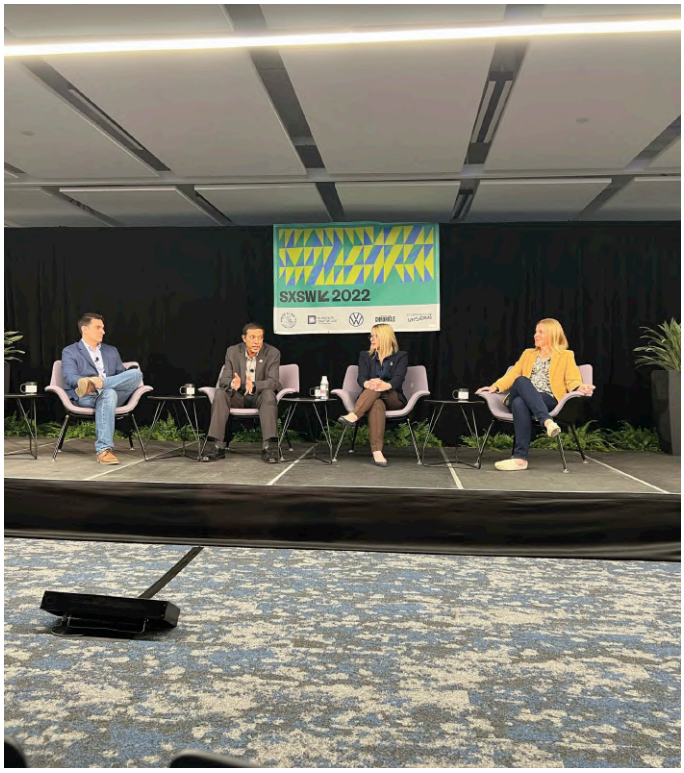
The Army is moving into a high tech, software-intensive world, one that is not compatible with all of our institutional processes.

and deploy capability. Even in select programs that have adopted Agile development methodologies, the software product does not get into the hands of the users early in the life cycle for feedback. Instead, these software builds are consolidated into larger increments, which then go through further integration-testing and eventually user-acceptance testing before they're deployed.

Such an approach is not truly Agile. Compounding the problem is the enormous documentation that is required by our acquisition processes that includes various plans, reports and contract deliverables. Agile development is all about delivering a usable product, and if the Agile methodology is implemented correctly, that can be delivered with minimal documentation. For formal acquisition programs, the Army has not fully leveraged the flexibility and agility that comes with new acquisition models such as the software acquisition pathway, which is based on modern commercial software development best practices. The Army must take advantage of these authorities, organize ourselves as Agile product teams and focus on delivering high quality user experience through micro-applications delivered in weeks and not years.

BUDGETING FOR SOFTWARE

The Army's current software life-cycle processes are waterfall-based and defined by milestones and gates. As such, it is assumed that all software development will happen in linear steps moving from design to development to test to fielding and finally to sustainment. The way we budget for the software life cycle follows this waterfall approach whereby we budget using research, development, test and evaluation funds for development and testing, other procurement, Army, funding to procure hardware and software, and, finally, using operations and maintenance, Army, funds for sustainment. DOD fiscal laws drive this distinction across various colors of funding, and strict rules apply for what type of activity can be conducted in each phase of the life cycle. Any transfer of funds across these colors of funding can require lengthy and complex reprogramming efforts and even Congressional approval. This model falls apart quickly when we leverage Agile development.



CLOUD CONCEPTS
Iyer and a panel of peers discuss the importance of cloud technology as a catalyst for change and modernization. (Photo by Army Futures Command Public Affairs Office)

Once the minimum viable product is deployed, not only is it continually sustained but new capability and enhancements are implemented at the same time, making distinctions between colors of funding almost impossible to ascertain. This leads to subjective legal opinions for how to allocate funding in later phases of the software life cycle, all of which leads to potentially artificial decisions being made to apply the right color of funds to the project to ensure compliance.

The DOD and Congress recognized the need for "colorless" funds for software and have established a pilot called the Budget Activity 08 (BA-08) to address this challenge. The Army currently has only software programs under this effort, and we must expand and scale the number of programs under this pilot to maximize the benefits available through the pilot, while at the same time

BENEFICIAL VISIT
Iyer paid a visit to a data center still under construction in South Korea, in March, to assess progress and problem areas in development of the center. (Photo by 8th Army Public Affairs Office)

working with Congress to find an enduring solution to the problem.

TEST AND EVALUATION FOR SOFTWARE

Software that is embedded in weapon systems are required to go through extensive test and evaluation activities—developmental testing, independent operational testing, interoperability testing, Section 508 testing; and various certifications such as Army interoperability certification, before the software can be deployed into the weapon system platform. However, these activities follow a very waterfall approach and require a great deal of documentation to complete. Many of the test cases are duplicative and repetitive, or non-value added. To deliver software in small increments we will need to reform the Army's test and evaluation processes to become more agile.

The only true measure of whether a software works as intended is to get it in the hands of real users early and often for real feedback. Using accredited development platforms and tools and a standard architecture can ensure interoperability upfront, and keep the focus on delivering usable software to users. For tactical systems and deployments, leveraging modeling and simulation tools, virtual testbeds or even digital twins is how the Army can reduce the need for test and evaluation on physical platforms. The Army's Joint Systems Integration Laboratory is an example of how we must address testing and certifications in the future.

CYBERSECURITY

Cybersecurity for Army software continues to be an afterthought as part of the system accreditation. System security plans too often focus on the risk management framework-driven waterfall process to accredit a system through authority to operate (ATO) rather than continually testing for cybersecurity vulnerabilities in the code during development. Cybersecurity needs to be an important consideration in the development of the system architecture, and followed through with continuous testing such as static code

HIGHLIGHTING ARCHITECTURE AND INFRASTRUCTURE
During a visit to South Korea, in March, Iyer participated in discussions with senior leaders on current command initiatives and the unique joint mission that exists in Korea. Highlights included briefs on Zero Trust Architecture and Virtual Desktop Infrastructure. (Photo by 8th Army Public Affairs Office)

analysis, penetration testing and red teaming assessments (cybersecurity experts who attack an organization's cybersecurity defenses and exploit weaknesses).

These concepts are core to the DevSecOps framework that is widely adopted by industry to build, deploy and operate software through extensive automation. DevSecOps also supports the concept of a continuous authority to operate where as long as the software is built in an accredited DevSecOps platform with the right processes and controls, any software application developed can be instantaneously deployed obviating the need for many months of separate cybersecurity processes to achieve an ATO. The Army's CREATE DevSecOps platform in the cARMY cloud is one such example, and has validated tremendous reductions in cycle times through its usage by the Army Software Factory. The Army must move towards DevSecOps for all software applications in the future, in order to increase agility and velocity.

CONCLUSION

The Army has a tremendous opportunity to reform these institutional processes now, but these are not just Army pain points, they are DOD-wide. We need to leverage existing authorities where available, such as the software acquisition pathway, optimize our internal processes to be more agile and flexible where possible, and then work across the DOD and joint community to seek solutions for others. Without this much needed reform, the Army risks continuing to fall behind, risking our ability to modernize for the Army of 2030.

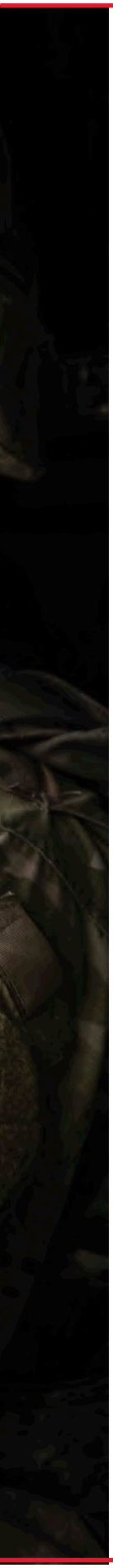
For more information, go to ***https://www.army.mil/cio****.*

RAJ IYER, Ph.D. is the U.S. Army chief information officer for information technology reform. Prior to his current role, Iyer served as the managing director for government and public services and senior manager, technology strategy, defense and national security for Deloitte Consulting. He has held various roles in information technology within the commercial and military space. His top civilian awards and professional achievements include the Meritorious Civilian Service Award, the International William Conroy Standards Professional Award, and dozens of published peer-reviewed papers. He holds a Ph.D. in electrical engineering from the University of Texas, an MBA from the Ross School of Business, University of Michigan, an M.S. in electrical engineering from the University of Texas, and a B.S. in electrical engineering from India's National Institute of Technology.

Data is the new ammunition.

TEST RUN

Re-imagining Future Long Range Assault Aircraft means taking real data from flight tests and rigorously refining the requirements to meet the Army's needs for flight performance, combat survivability, sustainability and safety. (Photo by Luke J. Allen, Army Futures Command)



BALANCING ACT

Along with industry, the Army is taking a once-in-a-generation opportunity to imagine what vertical lift means for the Future Long Range Assault Aircraft.

by Col. David Phillips

Modernizing Army aviation is of monumental importance to the nation's defense, and there is a great opportunity for the Army and industry to get it right. With the right balance of empowered professionals, innovative acquisition approaches and a set of optimized requirements, the Army has a once-in-a-generation opportunity to design, develop and deliver Future Vertical Lift (FVL) aircraft that are able to operate at far greater speeds and ranges to support our Soldiers in 2030 and beyond.

But the Army cannot build a 21st century aircraft using the same tools and processes as it did with the venerable Black Hawk in the 1970s. Today, the stakes are high for the Army's modernization strategy. National security, the industrial base and precious resources are at stake. And, more importantly, future warfighters will need these modernized Army aviation capabilities to win on future battlefields. One of these capabilities is the Army's Future Long Range Assault Aircraft; the next generation of affordable vertical lift aircraft with the primary mission of long range air assaults and aeromedical evacuation. Historically, the Army has typically had linear acquisition processes with industry during the requirements and design process. Working alongside the Future Vertical Lift Cross-Functional Team and with teams across the aviation enterprise, the Future Long Range Assault Aircraft Project Office—the early adopters of DOD's adaptive acquisition framework—are using new acquisition authorities and procedures to revamp a decades-old Army process to become leaner, faster and ultimately deliver advanced capabilities to Soldiers. Along with industry's best and brightest, the Army is re-imagining what Future Long Range Assault Aircraft can be.

INVERTING THE DEFENSE PROCUREMENT PARADIGM

The adaptive acquisition framework was described as "the most transformational acquisition policy change we've seen in decades," by Ellen Lord, the former undersecretary of defense for acquisition and sustainment. Lord said that the framework allows for "innovative acquisition

NEXT GEN IN ASSAULT AND EVAC
The Future Long Range Assault Aircraft is the next generation of affordable vertical lift aircraft with the primary mission of long range air assaults and aeromedical evacuation. (Photo by Spc. Cody Rich, U.S. Army)

approaches that deliver warfighting capability at the speed of relevance." As a key component of Army aviation's modernization strategy, the Future Long Range Assault Aircraft team is paving the way in leveraging authorities established in the framework, enabling the program to remain on schedule and meet the Army's objectives through the use of a hybrid acquisition approach.

The program's approach includes three main phases: risk mitigation activities using other-transaction authority agreements, rapid prototyping using middle tier of acquisition authorities and tailored major-capability acquisition weapons system development with a Milestone B in 2023.

HOW IS THIS DIFFERENT?

Over the past two years, the Army engaged with industry through two other-transaction agreements, and conducted detailed trades analysis, reviewing hundreds of system specifications. This is a different approach from the past where the Army would define system specifications and send out for red line, getting only one opportunity for formal industry feedback on detailed requirements ahead of the request for proposal and formal design process.

Instead, the Future Long Range Assault Aircraft Project Office asked industry to assess key requirements and design attributes, and then do their part to demonstrate new ways to optimize cost, performance and schedule. With competitive demonstration and risk reduction, the Future Long Range Assault Aircraft Project Office is using digital engineering with industry to significantly reduce risk, reduce life-cycle costs and increase

SPEED THINGS UP
With the right balance of government and industry resources, the Army has an opportunity to design, develop and deliver FVL aircraft that are able to operate at far greater speeds and ranges. (Photo courtesy of Lockheed Martin)

performance of these new weapons systems. The Army brought industry on board early in the conceptual design process to help optimize requirements through numerous design iterations. The optimization of those designs and requirements before investments in major hardware and resources will ultimately drive affordability for the life cycle of the program.

Since 2020, the project office has executed two rounds of competitive demonstration and risk reduction, allowing the Army to leverage industry knowledge and optimize requirements through digital engineering in advance of entering the final design, build and test of the weapons system. This means taking real data from flight tests that the Army has continued over the past two years with the Joint Multi-Role Technical Demonstration program and rigorously refining the requirements to meet the Army's needs from flight performance, combat survivability, sustainability, safety—all of which enable affordability for the life cycle of the program. If the UH-60 Blackhawk is the benchmark, that could be over the next 50 years.

Early collaboration between the Army and industry is also allowing the Army to influence innovation and competition, and it is offering more opportunities for Soldiers to provide valuable input into the final product during touch points. Army pilots have flown these new configurations, and both Army maintainers and infantry squads have provided invaluable feedback on the new approaches to sustainment and operations in the field.

The Army is embracing an adaptive acquisition framework that allows for tailoring before entry into major acquisition milestones and allows for the appropriate use of acquisition-reform authorities. The project office's use of mid-tier authority accelerates

FORD PHENOMENON
The Ford Mustang is a great example of a product that surpassed expectations. Sales exceeded 400,000 in the first year of production and 1,000,000 in the first 18 months. (Image by Getty Images)

capability maturation and allows for early development of virtual aircraft prototypes, focusing on maintaining program momentum with appropriate acquisition rigor.

With mid-tier acquisition, the focus is on balancing speed with rigor: Requirements authorities and acquisition oversight are pushed down, and funding is provided for deliberate increments of capability through rapid prototyping. Ongoing technology risk reduction will continue by capitalizing on data from the flying demonstrators, test stands and wind tunnel models. Ultimately, virtual prototypes will further reduce risk to the program and set a strong foundation for future program success.

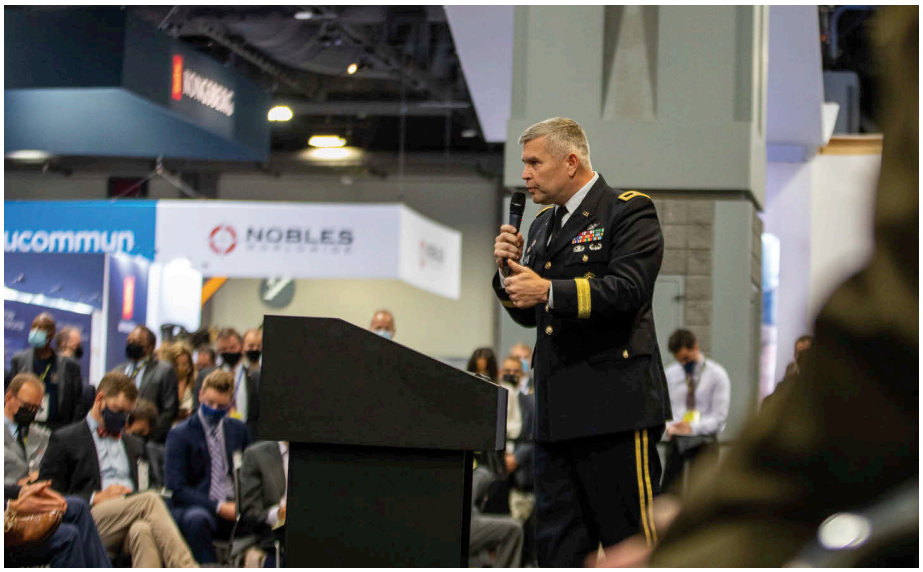
Comparatively, the automobile industry has many examples of programs and innovations that have either been successful or failed. A similar thought process of revamping traditional methods came out of Ford Motor Company in the 1960s. Looking to develop a new sports car, Lee Iacocca faced multiple dilemmas, at the heart of which was one of the biggest losses in Ford history with the development of the Edsel. Driving against the tide of skepticism from senior executives, Iacocca and his team innovated. With constrained resources for development, Ford's "Fairlane Committee" worked through more than 18 designs. Ultimately, it was the competition amongst Ford's design teams that produced a great outcome. Ford's final design was a proper balance between the performance, weight (approximately 2,500 pounds) and cost (approximately $2,500). In 1964, Ford built a car that far exceeded even their own expectations—the Mustang—selling over 400,000 in the first year, and over a million in the first 18 months. This was proof of an *optimized design* that was ideally suited for the market.

TRUST IS CRITICAL TO SUCCESS

For the Future Long Range Assault Aircraft, the Army is building both relationships and trust while getting multiple bites at the "requirements apple," and counting on a much more rapid development path, proving technologies early with designs that strike a balance between performance and cost. With the goal of enabling life-cycle affordability, the project office has deliberately integrated the modular open systems approach into its requirements and sustainment strategies. That modular approach is the Army's emerging set of common standards and interfaces for aircraft electronics allows for rapid, cost-effective upgrades and tailored mission systems, which ultimately drives long-term cost savings.

Over the past two years, the Future Long Range Assault Aircraft Project Office, along with the Program Executive Office for Aviation, has invited industry, government partners and academia to the architecture-collaboration working group that helped to define the framework included in the Future Vertical Lift architecture framework. That architecture framework defines the objectives and requirements that the contractor shall uphold to execute a modular approach and deliver a product and capability that meets the new aircraft's modular approach objectives. The architecture framework will improve the government's ability to use appropriate data rights by enabling competitive, continuous upgrade and delivery of threat-based capability through faster fielding of innovation by using common processes, tools and standards.

Leading change always presents many challenges, even in commercial industry. Lee Iacocca finally convinced Henry Ford II that a paradigm shift at Ford Motor Company would be the answer. There was no sports car in Ford's portfolio. There were no plans to build one. The company tried to buy Ferrari, but that attempt failed. It also led to a series of history-making decisions. Ford's innovation and willingness to change its business



FOCUS ON AFFORDABILITY
Brig. Gen. Robert L. Barrie, program executive officer for Aviation, speaks at the "Modular Open System Approach" Warriors Corner speaker session during the 2021 Association of the United States Army annual meeting. The Future Long Range Assault Aircraft Project Office integrated the approach into its requirements to enable life cycle affordability. (Photo by Sgt. 1st Class Henry Gundacker)

practices was not easy. While hardliners scoffed at the idea and worried they wouldn't make a profit, Ford changed its script, and sales skyrocketed.

ACQUISITION NEEDS A NEW THOUGHT PROCESS

In 2018, the Army laid out a modernization strategy in line with the National Defense Strategy. Four years later, the Army is executing to this strategy, aligning with best commercial practices for design and requirements optimization and using cutting-edge digital engineering design tools to flesh out ideas, concepts and innovations before selecting the eventual builder of these aircraft in 2022.

Army leadership is fostering an environment where tailored acquisition strategies thrive, and senior leaders know the difference in associated risks between rapid and deliberate processes. Acquisition professionals are ensuring this process fully involves experienced operators and sustainment professionals, embracing their feedback. While there is a healthy tension between the industry competitors who are looking to be selected to build the aircraft, competition will only drive us to a better, more affordable end-product.

CONCLUSION

The nation's challenges aren't getting any easier. While we trust that its strength will endure, and hopefully deter the next war, it will be a new era of Soldiers who will fight in the next major conflict. It is our responsibility in the Army to ensure Soldiers have the right equipment, the very best aircraft and lethal capabilities to win. Our mission is important, and with the changing environment, Army aviation may yet again be the first in harm's way.

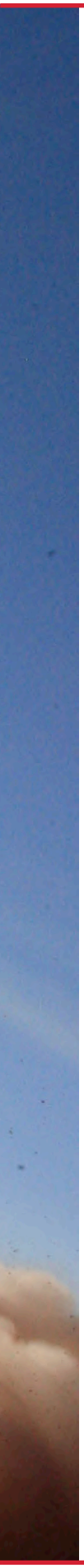
For large, complex organizations like the Army, adopting new models can be difficult and the barriers to change are often steep. With today's realities, the Army cannot afford the luxury of historically long, drawn-out acquisition timelines. Making informed decisions on requirements through design optimization will enable the Army to ensure capabilities are affordable, meet multidomain operations requirements and deliver on an aggressive schedule that does not sacrifice rigor for speed.

Delivering next generation Army capabilities will require a new paradigm and a team-of-teams effort. We will succeed.

For more information, go to ***https://www.army.mil/article/239362/future_long_range_assault_aircraft_flraa****.*

COL. DAVID PHILLIPS is the project manager for Future Long Range Assault Aircraft. He has an M.S. in aerospace engineering from North Carolina State University, a masters of strategic studies from the U.S. Army War College, and a B.S. in engineering physics from the United States Military Academy at West Point. He has completed Defense Acquisition University's Executive Program Managers' Course, and is Level III certified in program management.

ROCKET AT THE READY
An M142 HIMARS launches a Precision Strike Missile Dec. 10, 2019, at White Sands Missile Range, New Mexico. HIMARS is one of the Army's front-running munitions that addresses Long Range Precision Fires. (Photo courtesy of White Sands Missile Range)



SOFTWARE, LAUNCHED

The future is now, and the future of Army modernization is an Agile software system.

by Katie Davis Skelley

A pivotal software acquisition for the U.S. Army's number one modernization priority, Long-Range Precision Fires, is the High Mobility Artillery Rocket System (HIMARS)—to provide an all-weather, indirect, service-point targets and area-fire weapon system to strike counter fire, air defense, armored formations and other high-payoff targets at all depths of the tactical battlefield.

In 2018, the launcher software data rights transitioned from contractor-developed and -owned to 100 percent government-owned by the Strategic Operational Rockets and Missiles Project Office (STORM), being designed and developed by the U.S. Army Combat Capabilities Development Command Aviation and Missile Center (DEVCOM AVMC) at Redstone Arsenal, Alabama.

"Any new capability that requires integration with the HIMARS, such as new munitions, new communications systems, any type of interoperability—the U.S. government now has the rights to all of the HIMARS software data and test environments," said Amber Marsh, software sustainment division chief for the DEVCOM AVMC Software, Simulation, Systems Engineering and Integration (S3I) Directorate. "Right now we are performing launcher software updates to support new munitions, which include Precision Strike Missile [PRSM], one of the Army's top [Long-Range Precision Fires] programs." What this achieves for the Army is a faster, more cost-effective way of modernizing its technology, to meet current and future threats on the battlefield.

RE-ARCHITECTED, REDESIGNED AND READY TO GO

Since 2019, HIMARS has supported the Precision Strike Missile during its development flight tests, successfully launching the next-generation munition to its extended ranges and targeted impacts. DEVCOM AVMC conducts system and testing under controlled conditions, using interoperability modifying the HIMARS launcher software for compliance with message protocols of the PRSM munition, and the digital command and control, Advanced Field Artillery Tactical Data System with interface-control specifications.

TROOP TRAINING
Soldiers receive additional HIMARS launchers and training from the STORM Project Office. (Photo by 1st Lt. Kendra Thomas, 18th Field Artillery Brigade)

FIELDING UPGRADES
The S3I Directorate fields the Universal Fire-Control System version 7.11B and 8.2 software upgrades to more than 40 U.S. Army, Marine Corps and National Guard Multiple Launch Rocket and HIMARS units. (Photo by 1st Lt. Kendra Thomas,18th Field Artillery Brigade)

System and software engineers at AVMC re-architected and redesigned the HIMARS launcher software, adopting an open system architecture and modern design that enables them to upgrade and add capabilities, without the traditional limitations of its previous design. Throughout development, the Army conducted Soldier touch points and user juries to ensure maximum usability and functionality for the warfighter. Soldier feedback identified which operations the user performed most frequently, then the software interface was designed so that the keys or buttons for these operations would be readily available on the home screen. Feedback also included using green, yellow and red colors to aid the user with both operational and caution alerts.

"We updated the user interface from a human factor standpoint as the software intuitively guides the Soldier through the conducted mission," said Marsh. "We strive to make the interaction with the software as easy and intuitive as possible for the end user."

HIMARS will share a commonality of hardware and software with the tracked Multiple Launch Rocket System M270A1/A2 by using its redesigned software for the Common Fire-Control System. The result will be 85 percent of the software being reused across the HIMARS and M270A1/A2 launcher platforms, further reducing the cost for the Army to maintain, while increasing the capability of both weapon systems. The software is designed with a modular architecture to support scalability and future modifications.

COST SAVING SOLUTIONS

The government-developed, designed and owned software solution reduces life cycle costs at a rate of approximately $12 million per release—sizable cost savings for the Army, when it is noted that software is released every 18-24 months. The AVMC team uses Agile and Development Security Operations (DevSecOps) principles to make launcher software updates, which enables rapid delivery of capability to the Soldier through flexible contracts that focus on iterative feedback loops with direct customer and user involvement, while applying rigor through DevSecOps automated testing to produce software that is safe, survivable and relevant in today's mission field.

"We are currently in the middle of fielding updates for the HIMARS software to field artillery Soldiers and Marines in the field," said Michael Murray, operations, fielding and training lead for DEVCOM AVMC S3I. "They are already proficient with the current launcher software, and the latest software update enables units to employ the Insensitive Munition Propulsion System rockets. "The differences the user will see in the updated fire-control

system software is minimal as the software internally handles the operations to launch the new rockets."

CONCLUSION

This year alone, Murray and his team are fielding launcher software upgrades to more than 40 U.S. Army, Marine Corps and National Guard units along with Army pre-positioned stock sites worldwide. Soldiers are receiving hands-on, over-the-shoulder training from experts who have been in the field as former launcher crew-members.

However, as the Army transitions from the current universal configuration to the Common Fire-Control System, there will be additional capabilities in the hardware and user interface requiring Soldiers to gain a new understanding and familiarity with the changes.

"There will be an initial learning curve and some differences in the way the software looks to them," Murray said. "There's going to be more technology for the Soldier to learn, but the good news is that for every version of tactical software we release for the launcher, we also release the Fire Control Panel Trainer using 95 percent of the tactical launcher code."

The Fire Control Panel Trainer, which runs on a laptop, will help provide the necessary training for the warfighter to be prepared for tactical operations in the field and during training missions.

HIMARS and its Universal Fire-Control System software will continue to support the Army's Long-Range Precision Fires priority in 2023 with additional live-fire PRSM flight tests and Soldier touch points.

"Just as the software upgrades have integrated with and advanced the HIMARS launchers, so has our AVMC government-to-government partnership with STORM worked hand-in-hand, side-by-side," said Marsh. "Together, we are continuing to deliver the latest technology to the battlefield, modernizing the fleet and readying the warfighter with future capabilities."

BALLISTIC BAY

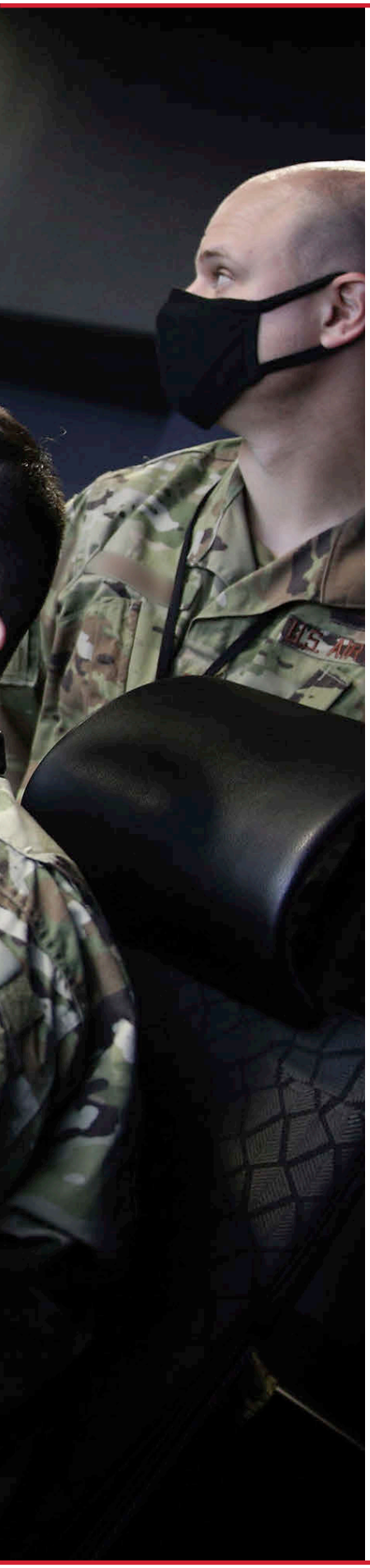
The HIMARS system resides in a high bay at the DEVCOM AVMC at Redstone Arsenal, Alabama. (Photo by Haley Myers, DEVCOM AVMC Public Affairs)

For more information about DEVCOM AVMC go to ***https://www.army.mil/devcom-avmc****.*

KATIE DAVIS SKELLEY is a communications specialist for the U.S. Army Combat Capabilities Development Command Aviation and Missile Center. She has a decade of experience in telling the Army's story and her work has been recognized by the Alabama Press Association Media Awards. She earned a bachelor's degree with majors in criminal justice administration and sociology from Middle Tennessee State University.

CONTRIBUTOR: Kinsey Lindstrom, strategic communications, U.S. Army Program Executive Office for Missiles and Space, STORM Project Office.

HIGH PRIORITY
Collaboration among the joint services is a top priority for U.S. Cyber Command. (Photo by Josef Cole, U.S. Cyber Command)



ACT NONTRADITIONAL

One small organization is changing the face of acquisition and collaboration, and taking cyber defense to a new level.

by Fianna Litvok

What happens when you combine superior technology, nontraditional acquisition and an award-winning solutions delivery model? A joint service collaboration that promises to take the nation's cyber defense to a whole new level.

The U.S. Army's Applied Cyber Technologies office is partnering with the U.S. Air Force Cryptologic and Cyber Systems Division to maximize capabilities within the DOD's cyber enterprise. In November 2021, the organizations agreed to do a side-by-side performance comparison between their hardware and software, and determine if there was an interconnection.

Leaning forward with a top priority for the U.S. Cyber Command—joint collaboration—both organizations moved forward to effect change. The Defensive Cyber Operations Applied Cyber Technologies (ACT) team began integration efforts with the Deployable Defensive Cyberspace Operations System – Modular and the Air Force's version of the Defensive Cyberspace Operations Tools Suite, software tools designed to identify, mitigate and protect DOD networks from cyberspace threats. These teams will focus less on specific tools and more on the entire weapons system.

MAKING ACQUISITION WORK FOR US

The secret sauce lies in Labyrinth—Applied Cyber Technologies' prototype solutions delivery mechanism. Labyrinth uses an other-transaction authority agreement to rapidly develop prototype solutions for the Army's cyber enterprise. It also serves as the technical platform where prototypes are developed and assessed. Labyrinth has developed a partner ecosystem consisting of industry vendors and academia that integration teams can tap into whenever a critical challenge arises, or when a new solution is required.

When it became clear that the Army and Air Force wanted to explore technical synergies between their respective defensive cyber weapons, ACT turned to its partner ecosystem

NOT LABYRINTHINE
Labyrinth is the Applied Cyber Technologies' solution space where industry and government can collaborate to develop solutions, partnerships and more (Graphic by Applied Cyber Technologies)

and sent out a request for information. A Labyrinth partner submitted a proposal indicating how they would approach the integration, which the government subsequently approved. Two months later, the vendor had successfully proved compatibility between the Army's Deployable Defensive Cyberspace Operations System – Modular and the Air Force's software, opening the door for further development. The nimble nature of the other-transaction authority consortium and Labyrinth's Agile development methodology enable the Army's cyber enterprise to move rapidly in a continually evolving landscape.

(For more on how the other-transaction consortium model works, see "Not Far at All," in the Winter 2022 issue of Army AL&T.)

"Labyrinth provides our team with a key tool in our kitbag to quickly home in on solutions to some of our toughest acquisition challenges," said Col. Mark Taylor, project manager for Defensive Cyber Operations at Army Program Executive Office Enterprise Information Systems.

Labyrinth is a straightforward yet novel mechanism. In many ways, it is an acquisition oddity; it breaks the proverbial mold of Army acquisition in its ability to quickly secure a prototype solution. Labyrinth's strategic use of other-transaction authority, and its subsequent ability to rapidly respond to pressing challenges, helped it garner a 2021 Maj. Gen. Harold "Harry" Greene Award for Acquisition Writing in the innovation category.

"Developing novel ways of engaging with industry and rapidly securing prototypes are the best ways we can serve our cyber warriors," said Arthur Edgeson, product lead for Applied Cyber Technologies. "We're proud of our Labyrinth mechanism and what it allows us to do for our warriors."

THINKING DIFFERENTLY

No one would argue about the importance of defense acquisition in keeping the nation safe. However, traditional acquisition models don't necessarily provide rapid solutions. The novel emerging threats facing the nation today are a call to action for the acquisition workforce to consider new procurement approaches.

In recent years, DOD has made considerable efforts to quicken the pace of acquisition, particularly with the introduction of the Adaptive Acquisition Framework in 2020. Other-transaction vehicles serve as a promising possibility in the sometimes cumbersome acquisition framework. With Labyrinth, Applied Cyber Technologies has created a way to quickly equip the Army's defensive cyber forces with effective prototype solutions

The secret sauce lies in Labyrinth—Applied Cyber Technologies' prototype solutions delivery mechanism.

while saving the government money on protracted development of full-fledged products that may not even work. Labyrinth is an Agile mechanism and does not require heavy lifting to implement. It supports creative collaboration with other organizations, and—in Applied Cyber Technologies' case—with other services.

Other-transaction authority provides a way for organizations to create prototype solutions in a rapid and streamlined manner. These innovative vehicles can lead to successful prototypes that solve an immediate problem, while simultaneously paving the way for a more formal FAR-based acquisition down the road.

Other-transaction authority has been available to us for a long time. Because it can occasionally generate questions resulting from their unique nature, some organizations understandably are still cautious about using other-transaction authority when crafting an acquisition strategy. The vehicles are worth considering for their potential to help solve real-world problems. Other-transaction authority is "different" and requires organizations to think differently. In the end, thinking "differently" can make all the difference for our warriors.

CONCLUSION

Labyrinth stands out as an example of what is possible when organizations challenge their own assumptions.

Applied Cyber Technologies was established in 2018 to identify ways to rapidly provide solutions to the U.S. Army's defensive cyber forces. Since its inception, the organization has known that Federal Acquisition Regulation-based vehicles would not suffice; it also has understood that other-transaction authority is suitably designed to provide the very solutions needed, even if only in prototype form. Applied Cyber Technologies' Labyrinth and its use of other-transaction authority enable the rapid development of prototypes, as well as strategic collaborations like the project with the joint services.

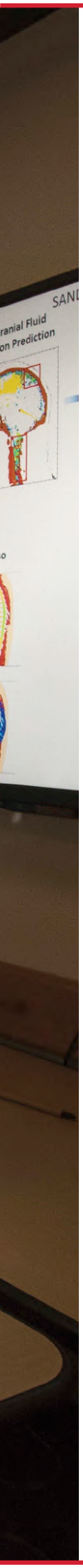
COLLECTIVE COORDINATION
U.S. Cyber Command personnel work to defend the nation in cyberspace at Fort George G. Meade, Maryland. Cyber Command's mission is to direct, synchronize and coordinate cyberspace planning and operations—to defend and advance national interest—in collaboration with domestic and international partners. (Photo by Josef Cole, U.S. Cyber Command)

It is possible that these innovations would have never come to pass had Applied Cyber Technologies held onto traditional ideas about what could or should be. Thinking differently leads to doing differently, and redefines concepts and new possibilities.

For more information, go to ***https://www.eis.army.mil/programs/act****.*

FIANNA LITVOK is the communications lead for Applied Cyber Technologies, and a two-time winner of the Maj. Gen. Harold "Harry" Greene Awards for Acquisition Writing. She also serves as a military intelligence chief warrant officer in the U.S. Army National Guard's 91st Cyber Brigade. She holds an M.A. in English and B.A. degrees in English and history from Stony Brook University.

BLAST FROM THE PAST
Sandia National Laboratories researchers Candice Cooper, left; Shivonne Haniff, center; and Paul Taylor use a blast impact simulator to study mechanisms behind traumatic brain injury. Most existing simulations developed in stovepipes and are tailored to each community's requirements. (Photo by Randy Montoya)



ARMY SIMULATIONS JUST DON'T CUT THE MUSTARD

Modernization demands an Army migration to modeling and simulation as a service.

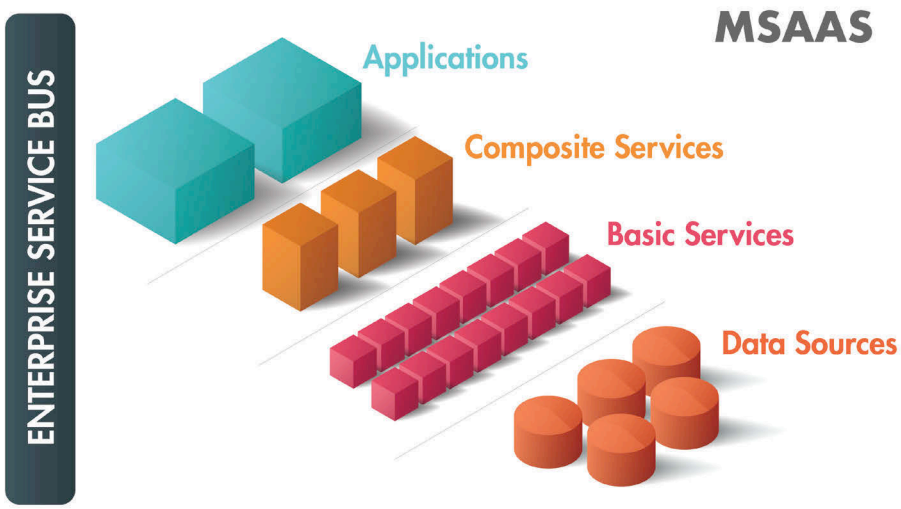
by Charles Sanders, Ph.D., and Gene Davis

The U.S. Army established the Army Futures Command (AFC) to address the realization that changes in technology and threats are outpacing their capability development processes. The AFC cross-functional teams are focused on more rapid delivery of new capabilities. However, current Army simulations used to analyze, experiment with and test these new capabilities lack agility and the ability to represent the systems and all domains of the operational environment to support rapid development. In short, modernization of the Army modeling and simulation (M&S) enterprise is required to enable Army modernization.

Current battlespace simulations should be able to provide the required operational assessments and integration into the force structure. However, they are expensive to operate and slow to modify to accommodate the modeling of new systems performance and behaviors. Simulations across the Army are decentralized; they are resourced and managed by six separate communities: analysis; acquisition; experimentation; test and evaluation; and training and intelligence. For example, training simulations are funded through Training and Doctrine Command G-3/5/7 and simulations used by the analysis community are funded through United States Army deputy chief of staff G-8. Most existing simulations developed in stovepipes as standalone capabilities tailored to each community's requirements. Integration for cross-community cooperation is technically and fiscally challenging. For example, the analysis community typically runs simulations faster than real time to facilitate multiple iterations for statistically valid results while the training community runs their simulations in real time with real players. This means that each community separately creates or collects the same models and data to support their simulation, with limited ability to share or leverage the investments of others.

The long time and high cost to modify a simulation is particularly significant—given the complex, unpredictable and dynamic nature of the forecasted operational environment—the requirement for a simulation to keep up with the pace of change is a serious challenge. Modifying or updating legacy M&S tools is not sufficient for meeting emerging requirements, as they are inherently man-power intensive, require coding skills and are costly to upgrade and sustain. Therefore, a new approach is

FIGURE 1



MSAAS FRAMEWORK

Service-oriented simulations are designed to be modular, where individual functions or domains that are modeled in the simulation are built as individual parts that can be changed or mixed in different ways for the particular use case. (Graphic by the authors and USAASC)

necessary to develop and modify simulation capabilities more rapidly and with much less post-development integration re-engineering.

EMERGENCE OF M&S AS A SERVICE

In 2018, the NATO Science and Technology Organization's Modelling and Simulation Group introduced the M&S as a service (MSAAS) concept to enable more composable simulation environments that can be deployed and executed on-demand (NATO MSG-136 Report – MSAAS Concept and Reference Architecture Evaluation Report) (see Figure 1). Service oriented simulation is modularly designed, where functions or domains modeled in the simulation are built as individual parts that can be changed or mixed in different ways for the particular use case.

The MSAAS paradigm supports agile, rapid, tailor-made simulation solutions from a collection of pre-built and validated models and tools into a unified cloud-based simulation environment whenever the need arises.

MSAAS is intended to promote discovery, reusability and composability of M&S services by one key aspect, the use of modularized simulations. These tools can be easily tailored and composed for a specific use case, rather than relying on monolithic simulations that simply provide all the required simulation functionality or representation, and are slower and more expensive to modify. This approach enables executing each distributed simulation use case with fewer resources and data streams (for more details see, "A Necessary Paradigm Change to Enable Composable Cloud-based MS Services," by Andreas Tolk and Saurabh Mittal in the Proceedings of the 2014 Winter Simulation Conference).

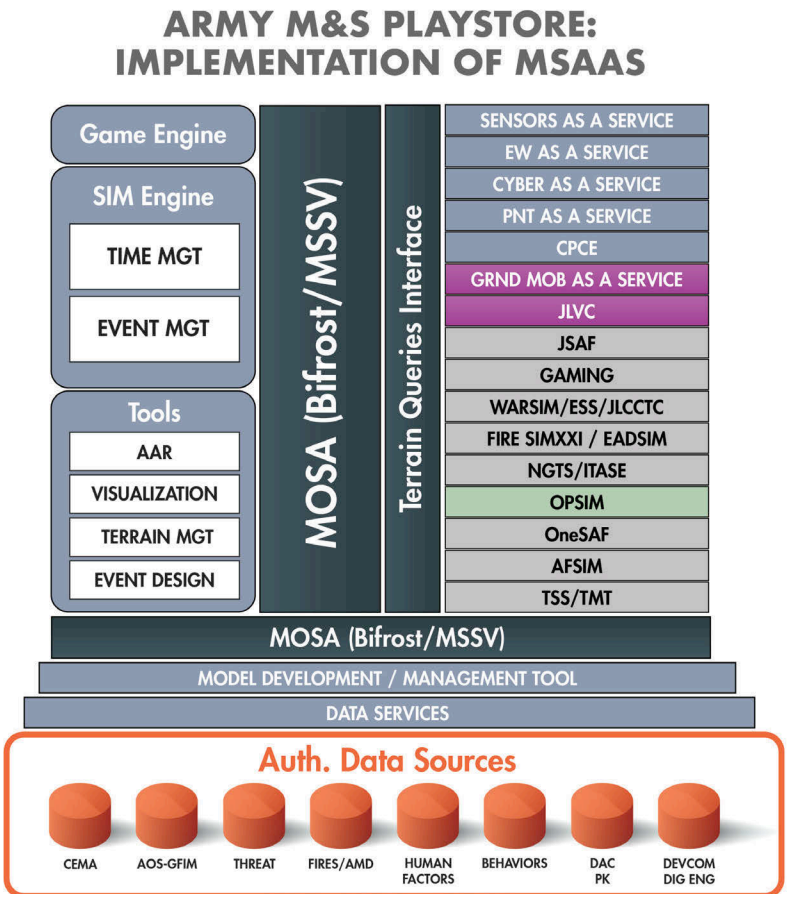
MSAAS offers an opportunity to better leverage new technologies and tools, plus create inherently interoperable capabilities faster through cooperative and coordinated research and development efforts. Open-source software development, which avoids the limitations of proprietary solutions, enables crowd-sourcing, which is more effective for innovations. This opens participation by smaller companies with new ideas. Open-source allows for many more experts and more cooperation for more frequent innovations. A good example is the development of the Linux operating system.

MIGRATION FOR ARMY MODERNIZATION

To achieve the required agility and cost limitations, migration from the current monolithic simulation paradigm to one of M&S services that support rapid simulation development is critical for Army modernization to keep pace. However, Army modernization cannot wait 10 to 15 years—the typical timeframe for building a new simulation environment—while the new MSAAS ecosystem is created from scratch.

Therefore, the proposed alternative approach is to integrate cloud-enabled services with existing simulations through a web-enabled interface to provide new modeling capabilities as they develop (see

FIGURE 2



DATA SHARING WITH EASE

The web-enabled interface will facilitate a service-oriented architecture that provides data sharing between the simulation and each service to provide the desired additional modeling or effect. (Graphic by the authors and USAASC)

FIGURE 2 KEY

AAR: After-action review

AFSIM: Advanced Framework for Simulation, Integration and Modeling

AOS: Army organization server

CPCE: Command Post Computing Environment

DAC PK: Data analysis center

DEVCOM DIG ENG— U.S. Army Combat Capabilities Development Command digital engineering

EADSIM: Extended air defense simulation

ESS: Entity-simulation service

EW: Electronic warfare

FIRES/AMD: Fires and air and missile defense

FIRE SIMXXI: Fire simulation

GFIM: Global Force Information Management

GRND MOB: Ground mobility

ITASE: Integrated threat analysis and simulation environment

JLCCTC: Joint Land Component Constructive Training Capability

JLVC: Joint live virtual constructive

JSAF: Joint Semi-Automated Forces

MOSA: Modular open-systems approach

NGTS: Next generation threat system

OneSAF: One Semi-Automated Forces

OPSIM: Officer planning and simulation model

PNT: Positioning, navigation and timing

SIM: Simulation

TMT: Training management tool

TSS: Training simulation software

WARSIM: Warfighters' simulation

THE HOLLYWOOD TOUCH

MSAAS is intended to promote discovery, reusability and composability of M&S services by one key aspect: The use of modularized simulations. Westefx, a Hollywood special effects company, and a team of Idaho Army National Guardsmen transform an M1097 HMMWV into a T-72 Main Battle Tank using a visual modification kit. (Photo courtesy of the Idaho National Guard)

Figure 2). The web-enabled interface will facilitate a service-oriented architecture that provides data sharing between the simulation and each service to provide the desired additional modeling or effect.

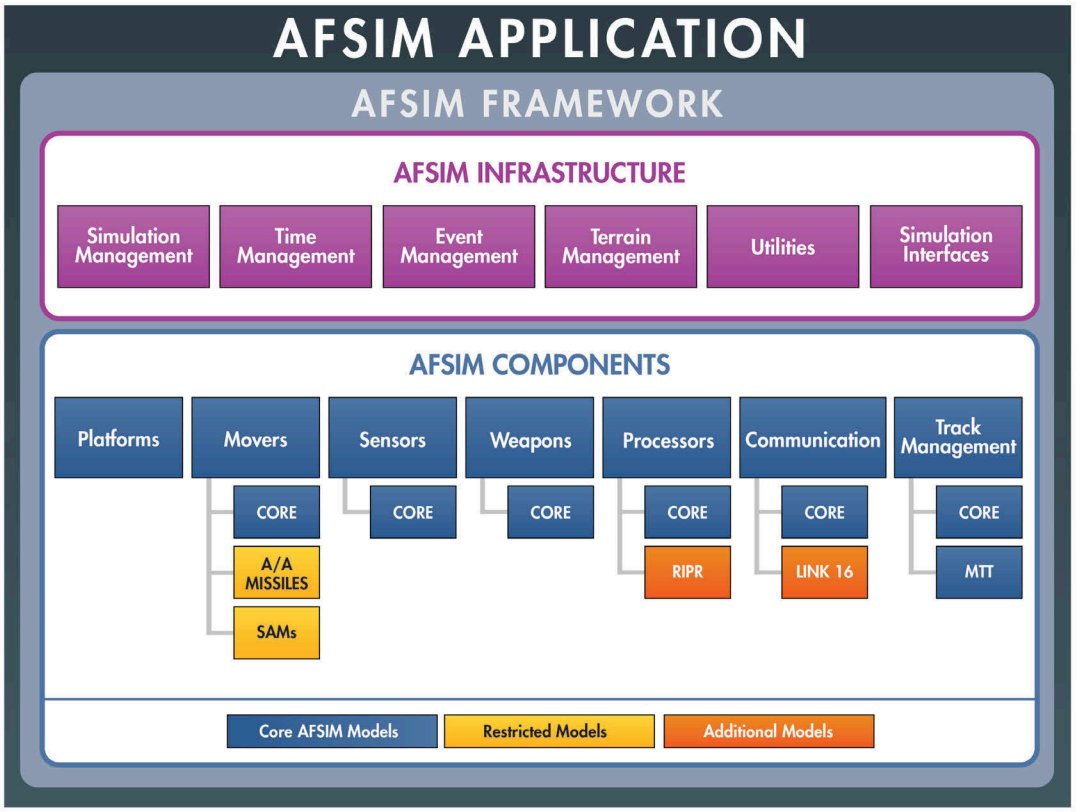
The Army Modeling and Simulation Office (AMSO) and the Army Geospatial Center (AGC) are cooperating to establish a rapid integrating environment called M&S Skunkworks, to support integration of M&S services already developed into a persistent simulation framework to test integration of new or updated services as they emerge from both government and industry partners with existing simulations.

The integration environment will include a cloud-enabled interface called Bifrost that permits simulations to share simulation state using modern commercial approaches and technology under an Army enterprise license. Bifrost will facilitate integrating M&S services as they develop into an ecosystem of current simulations, with access to cloud services for testing before employment in a live cloud service provider. Bifrost's web-enabled user interface can be used to control multiple sources of simulated entities (simulation agnostic), providing a common single user interface across multiple simulations.

NEED FOR A UNIFIED SIMULATION FRAMEWORK

An ideal scenario for developing future M&S capabilities would be a common modeling framework, in which newly developed technologies and tools from industry, academia and DOD laboratories can be integrated and tested, and then retain those technologies and tools in a persistent distributed modeling environment. AMSO views this approach as similar to the Apple App Store architecture, where applications are built to work on the Apple Mac operating system through specified interfaces. A new sharable synthetic environment can be developed gradually on an established common technical foundation. The advantage of this approach is that this new synthetic environment would provide needed capabilities faster as each tool or software is developed and

FIGURE 3



BETTER MODELING CAPABILITIES

AFSIM provides the ability to model the capabilities of the participants and to control the interaction of the participants as they move through space and time. (Graphic adapted by the authors from a paper on AFSIM from the Proceedings of the International Conference on Scientific Computing)

FIGURE 3 KEY

A/A: Air to air

AFSIM: The Advanced Framework for Simulation, Integration and Modeling

MTT: Multiservice tactics, techniques

RIPR: Releasable Internet Protocol Router

SAMs: Surface-to-air missiles

tested by scientists and developers; then validated by military operators. This new modeling framework would also enable sharing of investments (cooperative development, where different organizations build separate parts) and facilitate reuse.

Some modeling frameworks have emerged that offer an opportunity for sufficient composability, and to better leverage new technologies and tools, to create inherently interoperable capabilities faster through cooperative and coordinated research and development efforts. These modeling frameworks enable rapid scenario development with the ability to quickly build models of new systems and then play them in the scenario. One of the available modeling frameworks of particular interest to the needs of several AFC cross functional teams is the Advanced Framework for Simulation, Integration and Modeling (AFSIM) (see Figure 3), owned and managed by Air Force Research Laboratory, but shared across DOD and with industry partners.

SIMULATION TO SUSTAIN READINESS

Rather than relying on simulations that provide all the required functionality, but are slower and more expensive to modify, MSAAS tools can be tailored for a specific use case. Capt. Balazs Bene reviews a simulated plume model during Vibrant Response 20 Lite. (Photo by Mass Communication Specialist 2nd Class Michael H. Lehman, U.S. Navy)

The framework provides the ability to model the capabilities of the participants and to control the interaction of the participants as they move through space and time. The resulting simulations can be:

- Constructive and non-interactive (the user invokes the simulation, which then runs without further interaction), or interactive (the user or other simulation controls some aspects of the simulation).
- Non-real-time (faster or slower depending on the fidelity of the platform component models), or real-time (constrained by some multiple of a real-time clock).
- Event-stepped (simulations proceed according to processing of relevant events) or time-stepped (simulations proceed according to events occurring in succeeding time steps).

CONCLUSION

Modifying Army simulations for the rapidly changing operational environment and Army modernization focus areas are proving too slow and costly. Therefore, a new approach to composing simulation environments and scenarios is required. The emergence and promise of MSAAS necessitates migrating simulations

Army modernization cannot wait 10 to 15 years.

to this new paradigm. To move more quickly while new simulation frameworks are explored and tested for MSAAS, AMSO and AGC are partnering to establish an M&S enterprise skunkworks with a web-enabled interface to facilitate the introduction of new M&S services with existing simulations.

For more information on MSAAS go to: ***https://csiac.org/articles/a-new-reality-modelling-simulation-as-a-service/*** *or* ***https://nmsg.sto.nato.int/themes/msaas****, or read* ***https://apps.dtic.mil/sti/pdfs/AD1076559.pdf****.*

CHARLES SANDERS, Ph.D., Trideum Corporation, is a simulation systems architect for AMSO with more than 30 years of experience in M&S, organizational development, strategic policy and planning, training and learning concepts. He has provided technology innovation advice to Office of Secretary of Defense, Joint Chiefs of Staff, U.S. Navy Staff, Joint Forces Command and other executive-level government and industry organizations. He also led studies of emerging technologies for the M&S community, including cloud-based simulation and development of a persistent simulation test bed for coalition experimentation. He previously provided strategy and plans support for the initiation and development of the DOD Training Transformation program and DOD Advanced Distributed Learning Initiative. He holds a Ph.D. in organizational development with a focus on innovation from Regent University, an M.S. in information systems management from Syracuse University, and a B.S. in chemistry from The Catholic University of America. He is certified as a Navy nuclear propulsion engineer.

GENE DAVIS serves as AMSO's data standards and acquisition officer. Ongoing projects are AMSO's M&S force structure efforts (Army Organization Server, U.S. Forces integration and migration to the Global Forces Information Management environment, and M&S real world threat representation). He has over 15 years of experience in M&S, live-virtual-constructive integration and event support, and leading technology innovations regarding M&S data ingestion, with experience stemming from the Army National Simulation Center, U.S. Joint Forces Command J7, Joint Staff J7, and the Defense Modeling and Simulation Coordination Office. He holds a B.S. in pre-law and criminal justice from Seton Hall University.

CONNECTING THE ARMY.

WORKING FOR SOLDIERS.

DATA-DRIVEN DECISION-MAKING
BUSINESS SYSTEM CONVERGENCE
NETWORK MODERNIZATION
CYBER DOMINANCE

ENSURING SOLDIERS ARE THE MDO READY FORCE OF TOMORROW.

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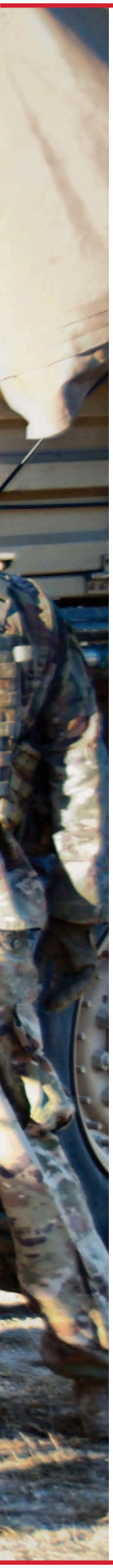
DATA ASSURANCE
JPEO A&A's new prototype Network-Assisted Assured Positioning, Navigation, and Timing capability provides automated worldwide distribution of an expanded set of assured position, navigation and timing hot-start data needed by precision-guided munitions. (Photo by Staff Sgt. Desmond Cassell)



CODE WORD FOR CAPABILITY

Precision-guided munitions fly to the sound of different GPS signals.

by Paul Manz and Thomas Blenk

On Oct. 12–14, 2021, the Joint Program Executive Office for Armaments and Ammunition's (JPEO A&A) Assured Precision Weapons and Munitions team and its partners successfully executed the first-ever network-assisted M-code GPS precision-guided munition live-fire developmental test at Yuma Proving Ground in conjunction with Project Convergence 2021.

Until recently, most precision-guided munitions used an encrypted GPS reference signal called P(Y)-code to help them accurately fly to and engage an enemy target. (P-code is precise code. P(Y)-code is encrypted code to protect against spoofing.) Now, after many decades of using P(Y)-code GPS signals, precision-guided munitions are migrating to a new, enhanced military GPS signal called M-code. M-code GPS has many benefits, including improved GPS jamming resistance, improved ability to determine enemy spoofing of GPS signals and enhanced cryptography for improved security.

OFF TO A HOT START

The ability to use any form of GPS, including M-code GPS, is based on the user or platform being able to "see" GPS, "hear" GPS and know what is being heard is "truth" in a timely manner.

Seeing GPS means the user or platform—in this case, a precision-guided munition—must have direct view of sufficient overhead GPS satellites to determine its location in simplistic terms of X, Y and Z coordinates. Sufficient GPS satellites mean a weapon or precision-guided munition must always see at least four GPS satellites, noting that seeing more than four satellites that are widespread across the sky results in even better positioning accuracy. The information (such as satellite location, timing and "health" information) from GPS satellites seen by the weapon can be used to hot-start the precision-guided munition. This pre-loaded hot-start information allows the precision-guided munition to more rapidly see and hear GPS signals after launch and help in determining if those signals are truth or spoofed signals.

While a precision-guided munition at the highest point of its flight usually has an unobstructed direct view of all GPS satellites in the sky from horizon to horizon (sometimes eight satellites or more), ground-based indirect-fire artillery and associated precision-guided munitions being fired may sometimes initially see less than the required minimum four GPS satellites. This could happen if the weapon is located in vertically-challenging terrain, such as a deep valley

IMPROVED CAPABILITES

Howitzers like this one can fire high-explosive precision-guided munitions that use M-code GPS signals that improve jamming resistance, ability to determine enemy spoofing of GPS signals and enhanced cryptography. (Photo by Staff Sgt. Desmond Cassell)

in mountainous terrain that masks a full view of the sky. Prior to the advent of a system-of-systems capability developed by JPEO A&A called Network-Assisted GPS, any weapon system seeing fewer than four GPS satellites would be deemed "not precision-guided munition capable" since it would then not be able to hot start the precision-guided munition with sufficient GPS satellite information.

Network-assisted GPS solves this "not precision-guided munition capable" problem by using an innovative system-of-systems solution to "pull" the needed GPS data for *all* the potential GPS satellites a weapon system should be seeing on that side of the Earth (i.e., as if its location were not terrain-masked and shooting from a "world is flat" position) and then hot-start the precision-guided munition with this same GPS information prior to launch. Once an artillery-based precision-guided munition is fired, it rises and clears terrain-masking features (e.g., flies out of the valley and above the ridgeline) and sees more and more GPS satellites. Once at least four GPS satellites come into view, the precision-guided munition starts navigating and is now able to complete its precision engagement on the target, even when the weapon position location couldn't see this minimum number of GPS satellites in the sky.

Network-assisted GPS is a fielded system-of-systems capability today for P(Y)-code based precision-guided munitions.

EXPANDED GUIDANCE

With the new enhanced M-code GPS signal being broadcast by the latest GPS satellites, the amount and specifics of hot start data is much different. A corresponding new updated capability called

NEW CODE

After decades of using P(Y)-code GPS signals, precision-guided munitions are migrating to a new, enhanced military GPS signal called M-code. (Photo by Spc. Zachary Burke, 55th Combat Camera)

Network-Assisted Assured Positioning, Navigation, and Timing (NA2) is being developed to provide this new M-code GPS satellite hot-start data to new M-code based precision-guided munitions.

JPEO A&A's new prototype NA2 capability provides automated worldwide distribution of an expanded set of assured positioning, navigation and timing (A-PNT) hot-start data needed by precision-guided munitions (such as M-code GPS information) and directly supports the top Army modernization imperatives under the auspices of the Army's A-PNT/Space Cross-Functional Team.

During the Project Convergence 2021-related M-code live-fire developmental test, four successful prototype M-code GPS Precision Guidance Kit (PGK) guide-to-hit fire missions were executed—two each with M777A2 and M109A7. M-Code GPS satellite hot-start data was provided by NA2. All four PGKs used this data to acquire and track the M-code GPS signals and guide to the intended target. These successes were verified using telemetry data captured in-flight.

CONCLUSION

This M-code live-fire developmental test has been subsequently documented in a recently issued final test report by JPEO A&A. The results of the M-code live-fire developmental test verified that hot-start M-code GPS satellite data can be digitally disseminated across the fires network to the weapon system which, in turn, use this data to execute precision-guided munition fire missions.

Hot-start information allows the precision-guided munition to more rapidly see and hear GPS signals after launch and help in determining if those signals are truth or spoofed signals.

This was the first-ever live-fire guide-to-hit demonstration using network-provided hot start M-code GPS satellite data to execute precision-guided munition fire missions. JPEO A&A's NA2 prototype system-of-systems capability enables warfighters to execute precision-guided munition fire missions in vertical-terrain-challenging and GPS-contested environments.

For more information, contact Becky Gilbert at JPEO A&A Public Affairs at ***rebecca.s.leonard3.ctr@army.mil****.*

PAUL MANZ serves as chief technology officer for JPEO A&A at Picatinny Arsenal. He is a Lean Six Sigma Black Belt, a senior member of the Institute of Electrical and Electronics Engineers (IEEE) and a recipient of the Ancient Order of Saint Barbara. He has been honored for his work by the National Defense Industrial Association, IEEE and DOD. To learn more about his work, including papers and patents, go to https://orcid.org/0000-0001-5644-9892. His work has appeared most recently in Army AL&T in the Spring 2017 issue. (See "Need a LFT?")

THOMAS BLENK serves as the director of Assured Precision Weapons and Munitions under JPEO A&A at Picatinny Arsenal. He has more than 10 years of navigation experience and made significant contributions to various precision-guided munition and weapon programs, and he is currently pursuing his doctorate in electrical engineering from Stevens Institute of Technology.

HANDLE WITH CARE
Image of the ReHeal Glove. (Photo by Muthu Wijesundara, Ph.D., University of Texas at Arlington Research Institute)

THE MAGIC GLOVE

MTEC gives traction to promising technology for healing Soldier injuries.

by Ramin A. Khalili

After more than two decades as a hand surgeon, Chris Allan was still looking for a solution—a way to solve a frustrating problem. Given that human hands require full, unobstructed motion to function properly, any major surgery on the area usually requires a lengthy and tedious rehabilitation process. Sure, wound care techniques like negative pressure wound therapy are effective, but usage on the hand occasionally comes with just as many drawbacks as benefits. Considering the sheer amount of major hand injuries in the U.S. alone—nearly four million per year, according to Allan—the need for something better was obvious and pressing.

"You do this long enough and you learn that the only way around the mountain is through the mountain," said Allan, who's since retired from clinical practice and now works as a researcher at the University of Washington in Seattle, Washington. "So we set off to begin burrowing our way through the mountain."

THE MAGIC GLOVE

All of that burrowing resulted in what is now the ReHeal Glove; a bioengineered glove designed to promote faster healing in surgically-repaired hands. Developed alongside colleague Muthu Wijesundara, Ph.D., a scientist at the University of Texas at Arlington Research Institute (UTARI), the glove is now being tested by the U.S. Army Medical Research and Development Command's (USAMRDC) Congressionally Directed Medical Research Programs. The military currently sees great promise in a tool with such an effective and portable profile—one with the capacity to help heal a variety of burns and other potential traumatic hand injuries. Indeed, research shows that, collectively, the hands and fingers were the second most common sites of non-battle injuries reported by service members during their deployments to Iraq or Afghanistan from 2003 to 2004; with hand injuries standing as the third most common injury requiring evacuation. According to the same research, 96 percent of those injured were Army Soldiers.

How exactly the ReHeal Glove got to where it is now—flush with funding and undergoing various rounds of testing—is largely the result of the Medical Technology Enterprise Consortium (MTEC), a nonprofit corporation that operates as the premier facilitator and collaborator across the entire DOD. Indeed, if it weren't for MTEC, the near decade-long effort to develop

PERFECT FIT
Muthu Wijesundara, Ph.D., is fitted with the ReHeal Glove during a laboratory session at the University of Texas at Arlington Research Institute (UTARI). (Photo courtesy of the UTARI)

the ReHeal Glove may have withered on the vine. Instead, it provides a promising medical option for millions.

A FLEXIBLE ARRANGEMENT

What makes the ReHeal Glove so unique—the reason it caught the eye of the MTEC team in the first place—is the (literal) flexibility it offers. Patients are able to move their fingers during treatment, a feature that Allan and Wijesundara say reduces the scarring that often results from current rehabilitation techniques that require near-complete immobilization of the hand. Further, the foam dressing used in standard negative wound-pressure therapy treatments—which renders the hand immobile under a vacuum—is eliminated in the glove; replaced instead by clear, flexible, textured silicone, permitting easy application and removal, wound assessment and full range of motion.

For both men, such forward thinking demanded a partner that was on the same page.

"Getting funding for this kind of cutting-edge work is not easy, but MTEC knows this area extremely well," said Wijesundara, who officially heads the Biomedical Technology Division at UTARI, in reference to the ReHeal Glove's development process. "Not only does MTEC serve an important role, but they understand the needs for prototype-to-product transition that nobody else wants to fund."

That explanation of the overall value of MTEC is probably as succinct as it gets; an organization dedicated to fostering collaborations that, in the end, result in moving projects forward. As a 501(c)(3) nonprofit entity, MTEC consists of more than 540 industry and academic organizations

committed to developing medical tools that better manage, prevent, diagnose, treat and rehabilitate a wide range of injuries.

MTEC's consortium-based approach is different from standard funding mechanisms in that it is designed to facilitate frequent interaction between military sponsors, academic institutions, nontraditional defense contractors and large businesses in order to determine exactly what the military is looking for in any particular product.

LET'S COLLABORATE

MTEC starts any collaborative effort by conducting outreach; first by scouting through relationships with industrial associations, medical accelerators and venture capital groups, as well as attending scientific conferences and military symposia and judging at company-pitch events—all of which are all instrumental in providing innovation that is ready to meet the military need. This outreach helps capture a large number of those nontraditional partners, thereby constantly bringing new ideas into the military ecosystem.

"In addition, MTEC membership helps innovators get connected with resource capabilities required for prototype maturation and, potentially, with large industrial members that may serve as teaming, co-development or even be potential acquisition partners one day," said Lauren Palestrini, director of research programs at MTEC. "MTEC has developed strong ties with USAMRDC since its inception in 2015, and our teaming and collaboration capabilities across both university and large and small business members helps our military sponsors access a dynamic, innovative ecosystem that is uniquely suited to encourage small startup companies developing technologies in the military medicine space."

UP TO THE TEST

The ReHeal Glove during a testing session. (Photo courtesy of the University of Washington)

The tool MTEC uses to get an up-close look at promising efforts is an other-transaction agreement, which is a special contracting mechanism that allows USAMRDC to move forward far more quickly along the contracting pathway than standard Federal Acquisition Regulation (FAR)-based contracts normally allow; a process that in turn increases the speed at which Soldiers receive innovative medical technology. The other-transaction agreement aims to set chosen projects in motion in mere months and allows for complex collaborations, made possible by the mechanism's reliance on nontraditional partners and built-in flexibility with regard to data rights and regulatory terms. Additionally, other-transaction agreements allow for more conversation and negotiation between DOD and the performer as compared with traditional FAR-based contracts. (In this context, "the performer" is the entity developing the prototype. MTEC members can partner with the performer for particular needs.)

With that kind of unique support infrastructure in place, MTEC is able to offer investigators a partnership in which, following review and approval of their funding request, they watch that very infrastructure actively work on their behalf; making connections, suggesting teaming arrangements and more.

"We then have competitive methodologies in place that can quickly solicit solutions to the government requirements," said Kathy Zolman, director of operations for MTEC, describing how the process works. "Then it's up to the individual performer—whether that's a university or a company—to propose their [scientific] milestones and associated timelines; and then once on award, we manage and track the project from there."

Said Palestrini, "I think it's one of the major benefits of the infrastructure that we've built that folks can bring a new technology forward and then have those interactions with the government and with MTEC to help them better refine or steer their technology into a direction that best fits the military need. And concurrently, that technology provider can pursue a broader civilian use case as well."

GAINING MOMENTUM

This is the terrain Allan and Wijesundara were attempting to navigate back in 2013 when they first began pooling their talents on the ReHeal Glove. Following their successful application for funding, MTEC funded the pair more than $200,000 (via a prototype-acceleration award) for additional prototype development, which—when combined with the $1 million the team was eventually awarded from Congressionally Directed Medical Research Programs (CDMRP)—catapulted the project

The hands and fingers were the second most common sites of non-battle injuries reported by service members.

into reality. For perspective, the MTEC prototype-acceleration award mechanism is instrumental in helping teams advance their prototypes toward their next major technical milestone, with the hopes that additional funding from another source will follow from there. According to MTEC, the award mechanism provides that "awardees may receive up to $250,000 to achieve a technical milestone(s) that helps them secure follow-on funding." Each prototype-acceleration awardee also receives tailored support from MTEC's staff and associated M-Corps—a network of subject matter experts and service providers—to address business, technical and regulatory challenges associated with medical product development. This support aims to advance the commercialization readiness of the MTEC technology portfolio for positioning and possible funding by MTEC's investor network.

"I was in an early meeting years ago discussing MTEC," said Wijesundara. "And I saw very quickly the opportunity that was available, what they had created—the attempt to get semi-mature technology into the hands of clinicians."

Those attempts have blossomed over the past several years. Since it became fully operational in January 2016, USAMRDC has awarded 176 different prototyping projects through MTEC with more than $640 million in government funding—along with an additional $87 million in cost share funds (which comes via either cash or another type of in-kind contribution by the performer). Currently, MTEC has more than 117 active awards; meaning the opportunity that Wijesundara saw all those years ago has made a similar impression across the larger academic and business worlds as well.

CONCLUSION

As it stands now, the ReHeal Glove is involved in an early feasibility study clinical trial with the U.S. Food and Drug Administration—a trial funded by CDMRP. The device will be tested on a range of individuals—so far, two healthy volunteers have been studied, with injured patients to follow later this year. Throughout this process, questions have been posed and answered, processes revised and physical changes made before even more testing takes place. This is the life cycle of this kind of technology.

But the promise of MTEC extends far beyond just the initial idea. Overall, more than 40 percent of MTEC's roster of successful projects have secured follow-on funding from either the government or the corporate sector that continues to invest in the prototype's advancement with the ultimate goal being to turn the device into a final, polished product.

"There are a lot of parties that are just now becoming familiar with MTEC," said Palestrini. "It's got this added benefit where everyone—investors, venture capital groups working through our expanded programs for commercialization, industry partners, the foundations we work with—can come into the mix to get a sense of what the government is funding for the military and then, also, what they can piggyback onto for a civilian use case."

Allan and Wijesundara are hoping for similar success. For Allan specifically, the ReHeal Glove would be the answer to a problem he's been trying to tackle for his entire career.

"I used to wish for a device like this," said Allan, firm in his belief the ReHeal Glove could lead to a dramatic improvement in outcomes across the board—including quicker recovery times. "We expect that it's going to fill a gap that I've observed—and also that my colleagues have observed—over the past 20 years."

*For more information about USAMRDC, go to **https://mrdc.amedd.army.mil/**. To learn more about MTEC, go to **https://www.mtec-sc.org**. To see a video about the ReHeal Glove go to **https://www.youtube.com/watch?v=N2na9dsvNLY**. To learn more about the consortium model, go to **https://asc.army.mil/web/news-not-far-at-all/**.*

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GAINING GROUND

A culmination of efforts brings the Army one step closer to delivering PRSM to the warfighter.

by Kinsey Lindstrom

DESIGN DISCUSSIONS

Industry teammates discuss the forward sabot design and fabrication. The sabots aid in keeping the missile aligned as it exits the launch pod. From left, Michael Sweeney and Aaron Sosa, Lockheed Martin, Dallas, manufacturing engineers, and Lockheed Martin production planning and control manager Derek Jones. (Photo courtesy of Lockheed Martin)

In the last two years, the U.S. Army's Precision Strike Missile (PRSM) program successfully accomplished numerous flight tests, pushing the next-generation munition to the edge of its range and proving its long-range capability. And while PRSM has been testing its limits in the sky, the Army has been simultaneously conducting critical, on-the-ground system qualification tests and manufacturing-readiness assessments.

Addressing the Army's top modernization priority, long-range precision fires, PRSM is the Army's new surface-to-surface missile that replaces and improves upon the Army Tactical Missile System's capabilities. The new missile will defeat threat air defense, missile launchers, command-and-control centers, assembly and staging areas, and high-payoff targets at all possible depths of the multidomain battlefield. By 2023, the Army will deliver the first lot of PRSM missiles to the warfighter.

To replace the legacy munition, the PRSM program requires the Army to design, build and produce this new technology from the ground up. However, before PRSM can be delivered to the Soldier, the manufacturing facilities must undergo scrupulous reviews to ensure missile assembly and production are ready for operation.

In early March, the U.S. Army Strategic and Operational Rockets and Missiles (STORM) Project Office and Defense Contract Management Agency conducted the final PRSM enhanced-technology maturation-and-risk-reduction manufacturing-readiness assessment at the Lockheed Martin production facility in Camden, Arkansas. The manufacturing-readiness assessment defines the current level of manufacturing maturity, identifies any shortfalls and associated costs and risks, and provides a basis for management of manufacturing-maturation planning of the program.

GROUND-LEVEL TEAMWORK

That March system manufacturing-readiness assessment was a culmination of a yearlong team effort between the STORM Project Office and the prime contractor. The manufacturing-readiness assessment team reviewed objective evidence in support of a Manufacturing-Readiness Level 7, which identifies the capability to produce the PRSM systems, subsystems and components in a production-representative environment.

To achieve that level, the production facility demonstrated how it will operate, not only when assembling prototypes but also during production of the actual fielded tactical missiles. The team discussed manufacturing planning early, while ensuring the necessary resources will be in place to support future production needs of the program. Some of the manufacturing-readiness areas included technology and industrial base, design, cost and funding, materials, process capability and controls, quality management, workforce, and facilities and manufacturing management.

TESTING THE LIMITS
The next-generation PRSM launches from the HIMARS during the U.S. Army's fourth consecutive flight test on May 12, 2021, in a 400-kilometer demonstration at White Sands Missile Range (WSMR), New Mexico. (Photo courtesy of WSMR)

"The event proved to be a critical asset to the ongoing success of PRSM production, providing an early opportunity to address manufacturing risks as well as planning appropriate mitigation steps," said Linda Fechner of the assessment. Fechner is the STORM PRSM production lead engineer who spearheaded the manufacturing-readiness assessment efforts. "The team was able to define the current level of manufacturing maturity, identify roadblocks and provide a basis for maturing the overall manufacturing of the PRSM system."

INVESTIGATING THE INNER WORKINGS

Jay Cossentine, STORM Precision Strike Missile systems engineer, investigates the inner workings of the missile Control Actuation System while visiting the PRSM assembly facility. (Photo courtesy of Lockheed Martin)

The team also identified action items and developed a maturation plan to address any anticipated manufacturing challenges and ways to overcome those potential obstacles. That plan is currently in motion and will continue to be monitored to closure throughout the program's progression, ensuring future production needs are in place and on schedule.

Leading up to the March manufacturing-readiness assessment event, the Army and contractor teams conducted 10 pilot-line validations as well as seven manufacturing-readiness assessments with the major PRSM subcontractors. A pilot line is a pre-production assembly line that produces a small volume of new technology to help test out the product's capability to perform in its final operating environment. The pilot-line validations verified subcontractor pilot production lines for PRSM subassemblies such as the warhead, rocket motor and guidance set. The subcontractors demonstrated that their pilot production lines were equipped, confirming they could build production-representative qualification hardware. The team conducted the manufacturing-readiness assessments to review objective evidence in support of a more rigorous Manufacturing Readiness Level 8 event.

The higher manufacturing-level criteria require demonstration of the pilot line capability to prove it is ready for low-rate initial production of the PRSM missile. These criteria will be fully assessed in the

By 2023, the Army will deliver the first lot of PRSM missiles to the warfighter.

ON CLOSER INSPECTION

During the Camden Launcher Integration Center facility tour, Craig Bergquist, Precision Strike Missile product director for the STORM Project Office, takes a closer look at the aft section of the missile, where the fins that help steer the missile will later be installed. Pictured with Bergquist, from left, are Jay Cossentine from the STORM Project Office, Gene Lotta from the Defense Contract Management Agency, and Derek Jones, Lockheed Martin production planning and control manager. (Photo courtesy of Lockheed Martin)

upcoming engineering and manufacturing development phase of the program. Some of the biggest hurdles toward achieving that level are validating all pilot production lines for Lockheed Martin and their subcontractors as well as completing qualification testing. Another criteria for Manufacturing Readiness Level 8 is achieving all system-level qualification testing to demonstrate a Technology Readiness Level 8.

During the final manufacturing-readiness assessment, the team toured the Lockheed Martin Camden Launcher Integration Center, as well as the new long-range fires production building. The PRSM missile container, known as the enclosure-assembly launch pod, will be built at the integration center along with future PRSM missile assembly. The facility is structured as an open and modular floor plan to support future process design and product development.

"The Army is one step closer to delivering PRSM to the warfighter," said Craig Bergquist, PRSM product director for the STORM Project Office. "The opportunity to visit the facility where PRSM final missile assembly will take place is a culmination of the incredible efforts being accomplished across the Army and among our industry partners."

SHIFTING FOCUS

With the enhanced-technology maturation-and-risk-reduction manufacturing-readiness assessment now complete, the Army is currently working to complete objectives for the PRSM engineering and manufacturing development contract and Early Operational Capability 1 effort, which will include system qualification and manufacturing readiness activities culminating in a fully qualified system. The fast-tracked PRSM program is shifting its focus from subassembly qualification to missile assembly qualification.

"PRSM has accelerated activities typically reserved for the [engineering and manufacturing development] phase into the [enhanced-technology maturation risk-reduction] phase in support of fielding the missile to the Soldier in [fiscal year] '23," said Fechner. "Since the timeframe to qualify and field PRSM is so condensed, it is crucial that the Army assesses manufacturing readiness early to ensure a successful transition from development to production and fielding."

The PRSM manufacturing assessments will continue during engineering and manufacturing development, preparing the program for the next hybrid acquisition phase, Milestone C and full-rate production. The engineering and manufacturing development assessments will have a Manufacturing-Readiness Level 8 requirement to demonstrate the prime contractor and subcontractors' pilot-line capabilities and prove their readiness to begin early operational capability production.

Before moving into Milestone C and full-rate production, engineering and manufacturing development production-representative missiles will be built and tested to finalize

TOUR DU JOUR
Alvin Gracie, center left, engineering production division chief for the U.S. Army STORM Project Office, tours the Lockheed Martin Camden Launcher Integration Center and the new long-range precision fires building with his teammates, gaining a hands-on perspective of the PRSM missile assembly and final production. Also pictured are Jay Cossentine and Linda Fechner. (Photo courtesy of Lockheed Martin)

PRSM's design. The Army is planning for those missiles to be the same design configuration as the first lot of early operational capability munitions that will be first delivered and fielded to the warfighter.

PRSM is slated to fly again in 2023 during the engineering and manufacturing development production qualification test series. These flight tests will fully qualify the system and confirm that the design meets required performance and technical specifications. The tests will also verify both the M142 High Mobility Artillery Rocket System and M270A2 Multiple Launch Rocket System capabilities to launch PRSM.

CONCLUSION

"Test like you fly" is a well-known principal that emphasizes the importance of ground testing and simulation and how these objectives should accurately reflect the program's long-term goals. As part of the Army's No. 1 tactical modernization priority of long-range precision fires, the PRSM program is doing just that, proving out its success both on the ground and in the air.

The program's incremental successes, though, are only achieved through a diverse team made up of dedicated Army leadership and user groups, software and mechanical engineers, acquisition and cost analysts, and a broad range of other collaborative teammates from within the Army and among industry partners. Military, civilian and contractor personnel are developing this cutting-edge technology and rapidly equipping the Soldier for the joint all-domain battlefield.

For more information, go to ***https://www.msl.army.mil/Pages/STORM/default.html****.*

"The team was able to define the current level of manufacturing maturity, identify roadblocks and provide a basis for maturing the overall manufacturing of the PRSM system."

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SEW FORTH
Quincy Pearce, textile production worker, stitches a neck dam at one of the sewing stations. (Photo by Rachel Selby, Pine Bluff Arsenal Public Affairs)

A CUT ABOVE THE REST

Pine Bluff Arsenal helps to produce the Army's finest "soft wear."

by Rachel C. Selby and Justin Lieber

Imagine you a have a mission so critical and specialized that only a small percentage of Soldiers are authorized to support it. Even though the specialized equipment needed to support these missions is equally as important as the Soldiers donning it, it is just not needed in the same mass quantities as standard issue gear and, thus, not as lucrative for private sector manufacturers to produce because there is no economy of scale to maximize profit. This has historically been the case with individual chemical and biological protective gear. In some instances, the services have waited years for backorders to be fulfilled, until the requested quantities built enough to justify commercial interest. When the commercial supply chain is not capable of providing what the warfighter needs, the organic industrial base—in this case, Pine Bluff Arsenal—is here, ready to support DOD demand.

Dustin T. Green said that domestic production of textile items for niche, low-density sustainment demands can be a challenge. Green is deputy product support manager for the Joint Project Manager for Chemical, Biological, Radiological and Nuclear Protection (JPM CBRN Protection).

"Oftentimes, the production profile during the acquisition phase results in very high peaks and long valleys where no replacement or surge capabilities exist for extended periods," said Green. "Production capabilities must then be re-established with an extended learning curve needed for skilled labor with high potential for initial quality issues." In other words, sporadic demand for these items prevents industry from consistently planning production, keeping lines running or employees training, which equates to higher costs.

Green said that, through the textile-production initiative at Pine Bluff, JPM CBRN Protection assisted in establishing a facility that could maintain low rates of production on a variety of similar textiles products. "This flexible manufacturing concept retains manufacturing expertise and low-volume capability that can be used to maintain material supply chains and provide limited quantities while commercial

industry establishes or ramps up production to meet larger volume requirements," he said. "At the end of the day, the goal is not necessarily about buying items. It's about buying readiness and capability to maintain it."

ROOTS

Pine Bluff Arsenal—a government-owned, government-operated installation—is the only active Army installation in the state of Arkansas, established in 1941 by the War Department (now DOD) to manufacture and assemble incendiary munitions to support WWII efforts.

Pine Bluff reports to Joint Munitions Command, the logistics integrator for lifecycle management of ammunition and is a major subordinate command of Army Materiel Command (AMC).

The genesis for textile manufacturing at Pine Bluff began with recurring issues at the Joint Project Manager for CBRN Protection. At that time, no manufacturing capability existed within the government for the low- and full-rate production of CBRN textiles. A few of the chemical- and biological-based textile commodities within JPM CBRN Protection's portfolio had very low demand from the joint services, and the existing manufacturers of those commodities no longer found it financially viable to maintain their production lines.

In order to mitigate perpetual back-order status, the program manager asked whether Pine Bluff would be interested in establishing textile manufacturing capabilities to produce these low-requirement commodities.

In October 2015, the initial groundwork and research began for finding industrial sewing training sources for the arsenal's workforce, including the University of Arkansas at Pine Bluff's Department of Human Sciences - Merchandising, Textiles and Design, as well as various academic institutes and industrial operations within the state.

The first textile item produced at Pine Bluff was the neck dam, which is a garment made with a carbon-impregnated fabric that provides protection against CBRN contaminants, and issued to wearers of face seal-type masks to increase protection at the mask-garment interface. These items are used with the Joint Protective Aircrew Ensemble, which is a lightweight, chem-bio-protective coverall that resembles a standard flight suit.

In the years following the initial start up, DOD has invested significant time and resources at Pine Bluff to improve the textile manufacturing processes there. JPM CBRN Protection worked with Pine Bluff and experts in textile design and manufacturing from the Naval Clothing and Textiles Research Facility and the U.S. Army Combat Capabilities Development Command (DEVCOM) Soldier Center

PINE BLUFF

Established in the early days of World War II, Pine Bluff Arsenal has evolved over the years, and an article in Army AL&T spurred a new phase in the installation's history.

UNDER WRAPS

The underside of a Chemical Protective Patient Wrap is shown during production. (Photo by Hugh Morgan, Pine Bluff Arsenal)

WRAPPING THINGS UP
Julee Johnson, production leader on Pine Bluff Arsenal's textile line, works on seam sealing a Chemical Protective Patient Wrap. (Photo by Rachel Selby, Pine Bluff Arsenal Public Affairs)

to set up and optimize the facility and add items to Pine Bluff's production portfolio.

NETWORKING

After discovering the article "Thread Level Green" in the September 2020 issue of Army AL&T magazine, Pine Bluff realized the need to open its aperture to include other textiles not part of the CBRN family. Since the infrastructure was already in place, Pine Bluff could simply scale its existing model to include commodities from the Program Executive Office (PEO) for Soldier. Pine Bluff cold-called all the authors of the article and started a dialogue to make sure they were aware of these new capabilities, and thus a new working relationship was born. They were unaware of the work Pine Bluff had done to support CBRN textiles and were eager to learn more about what could be done to support their portfolio.

In April 2022, Pine Bluff Arsenal was designated by the Department of the Army as a Center for Industrial and Technical Excellence (CITE) for Textile Manufacturing, per 10 U.S.C. 2474. This is the Arsenal's third CITE designation, having received designations for Chemical and Biological Defense Equipment in 2005, and Smoke Ammunition in 2017. Pine Bluff is the only installation within Joint Munitions Command to have three CITE designations.

The Army uses CITE designations to recognize the unique capabilities of an Army depot-level activity or military arsenal facility as a mechanism to align workload to the appropriate maintenance and manufacturing facilities.

And, as an Army Working Capital Fund (AWCF) site, Pine Bluff receives effectively zero dollars in appropriated funding. The 13,500 acre "city" is sustained through directly funded production projects. The more meaningful workload Pine Bluff can acquire, the more solvent it is. As most textiles use similar equipment to produce, there are little to no start-up equipment costs with exploring and establishing new workload.

STATE OF THE ART

Current textile manufacturing operations at Pine Bluff occupy approximately 8,000 square feet of industrial space. The space uses the latest in textile technology, including a Gerber Paragon automated high-ply cutting system using the industrial

PINE BLUFF STUFF

Some new textile items have recently been added to Pine Bluff's portfolio as the result of the PEO Soldier connection, including the Improved Ghillie System (IGS) and the Army Physical Fitness Uniform-Maternity.

Other CBRN products produced at Pine Bluff include:

- Chemical Protective Patient Wrap, a carbon-impregnated textile, which provides a way to safely transport wounded Soldiers in chemical-biological compromised environments. Pine Bluff entered into an interagency service agreement with the U.S. Army Medical Materiel Development Activity to produce this item.
- Integrated Footwear System, a sock and liner system worn under normal combat footwear to provide chem-bio protection to the foot. It is issued as a component of the Joint Service Lightweight Integrated Suit Technology or JSLIST, and the Joint Protective Aircrew Ensemble to meet chem-bio footwear protection requirements of the U.S. Navy and U.S. Marine Corps Aviation and U.S. Special Operations Command, and requires Gore Certification to produce.
- Cloth face coverings, non-medical personal protective equipment used to provide protection during the COVID-19 pandemic. Approximately 78,000 were produced for AMC's civilian population. This effort was highlighted in the Winter 2020 edition of Army AL&T.

MADE FOR MATERNITY
The Army Physical Fitness Uniform-Maternity is one of the new textile items recently added to Pine Bluff's portfolio as the result of the PEO Soldier connection. (Photo by Rachel Selby, Pine Bluff Arsenal Public Affairs)

standard AccuMark pattern design software, advanced seam-sealing equipment and new embroidering equipment with the ability to sew six digital patterns simultaneously. Staffing includes 14 trained operators with nearly 250 years of combined sewing experience, and three trained quality control specialists. These are exactly the types of equipment and processes needed to ensure the design of new textile products are ready for full-rate production.

Donna Cox, a senior systems engineer in the Product Manager for Soldier Clothing and Individual Equipment/Soldier Survivability (PM SCIE), said that a relationship with the arsenal was established to produce initial field assets for the Improved Ghillie System (IGS). The IGS is a new and improved sniper concealment system that is replacing the legacy Flame Resistant Ghillie Suit, which focused on flame-resistant capabilities at the expense of concealment capabilities, and ultimately did not fulfill the sniper's needs. As a result, the user redefined and validated new requirements and the team began development of the new IGS.

Pine Bluff "has already provided a mock-up design for PM SCIE and will provide product demonstration models in the coming months. After that, Pine Bluff Arsenal will provide the initial operational quantities of both the IGS kit and the optional items to PM SCIE for fielding to the sniper schools," Cox said. The new ghillie suit kit consists of a jacket, hood, leg drape, head drape and jute yarn. The additional optional authorized items include the ghillie hat, skid plate and equipment drape.

VALUE ADDED

According to Cox, the arsenal will also assist in refining the patterns, optimizing manufacturing and documenting the

DAM GOOD PROTECTION

The neck dam is a garment made with a carbon-impregnated fabric that provides protection against CBRN contaminants, and issued to wearers of face seal-type masks to increase protection at the mask-garment interface. (Photo by Rachel Selby, Pine Bluff Arsenal Public Affairs)

manufacturing process. This information is critical to the completion of the new ghillie suit's purchasing description and technical data package. Defense Logistics Agency (DLA) Troop Support is the primary inventory control activity for all consumable products, so once these items transition to sustainment, DLA Troop Support is responsible for sourcing and supplying them to the warfighter.

The new ghillie suit is more comfortable, less bulky and weighs less than five pounds. It is made of breathable materials and mesh. The system is modular, allowing the user to use some or all system components. This improved system now provides snipers, spotters and scouts with the capability to remain concealed during missions and go undetected when in close proximity of enemy forces.

Additionally, the need for the Army Physical Fitness Uniform-Maternity was identified in June 2020, at the 151st Army Uniform Board. According to Lester Smith, assistant PM with PM SCIE, the organization was directed by the Army Uniform Board to develop a maternity fitness uniform based on the current pattern and look of the unisex Army's physical fitness uniform. Pine Bluff was asked to codify the evolving designs and to survey the user community for important feedback into various fit factors, such as comfort and maneuverability.

"From 2020 to 2022, PM SCIE and DEVCOM Soldier Center, worked to develop the [Army Physical Fitness Uniform-Maternity] through wear trials with pregnant Soldiers in the Army. Upon completion of the wear trials, an organic, in-house solution

INDUSTRY PARTNERS

In 2019, Pine Bluff entered into a public-private partnership with ReadyOne Industries, an AbilityOne contractor. The agreement focused on the production of the Joint Service Lightweight Integrated Suit Technology, which is a two-piece suit that provides 45 consecutive days' worth of CBRN protection. The partnership enables ReadyOne to use Pine Bluff as a subcontractor in the production of the suit. ReadyOne has approximately 18 personnel working in a leased facility on the installation. Pine Bluff cuts and delivers the fabric, ReadyOne sews and produces the suit and Pine Bluff performs the final packaging.

In March 2022, Pine Bluff signed a memorandum of agreement with the DEVCOM Soldier Center. This agreement will ensure that Pine Bluff stays engaged with the center's world-class scientists, engineers and equipment designers to leverage their expertise into the production of all current and future textiles, as well as staying well informed with the new textile products being developed and routed through the acquisition lifecycle. As these products are being developed, understanding how they will be produced in a full-rate manufacturing environment is often a misunderstood challenge. Pine Bluff hopes to assist in building manufacturability elements into all stages of product design.

A STEP AHEAD
The Integrated Footwear System is a sock and liner system worn under normal combat footwear to provide chemical and biological protection to the foot. (Photo by Rachel Selby, Pine Bluff Arsenal Public Affairs)

for the cut and sew was found at the Pine Bluff Arsenal [PBA]," said Smith. "The benefit of having PBA do the cut and sew was two-part. Agreements between PBA and SCIE didn't require in-depth contracts and funding was upfront and transparent."

Smith said that the new uniform's "pattern verification is wrapping up and will be moving into production for the maternity pilot program, sponsored by the Defense Logistics Agency." As feedback is provided from the users, Pine Bluff will work with the DEVCOM Soldier Center to modify the patterns and designs to cement a final design and technical package.

CONCLUSION

Pine Bluff is provisioned to retain the critical manufacturing capabilities necessary to meet unique needs of the Army relating to enduring and future warfighter requirements, specifically in the areas of illuminating, infrared and phosphorus munitions as well as chemical biological defense equipment.

Pine Bluff's multiple CITE designations will enable the Army to identify, shape and sustain its organic industrial operations as a modern, cost effective and highly responsive enterprise, consistent with the Army's industrial base strategic plan. The aim of the CITE designation is to maintain the necessary resources and competencies that sustain life-cycle readiness of weapon systems and equipment while also maintaining the capability to surge to meet the demands of future contingency operations. The CITE also allows for the associated installation to serve as a recognized leader in its core competencies throughout DOD.

"We have room to grow, and have identified an additional building that is over four times the size of our current operations," said Roch Byrne, arsenal deputy to the commander. "With minimal investment, we can continue to bolster domestic textile and PPE manufacturing within the organic industrial base and provide value to our nation's warfighter." With AMC's emphasis on organic industrial base modernization, Pine Bluff will continue to invest and improve textile manufacturing capabilities to meet the demands of the future.

For more information go to: ***https://www.pba.army.mil/*** *or contact Justin Lieber at* ***justin.j.lieber.civ@army.mil****.*

RACHEL C. SELBY is a public affairs specialist at Pine Bluff Arsenal. She is also the editor of the Arsenal Sentinel, PBA's monthly newsletter. She has been with the arsenal since 2002, first working in the public affairs office as a contractor with General Physics Corporation. In 2013, she received second place in the printed publication category in the U.S. Army Materiel Command's David G. Harris competition, and in 2020 she received a first place in the same category. She has an M.A. in journalism from the University of Arkansas at Little Rock and a B.A. in communications with an emphasis in journalism from Drury University.

JUSTIN LIEBER is the division chief of operations and business development at Pine Bluff Arsenal. His office is responsible for the day-to-day operations of the arsenal as well as managing the functions of business development and public private partnerships. His knowledge is focused on commodities associated with chemical and biological defense equipment, including textile manufacturing and collective and individual protection and decontamination. He graduated from the University of Arkansas at Little Rock where he earned a bachelor's in system engineering, mechanical systems. He is Level III certified in systems engineering, and is an accredited Project Management Professional and Agile Certified Practitioner from the Project Management Institute.

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ARMY COMMENCES FINANCIAL STATEMENT AUDIT

The foreign military sales program begins its first-ever full financial statement audit.

by Curt Bartlett

The first-ever financial audit of the foreign military sales business practices and processes—the most sweeping official external full-scope financial statement audit ever performed on the security assistance account trust fund—has begun.

On February 17, the Office of the Deputy Assistant Secretary of the Army for Defense Exports and Cooperation (DASA(DE&C)) commenced the Security Assistance Account Full Financial Statement Audit across all organizations in the Army security assistance enterprise, having been notified in 2018 of the upcoming requirement to examine the foreign military sales (FMS) trust fund. The security assistance account—which falls under U.S. Code Title 22—has existed for over 50 years. This account currently has more than 6,500 active FMS cases being managed by the Army security assistance enterprise and is valued at over $210 billion in support of 150 international customers.

The Defense Security Cooperation Agency will facilitate this DOD-wide audit engagement being conducted by an independent public accountant. The two main goals for this audit are to express an opinion on whether the enterprise's financial statements are in accordance with U.S. generally accepted accounting principles and to report on internal controls related to financial reporting.

WHY AUDIT

The security assistance account trust fund is required to undergo a full financial statement audit in fiscal year 2022 by law. Ulysses Rhodes, the DASA(DE&C) policy, resources and audit director, is responsible for oversight of the Army's portion of the financial audit. He describes the audit cycle as "consisting of various steps needed to go from audit readiness, to audit, and then into the sustainment phase."

Rhodes notes that the audit is not going away—it will remain an annual requirement even in the event of an unmodified opinion (i.e., financial statements are presented fairly). "We go through all of this effort to show our foreign national partners that we are accountable for things being done correctly. Successful audits will establish the transparency our foreign partners desire, give them visibility on their programs, and demonstrate to them that they can trust us with managing their money," Rhodes said.

ROAD TO AUDIT

To prepare for the audit, during the past three years the Army security assistance enterprise underwent an extensive business process standardization documentation effort. This effort involved providing stakeholders with effective policies, guidance and support to execute effective business processes, best practices and internal controls. The Army security assistance enterprise

THE BEST DEFENSE

Brig. Gen. Douglas Lowrey, then-commander of U.S. Army Security Assistance Command (USASAC), and his staff watch a virtual training session at a key leader engagement with the Colombian army at the Canton Norte base in Bogota, Colombia on April 8, 2021. (Photos by Richard Bumgardner, USASAC)

performed gap analysis by going through steps to identify what financial reporting risks exist and if the current controls properly mitigate those risks. Ultimately, the business process standardization work minimizes risk by allowing the enterprise to identify and address findings early in the process, rather than waiting until the end of the audit.

DASA(DE&C) also established several support mechanisms to respond to audit requests:

- Leveraged the audit documentation and results from other audits to respond to audit requests for the security assistance account audit.
- Provided resources and plans for audit support across the Army security assistance enterprise to support security assistance account financial audit activities.
- Developed standard operating procedures for audit response and reference documents to support Army security assistance enterprise entities in gathering documentation to respond to audit samples.

AUDIT ACCOMPLISHMENTS

During the past three years of preparations, the Army completed several key audit readiness accomplishments:

- Documented and signed eight business processes into policy, ensuring documentation is ready for the audit.
- Identified several internal control deficiencies which will result in no unexpected findings from the independent public accountant.
- Incorporated robotics process automation within the business process documentation efforts to reduce manual processing and rework.
- Enhanced the Army Process portal, which provides access to the latest business process documentation. The portal, which is accessible to all Soldiers, civilians and contractors with a Common Access Card, allows users to access data that helps the Army move toward a culture of audit success.
- Established an Army security assistance account audit support infrastructure to coordinate and manage audit activities for the Army security assistance enterprise.

"We go through all of this effort to show our foreign national partners that we are accountable for things being done correctly."

SITE SEEING

Command Sgt. Maj. Sean Rice, senior enlisted advisor at U.S. Army Security Assistance Command, left, talks with Soldiers assigned to the aviation maintenance unit of the Colombian army base in Tolemaida, Colombia on April 6, 2021. Rice joined Brig. Gen. Douglas Lowrey and his staff as they visited several sites to see the impact of U.S. security assistance and foreign military sales.

STRIVING FOR AUDIT IMPROVEMENT

During the same period, the Army's preparation team identified some areas for improvement essential for auditability:

- Establish an auditable universe of transactions—consisting of multiple organizations and business processes which allow the Army to verify beginning balances and open obligations—by confirming the completeness and availability of Army data before starting the full financial statement audit, thereby enhancing knowledge of internal controls and risk mitigation for those business processes.
- Improve accounting policies including those for property, equipment and inventory by implementing key internal controls.
- Enhance information technology and system controls.
- Institute proper accounting system posting logic for initiating and recording transactions across the numerous accounting and feeder systems where most transactions originate.

Addressing these improvement areas will allow the Army security assistance enterprise to be auditable with the goal of obtaining an audit opinion on security assistance account financial statements by the year 2030. The independent public accountant will provide an audit opinion on whether the Army's financial statements are fairly presented in accordance with the U.S. generally accepted accounting principles. Between now and 2030, the Army will continue to implement internal controls.

CONCLUSION

Acknowledging the challenges that an audit brings, Rhodes emphasized that "the Army security assistance enterprise is prepared to answer the challenge of this full financial statement audit. At DASA(DE&C), we are extremely grateful for all the extra effort that the Army organizations and our partners are doing for the audit."

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

CURT BARTLETT works in the Policy, Resources and Audit Directorate as senior audit advisor and principal audit readiness officer for DASA(DE&C) and the Army security assistance enterprise. He serves as an active member on the Defense Security Cooperation Agency Senior Executive Steering Committee and Audit Remediation board. Bartlett has a Juris Doctor from the University of Houston Law Center and a Master of Public Policy from the University of Chicago. He is a certified public accountant and a Certified Defense Financial Manager.

Ultimately, the business process standardization work minimizes risk by allowing the enterprise to identify and address findings early in the process, rather than waiting until the end of the audit.

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ARMY AL&T

MARK SHAEFFER

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

TITLE: Program support specialist

YEARS OF SERVICE IN WORKFORCE: 12

DAWIA CERTIFICATIONS: Level III in program management

EDUCATION: B.A. in history, University of Richmond

AWARDS: U.S. Army Achievement Medal for Civilian Service (2019)

KEEPING IT REAL

Whether it's on the job or in daily life, we all, at one time or another, find ourselves in a situation where a decision needs to be made and we react accordingly. But it's *how* we react that will determine the best—or worst—outcome.

Mark Shaeffer has found this to be true on many occasions and one of the most important lessons he's learned during the course of his career is that what may appear to be "reality" in some circumstances, is not always the case. He said when determining what has just taken place—in any given circumstance—people don't always consider all contributing factors and typically jump to immediate conclusions. Which, he said, ultimately leads to hasty decisions, ineffective strategies and sometimes formulating the wrong conclusions.

"In the past, I tended to run high on adrenaline and often responded too quickly to circumstances—priding myself on being proactive—but in the process found that I had misjudged the situation even before the dust settled," he said. Especially when there was a conflict within a team or organization. "I realize how detrimental conflict can be to an organization, so I want to nip it in the bud as quickly as possible. I also have a strong advocacy streak in me and cannot tolerate injustice or team members stomping on one another in the process of accomplishing the mission."

Shaeffer said that, in the past, both his proactive pride and strong advocacy tendencies have led him to be hasty in drawing the wrong conclusion and at first attempting to correct a scenario that was in fact not anywhere close to reality. "Through the help of several wise mentors, I have learned to take time to breathe—sometimes literally—and process what happened before developing the proverbial three courses of action to execute."

Shaeffer's position supports U.S. Army foreign military sales, while protecting U.S. technology. So his responsibilities routinely involve weighing options before deriving viable solutions.

"My role not only supports the U.S. national security strategy, but also enables our warfighters to work confidentially alongside coalition forces with the same systems they have trained on and used throughout their careers," he said. So, hastily made decisions could have serious consequences. "My greatest satisfaction comes from finding solutions to complex challenges, especially when our allies have an urgent requirement for a U.S. Army capability," he said. "However, in the rush to deliver needed capabilities, it would be easy to overlook technology security or foreign disclosure concerns. Therefore, I lean heavily on several key organizations and tools within the U.S. Army to walk the fine line between security assistance and guarding U.S. interests."

Although some might say Shaeffer entered the Army Acquisition Workforce by chance, he would somewhat disagree. "I was in the middle of a major career change, having

"My greatest satisfaction comes from finding solutions to complex challenges."

come out of industry and non-profit organizations, and a munitions management information analyst position was the only opening that was available. To me, it was more than 'by chance,' " he said. "Looking back it was more than a lucky win for me to land and excel in the job."

In that role, he monitored and reported on the ammunition industrial base. "What interested me about this position was the fact that I could use project management and soft skills to make a significant contribution to the mission of the warfighter. My responsibilities have shifted since that time. However, I continue to leverage these skills as I lead efforts with diverse participants coming from engineering, business, production and logistics backgrounds, and it is this aspect of team building which really appeals to me."

More than anything, he values the mentoring and coaching he has received from Army acquisition professionals. "They have taught me so much—not only how to wade through the tasks at hand, but more importantly, how to think strategically, communicate effectively and to always conduct myself in an ethical manner while striving for excellence." It's one thing to know policy or standard operating procedures, but quite another to observe how a professional navigates difficult conversations or lays out a road map to solve complex acquisition challenges. "I have had the privilege of working with those who have 20 to 30 years of positive experience in Army acquisition, who can flesh out what it means to wisely apply what they learned in a DAU [Defense Acquisition University] class or in a previous letter of request from another foreign partner," he said.

For the past two years, Shaeffer has focused on classes that sharpen and develop leadership and communication skills. "This has been very helpful to me to take a step back and look at where I am as a leader and communicator," he said. "I have found areas in which I needed to grow and these Army-sponsored classes lend themselves well to analyzing myself and then the immediate implementation of what I have learned in class. I would highly recommend maintaining a good balance between technical training as well as class work that hones soft skills."

The right combination of experience, education and mentoring have helped him throughout his career, and he now provides advice to junior acquisition personnel while "walking alongside them" every step of the way. "I do not always have to be the talking head for my organization, nor the one who works all the challenging tasks. As a coach, I can train and equip, and then act as an affirmative supporter," he said. "For me, this is just as rewarding as achieving the goals myself."

There's a genuine team atmosphere within Program Manager Close Combat System's International Division that allows for shared responsibility and recognition for accomplishments. "In this atmosphere, we see new employees experiencing large leaps in skill development and loving the organization of which they are members," he said. "The advice I would give to junior acquisition personnel is to be confident in your achievements, and begin early to position yourself as a coach and mentor. Your organization will benefit from you multiplying yourself across the force in this way."

He believes there is a common link between his personal life and work as an Army acquisition professional when it comes to striving for justice and providing opportunities for those around him.

"I hold deep convictions with regard to Biblical faith and family," he said. These values apply both in and outside of work. Shaeffer has pastored churches in New Jersey and Pennsylvania, and said he has transferred the grace he has received to his family—he and his wife have 14 children, three of whom were adopted internationally, and four grandchildren. "It seems that much of what I do takes on an international flavor," he said. "Whether it is helping kids from hard places or positioning the U.S. Army to assist a partner nation with a serious national security threat, I am fully engaged in doing what I can."

"Regardless of what 'reality' truly is, my Biblical convictions provide a resilience far beyond what I can muster on my own, and the moral and ethical guidance to always do what is right and excellent," he said. "And this in combination with solid analysis is what I attempt to bring to bear to my work as an Army acquisition professional."

— CHERYL MARINO

FASTER FUNDING
Identifying the areas for improvement earlier in the process will get funding approved earlier than in previous years. (Image by Getty Images)

PROACTIVE TEAMWORK *IMPROVES FUNDING PROCESS*

Integrated product team collaboratively identifies budget proposal needs to expedite the approval process.

by Brooke A. Davis

Either in developing it or consuming it, an appetite for cutting-edge technology is one of the fundamental components of American society. Technology is part of our national nature and a keystone to our defense. This preoccupation with technology throughout the whole of the American experience is reflected by our representatives in government. Congress plays a key role in both encouraging innovation and protecting the American people from technological threats and risks through executing its Constitutional powers and responsibilities.

One way of encouraging innovation is through funding of areas that Congress deems important for growth and defense, often with an eye on dual-use outcomes, like the research efforts that led to global positioning systems. Through hearings, industry engagements and efforts of technology-oriented lobbyists, Congress is one of the most informed bodies on the state of technology in the nation. Each budget cycle, Congress will add funds where it thinks additional effort is warranted, according to a 2019 article from the Belfer Center for Science and International Affairs, Harvard Kennedy School, titled "Building a 21st Century Congress: Improving Congress's Science and Technology Expertise."

"Each year, Congress increases the Army's science and technology budget request by approximately $1.5 billion in funding, known as Congressional adds," explained Aaron Cutler, strategic communications specialist within the Office of the Deputy Assistant Secretary of the Army for Research and Technology (DASA(R&T)). As part of the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)), DASA(R&T) is responsible for oversight of science and technology programs, including budget increases through Congressional adds.

ADD COLLABORATION

The Congressional adds are a very important aspect of Army funding, but come to the Army as additions to the normal Army budgeting processes. A more effective way to capture the

BUDGET HEARING
Secretary of Defense Lloyd J. Austin III, Army Gen. Mark A. Milley, chairman, Joint Chiefs of Staff, and Mike McCord, Undersecretary of Defense (comptroller)/Chief Financial Officer, provide testimony at a House Armed Services Committee hearing on the fiscal 2023 defense budget request in Washington, on April 5. (Photo by U.S. Air Force Tech. Sgt. Jack Sanders)

associated data and manage the funds for efficient execution has always been desired by both parties.

Last year, a collaborative team of stakeholders within the Army's science and technology community proactively led efforts to improve the 2021 fiscal year Congressional add process, resulting in increased funding efficiency for the entire Army research, development, test and evaluation (RDT&E) community, and gained Congressional recognition.

Tina LeGrand, who worked as the deputy director for Army science and technology enterprise resource management within ASA(ALT), explained that the Army receives Congressional adds funding for more than 150 distinct science and technology efforts annually. LeGrand outlined the complex path it takes to execute a Congressional add. "In order to receive Congressional add funding, [science and technology] executing organizations must develop and submit a proposal to the defense appropriations committee that details the technical and financial plan for each funding effort," she said. "Before funding for these efforts can be released for execution, the Army [science and technology] community must route proposals through their organization's chain of command… and receive approval from the appropriate Congressional committees through the Army Budget Office [ABO]. In fiscal year 2020, we experienced challenges submitting proposals to Congress in a timely manner." LeGrand observed that this was partly due to shifting responsibilities between the various commands and organizations that compose and set priorities for the Army science and technology enterprise.

In response to these challenges, LeGrand formed an integrated product team (IPT) with key stakeholders from the Army

science and technology enterprise community and representatives from supporting Army budget and Congressional liaison offices. The IPT collaboratively identified the need to improve standardization of the proposal template, develop a process flowchart, and ensure alignment with all guidance to ensure mission success.

TIMING IS CRITICAL

Timing of the workflow process was an important aspect for the Army science and technology enterprise, as many different echelons needed to route requirements through various command levels for approval. "The flow and timeline is so very short after an enactment of an appropriation," observed Kim McGraw, science and technology functional budget lead at Army Futures Command's Science and Technology Directorate, Acquisitions and Systems. "It was very important," offered McGraw, "for everyone on the IPT to talk about their time sensitivity and workflow issues."

LeGrand outlined the process the IPT used to get to a more efficient process. "After cataloging lessons learned from the fiscal year 2020 cycle, we started our efforts to refine the proposal template. In addition to clarifying data fields to make proposal formulation easier for the [science and technology] community, we reviewed stakeholder guidance to ensure the template addressed all requirements, both explicit and implied," stated LeGrand.

Understanding that science and technology is a subset of the overarching RDT&E appropriation, the team recognized the requirement to develop a template that would be applicable to the entire community. While the team finalized revisions to the template, they worked a parallel effort with the Army's Congressional budget liaisons to clarify a new requirement proposed by the House Appropriations Committee. Specifically, the committee introduced language in House Report 116-453 that, if affirmed during the conference process, would require "the Secretary of Defense to limit Department overhead costs on Congressional program increases to not more than 10 percent of the funding level provided."

This new requirement could potentially have an impact on the science and technology proposal process, as Army laboratories and research centers often retain more than 10 percent of Congressional add funding to manage contracts, conduct in-house research and engineering, and purchase equipment necessary to achieve program goals in line with Congressional intent. Because the approval process for science and technology plans for Congressional adds is complex, clarification was critical as the team prepared to meet the submission deadlines set forth by ABO, explained Jeffrey D. Singleton, deputy assistant secretary of the Army for research and technology.

"This innovative approach to work collaboratively across organizations to meet challenges speaks of the caliber of people who work in the Army's RDT&E community."

"Although we weren't certain we would need to employ our strategy to address the committee's proposed requirement, we recognized the benefit of including it in the template," Singleton said. "With over 180 proposals anticipated for [fiscal year] 2021, we knew it would be easier to remove the language and relax the requirement vice trying to add the language and sharpen the restrictions midway through the process."

The team's proposal to address the new requirement was highlighted in a separate section of the template that showed funding dedicated to overhead represented as a dollar amount and percentage of total Congressional add funding for that effort, Singleton added.

Ultimately, the recommended template was accepted for use across the whole RDT&E community, and the limitation proposed in House Report 116-453 did make it through conference as a requirement for the execution of Congressional add funding. As a result of the proactive coordination and planning efforts, the Army science and technology enterprise was prepared to report on the new requirement—or so they thought.

"While the IPT working group did seek and receive clarification on the intent of the 10 percent overhead limitation to ensure it was being captured in an accurate and standardized manner, one day before the suspense, the community received further guidance on what should be counted in the calculation of the total overhead from the committee," LeGrand said.

The RDT&E community needed to revise and resubmit nearly all the proposals as a result of the clarification. "The request from ABO was to revise 180 [science and technology] proposals in five business days," LeGrand said, looking back on the effort to get the revisions staffed. "While we did not hit that target, given the number of revisions and the complexity of the [science and technology] proposals, we did submit all revised proposals within 10 business days of the revised guidance. This was a significant accomplishment for the community, facilitated by open lines of communication and established methods of coordination."

"This innovative approach to work collaboratively across organizations to meet challenges speaks of the caliber of people who work in the Army's RDT&E community," said Singleton. "Clearly defining their goals and exceeding them despite changing requirements is an encouraging trend for future fiscal years."

CONCLUSION

The team's efforts were recognized in the Report of the House Appropriations Committee on the Department of Defense Appropriations Bill, 2022. The bill called out the effort in legislative language, stating that "the Committee was encouraged that the Army developed a system for tracking overhead costs on Congressional program increases, and believes that all of the services and DOD-wide agencies should similarly track these costs to ensure that the overwhelming amount of each Congressional program increase is used to further the intended program and not simply supplement or supplant established overhead budget."

LeGrand was quick to point out the success of the working group would not have been possible without input from all stakeholders who provided assistance, guidance and insight along the way. "Every person who provided input was critical to our success," LeGrand observed. "This is a great example of how collaboration can lead to positive outcomes and improved efficiency." Despite the end of the formal fiscal year 2021 Congressional add season, the team continued to stay in contact in order to leverage their results for a successful fiscal year 2022.

"The team discussed the need for two IPTs for [fiscal year] 2022—one focused on RDT&E as a whole, the other focused on the subset of [science and technology]. In preparation for [fiscal year] 2022, the teams have developed step-by-step instructions to accompany the proposal template, which we modified slightly based on [fiscal year] 2021 lessons learned," LeGrand said. "The revised template and instructions have already been accepted by ABO and disseminated to the RDT&E community so they can begin drafting their proposals based on committee marks to date."

The team also disseminated a checklist specific to science and technology to address the community's unique requirements. The checklist was designed to assist the entire community, acting as a reference for individuals crafting proposals, as well as AFC headquarters and Army staff reviewers.

Additionally, ABO is developing a SharePoint site to improve tracking processes through a repository for proposals, approvals and requests for information, according to Sgt. 1st Class Sahib Singh, AFC resource management noncommissioned officer, currently detailed to the ABO.

"The biggest takeaway from the IPT is that funding gets approved earlier than in previous years," Singh said. "We started working together earlier, clarified key players and streamlined communications."

"There are three different echelons in this process and we incorporated feedback from those levels to help make the request process much smoother and better," McCraw said. "We really looked at questions like 'Are we hitting the Congressional intent?' The IPT process was extremely helpful in answering that." At the conclusion of the fiscal year 2022 cycle, the team hopes to report that all RDT&E Congressional add proposals have been submitted to ABO within 60 days of budget enactment. The newly formed science and technology IPT includes participation from every science and technology executing organization.

With Congressional language commending the Army's overhead tracking costs on Congressional adds, the team is also already looking to the future. In fiscal year 2023 the team hopes to share its Congressionally recognized tracking processes, lessons learned and best practices with the whole DOD RDT&E community.

For more information go to the ASA(ALT) website ***https://www.army.mil/asaalt****.*

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STILL FIGHTING THE GOOD FIGHT

JPEO CBRND's JA2 team helps speed vital COVID-19 related products to civilians and the military.

by Mason Aberle and Alex Hillman

ENSURING DELIVERY
JA2's screening and diagnostics team worked through holidays and long nights to serve the nation and the warfighter. (Photo by Spc. Ryan Lucas)

How we take care of the American people directly impacts the success of our national security goals and force posturing around the globe. Perhaps more than any crisis in recent memory, COVID-19 presents a serious obstacle, which actively threatens the health and safety of Americans here at home and abroad.

In the early days of the pandemic, the U.S. Department of Health and Human Services (HHS) sought out DOD to support and partner in their rapid public health acquisition needs, particularly to identify, deliver and distribute vaccines to save lives against the virus that causes COVID-19. Thus we had Operation Warp Speed, and later the Countermeasures Acceleration Group, before it became a team within HHS's Office of the Assistant Secretary for Preparedness and Response, now known as the HHS Coordination Operations and Response Element. DOD was well versed in the mRNA vaccine platform (the technology both the Pfizer and Moderna vaccines employ) and had experience with innovative contracting practices with unique acquisition authorities under the Defense Production Act. These experiences made DOD an ideal partner for HHS and the nation's public health acquisition needs during the past two or so years of the pandemic.

One billion COVID-19 vaccine doses and one billion free at-home COVID-19 tests are two of the milestones one office at the forefront of DOD's accomplishments achieved. Those victories should put the United States on stronger footing, particularly as it continues to prepare for the next battles with the SARS-CoV2 virus and its variants and subvariants.

The Joint Assisted Acquisition (JA2) team—DOD's assisted acquisition cell in the Joint Program Executive Office for Chemical, Biological, Radiological and Nuclear Defense's (JPEO-CBRND)—has had the critical mission to support HHS in its most pressing COVID-19 acquisition needs. The JA2 team brings together medical specialists, logisticians and acquisition experts, and uses unique acquisition authorities (i.e., the Defense Production Act) that enable agile procurement of lifesaving medical countermeasures in record time. JPEO-CBRND's creation of the JA2 team allowed a mechanism to better manage workloads supporting DOD-specific programs and the national response.

JA2 also allowed JPEO-CBRND to bring on new staff to continue to support HHS' critical COVID-19 medical countermeasures procurement efforts. At this writing, JPEO-CBRND helped HHS obligate more than $65.7 billion across 200-plus unique COVID-19 contracting efforts.

The JA2 team has three distinct levels of effort within the mission to support HHS, as outlined in the May 2021 memorandum of understanding: Expand the domestic industrial capacity of health and medical resources; procure diagnostics and medical supplies for the Strategic National Stockpile and the most pressing current pandemic needs; and accelerate the development, manufacture and distribution of COVID-19 vaccines and therapeutics. The JA2 team is partnering closely with the Army Contracting Command Joint COVID-19 Response Division (ACC-JCRD) to support the various program portfolio needs listed above. The intent is to help HHS address the current pandemic and get ahead of future public health threats, through investments in our domestic industrial base to support production of lifesaving products critical to the nation and DOD.

LIFESAVING PROTECTION FOR THE AMERICAN PEOPLE

JA2's efforts to procure vaccines, therapeutics and enablers (i.e., needles, vials and other critical items needed to administer vaccines and therapeutics) have been essential to the nation; this is where JA2's vaccines, therapeutics and enablers team jumped into action. From the very beginning of the pandemic, JPEO-CBRND worked closely in the whole-of-government COVID-19 response. Experts at the Joint Program Manager for CBRN Medical and the Joint Product Lead for CBRND Enabling Biotechnologies were natural choices for experts and resources to be involved from the outset. JPEO-CBRND is well-equipped to provide lifesaving protection for the nation through its extensive experience with

The speed at which these acquisition processes moved is unprecedented for an effort this large.

SUCCESS ON STAGE
JA2's diligent efforts to procure vaccines, therapeutics and enablers have been critical to the nation. (Photo by U.S. Air Force Staff Sgt. K. Tucker Owen)

acquisition and life cycle management of chemical-biological defense medical countermeasure programs and protective gear for the warfighter.

Many of the experts from these offices were quickly detailed to support the global response in partnership with HHS and DOD's joint mission, the Countermeasures Acceleration Group. Additionally, members of the JPEO-CBRND team were simultaneously supporting the COVID-19 acquisition needs of Defense Health Agency and DOD Health Affairs. Most of these individuals were tasked with dual mission sets—supporting the most pressing COVID-19 vaccine and therapeutics research and development needs, while still trying to keep up with their day jobs—managing programs of record for CBRND project portfolios that provide protection for the warfighter. As time went on, it became clear that a dedicated team was needed to oversee acquisitions efforts from cradle to grave if the government were to procure and distribute a suitable quantity of vaccine and treatment doses. JA2's vaccines, therapeutics and enablers team provided the link between DOD contracting and HHS, employing agile acquisition efforts for getting over two billion vaccine doses on contract and allowing acceptance of the first one billion vaccine doses domestically.

The vaccines, therapeutics and enablers team is made up of individuals who are dedicated to helping with the early development, procurement and delivery of more than one billion COVID-19 vaccine doses. These efforts directly support the ongoing frontline response to the pandemic. Because of that team's work for the past two-plus years, HHS' Biomedical Advanced Research Authority recently accepted its billionth vaccine dose for distribution.

Without the vaccines, therapeutics and enablers team, this milestone would not have been possible. Deputy vaccines, therapeutics and enablers lead Breena Berté

READY AND WAITING
DLA Distribution receives COVID-19 test kits on Jan. 18, at a contracted warehouse in Chambersburg, Pennsylvania. As part of the White House and HHS initiative, DLA is shipping the tests to USPS hubs in New Jersey, Maryland, Indiana and Texas. (Photo by DLA Public Affairs)

Tending to the condition of the nation means looking after every citizen regardless of income, status, race, ethnicity or religion.

said that "When the pandemic started, [the Joint Project Manager for Chemical, Biological, Radiological, and Nuclear Medical] was helping HHS with some of their contracting requirements, but it wasn't sustainable as the pandemic continued, and the mission kept expanding to meet global needs. JA2 came in to provide experts with experience using agile contracting vehicles and streamlined acquisition processes to help meet evolving requirements with accelerated timelines, while maintaining the DOD acquisition standards."

The vaccines, therapeutics and enablers team had to manage drug development processes that could ordinarily take a decade or more, with timelines that could address a public health emergency. Following the U.S. Food and Drug Administration (FDA) regulations and leveraging years of associated development efforts allowed the country to receive vaccines and therapeutics in record time. Several of the products and development efforts started under the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, which managed programs of record and established the pipeline that made the global response successful.

Lt. Col. Owen Roberts II leads the vaccines, therapeutics and enablers team, and is responsible for coordinating more than $56 billion worth of contracts in support of the national COVID-19 response. This includes seven vaccine contracts totaling $35.5 billion obligated to procure more than two billion doses in total; nine therapeutic contracts totaling $22 billion, yielding more than 22 million doses; and 13 contracts enabling vaccine delivery.

To support the distribution of these product quantities, the U.S. government had to coordinate and stand up IT ordering systems for distribution and planning within a matter of weeks. These distribution plans impacted contract terms and negotiations to ensure all systems and stakeholders were connected. The vaccines, therapeutics and enablers team navigated these challenges successfully because, as Roberts said, "With an acquisition mindset you can get ahead of some of the challenges—and being the Army, with our experience in supporting the warfighter, we have this experience to think critically about long-term systems."

It is easy to get lost in the numbers. It is difficult to overstate the hard work and persistence the vaccines, therapeutics and enablers team used to achieve these goals. "Contracts had to be awarded and requirements written based on information in real

time," Berté said. When the omicron variant hit, for instance, vaccines, therapeutics and enablers could not just continue using the same products they'd been working with to that point. They had to adapt by working with the data from the scientific community, drug manufacturers and the FDA and Centers for Disease Control. The vaccines, therapeutics and enablers team identified which products would be the most useful and closed negotiations as quickly and equitably as possible to maintain the supply of effective product to the country.

DELIVERING PRESIDENT BIDEN'S ONE BILLION AT-HOME TESTS

Another way that JA2 fulfills its mission is supporting HHS to procure screening and diagnostics products. In December 2021, during the week before Christmas, as many government offices were winding down their dockets for the holidays, the White House announced that the government would put 500 million COVID-19 over-the-counter tests into the hands of the American people for free. This was welcome news in the ramp up to the holidays, particularly for individuals and families who could not access tests. This January, as the omicron variant spread rapidly in the U.S., the president doubled the figure to a total of one billion tests to be made available to Americans for testing in the comfort and safety of their homes.

JA2's screening and diagnostics team was well-positioned to make these goals a reality, and instead of putting up their out-of-office messages, team members rolled up their sleeves and got to work on behalf of HHS and the nation. The screening and diagnostics team's joint project lead, Kevin Pitzer, Ph.D., was put in charge from the outset. The first problem set tackled was working with HHS and other key stakeholders to establish the requirements before beginning the herculean solicitation and contracting efforts. In his own words: "Requirements are the easy part. Writing the detailed specifications to ensure we acquired the correct tests, however, was the hard part. We went through the documents line by line to ascertain the needs, necessary logistics and language for the request for information [RFI] and contract language." Under usual circumstances, just getting an RFI together and published takes months. Thanks to strong leadership at the senior level, the interagency requirement team was able to get an RFI out to industry partners within two weeks. This same pace was maintained throughout each stage of the procurement process.

Previously established partnerships aided the screening and diagnostics team's lightning speed. By leveraging key relationships, the JA2 screening and diagnostics team forecast availability in the market, determined the regulatory specifications for the tests and identified which companies could potentially deliver the specific capabilities needed. Those partnerships included those with the National Institutes of Health's Rapid Acceleration of Diagnostics initiative, HHS Industry Engagement, HHS Testing and Diagnostics Working Group, JPEO-CBRND's One Network of Excellence for Regulatory Affairs and Quality Assurance and ACC-JCRD.

On December 30, 2021, personnel were still working hard to get solicitations out. To support ACC-JCRD, Pitzer was personally calling company chief executive officers to keep momentum alive and enable the RFI to be released. They did not stop on New Year's Eve. Their efforts ensured the RFI was appropriately modified and vital interagency

MILESTONE ACHIEVED

One billion COVID-19 vaccine doses have been delivered to the U.S. government. (Photo by Lisa Ferdinando, Office of the Secretary of Defense Public Affairs)

coordination with HHS and the Defense Logistics Agency (DLA) was accomplished.

The speed at which these acquisition processes moved is unprecedented for an effort this large. To ensure everything was completed in the short window, the team worked around the clock. In some cases, ACC-JCRD officers were awarding contracts at three o'clock in the morning. There was always someone there to respond. The team was frequently in virtual meetings into the late night hours. They had to ensure the solicitation made clear that these new contracts to procure the needed COVID-19 over-the-counter tests didn't disrupt existing orders for hospitals and nursing homes.

But contracting was not the only hurdle. HHS was tasked with ensuring product quality and efficient distribution of the tests, which were challenges all their own. How could this effort ensure that these tests were effective? To answer this question and others, the screening and diagnostics team participated in program-level discussions with HHS, DLA, Defense Contracting Management Agency and the U.S. Postal Service (USPS), which carefully coordinated the technical inspection activities that took place at DLA locations to ensure they were received as ordered, undamaged and ready for shipment.

DOD is particularly adept at supporting such major logistical efforts on behalf of the nation—JPEO-CBRND does this for warfighters and has the staffing and skills to help HHS solve these challenges. Following inspection, agencies needed to get the kits from the DLA locations to doorsteps throughout the nation. The senior leaders from HHS and DOD worked closely with USPS leadership to ensure the processes of downstream shipping were in place so everyone who requests tests from the official COVID-19 ordering website will receive them. Equity was paramount in this process, which enabled Americans without internet or communications access to obtain the tests as well.

CONCLUSION

The JA2 screening and diagnostics team, alongside counterparts from HHS, DLA and USPS, accomplished this mission. As of this writing, they procured approximately 900 million of the one billion tests in four months. This is a feat that would normally have taken at least a year to accomplish; and it was all thanks to strong leadership, excellent team-work and a wide network of U.S. government and industry partners.

While this mission was taxing on all interagency organizations involved, Pitzer said the efforts were worth it. "The test-kit mission

"Contracts had to be awarded and requirements written based on information in real time."

was such that the [screening and diagnostics] team, in coordination with and as part of the larger program mission, was able to procure almost one billion tests for Americans who needed COVID-19 tests the most." Tending to the condition of the nation means looking after *every citizen* regardless of income, status, race, ethnicity or religion.

It was only through this team-focused DOD acquisition mindset that one billion tests and COVID-19 vaccine doses were procured for the nation. Since reaching these milestones, tests and vaccines are being distributed around the globe.

It is important for the acquisition community to remember the accomplishments we have achieved and the challenges we will continue to address when called on by our nation. COVID-19's surges will eventually feel more endemic, but our purpose—to tend to the condition of the American people, whether military or civilian—will never fade.

For more information, go to ***https://www.defense.gov/Spotlights/Coronavirus-DOD-Response/, https://www.whitehouse.gov/covidplan/, https://www.hhs.gov/coronavirus/index.html*** *and* ***https://www.jpeocbrnd.osd.mil/Coronavirus/****.*

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EXTRA SENSORS PERCEPTION

The northern lights glow behind a Patriot M903 launcher station during Exercise ARCTIC EDGE 2022 at Eielson Air Force Base, Alaska, in March. The Lower-Tier Air and Missile Defense Sensor replaces the aging Patriot radar to intercept more complex and distant threats. (Photo by Senior Airman Joseph P. LeVeille)

THE BIG T

Major transitions in acquisition are often fraught, but the Lower-Tier Air and Missile Defense Sensor team faces new challenges planning the transition of a rapidly prototyped mid-tier acquisition to a major-capability acquisition. Here's how.

by Maj. David Yi and Capt. (P) William Woolsey

The Army has long operated under the assumption of superiority in air and space operations. Troops on the ground could focus on the ground fight, because of the superiority of our air and missile defense systems. That assumption is challenged by the escalation of great power competition and the rapid advancement in aviation and missile technology.

The rapid increase in complexity has made it difficult for fielded radar systems to counter threats. The Lower-Tier Air and Missile Defense Sensor (LTAMDS) is a radar intended to improve the air and missile defense battlespace, providing networked sensing and a greater ability to search, track and discriminate targets. The radar will act as the eyes and ears of the Army Integrated Air and Missile Defense, providing data for a network of launchers to intercept threats.

Detecting threats from a greater range increases the ability to intercept more complicated threats. So compelling is the need for this capability that Congress required its development. The National Defense Authorization Act for Fiscal Year 2018 mandated an initial operating capability of a 360-degree radar by December 31, 2023. Raytheon was selected to build six prototype radars to support an urgent materiel release.

Traditional acquisition programs do not support the development of a system in such a compressed period. The urgent materiel release is necessary to address the Congressional identification of gaps between our current capability and the emerging threats. Congress also authorized alternative, rapid-acquisition pathways to provide warfighters with the latest technology to counter emerging threats.

Rapid-prototyping authority under the mid-tier acquisition pathway allows the program to move fast to deliver capability. In addition to providing a needed capability, the new radar will replace the legacy Patriot radar, a fielded system that has served the Army since 1981. The legacy Patriot AN/MPQ-65A system is used to defend against ballistic and cruise missiles, manned and unmanned aircraft, and emerging future threats in the lower atmosphere portion of the air-and-missile defense battlespace—the lower tier. This system has served the military well, but the Patriot radar is starting to show its age.

APPLES BECOME ORANGES

In addition to its limitations in capability, the operations and sustainment costs for this dated technology are growing. Production, fielding, and sustainment of a modern radar must not be delayed. These activities are not included in rapid prototyping, and that means that the program must transition into a Milestone C decision under the major-capability acquisition pathway. Defense Acquisition University defines a traditional major-capability acquisition, as one that is "used to acquire and modernize military unique programs" that follows a structured process.

In February, the radar's acquisition strategy received approval from the Army acquisition executive to transition from a mid-tier acquisition to a major-capability acquisition program. The acquisition strategy addresses the need to deliver a capability through rapid prototyping and field a system to replace the legacy radar system.

In the Army acquisition process, milestone decision reviews exist for an acquisition program to graduate from concept to prototyping, testing and ultimately to production. The milestone-decision reviews require significant amounts of documentation to support the milestone reviewer that grants the program permission to proceed. In a traditional major-capability acquisition program, data is gathered through each phase and milestone to mature supporting documentation. This process normally takes years, and by the time a system is fielded to the warfighter, it may already be technologically obsolete. This process, however, is necessary to ensure a program is mature before going into full-rate production and fielded to the operational force.

The mid-tier acquisition pathway that allows a program to move quickly does not require the completion of previous milestones.

RADAR REPLACEMENT
A battery assigned to 1st Battalion, 1st Air Defense Artillery Regiment, displays its Patriot radar and antenna mast group during a table gunnery training exercise in Japan, Oct. 19, 2017. The aging Patriot radar's increasing sustainment and operation costs are partly driving the new sensor's development. (Photo by Capt. Adan Cazarez)

FORGING A NEW ACQUISITION PATHWAY

"That briefs well" often describes a task when execution is likely more difficult than it sounds. The new radar's acquisition strategy certainly briefs well; however, the radar will be one of the first Army programs to transition from the mid-tier acquisition directly into major-capability acquisition at Milestone C. Milestone C is a big transition, when the program can enter into manufacturing and production.

The mid-tier acquisition pathway does not require the completion of previous milestones. Mid-tier acquisition programs prioritize the delivery of capability at the tradeoff of some bureaucracy and risk. The dynamic nature of a prototyping effort means that the standard procedures for developing documentation to support a Milestone C decision are not available. Data received from prototyping efforts inform key documentation, but traditional staffing timelines do not support this. DOD Instruction 5000.02, Operation of the Adaptive Acquisition Framework, lays out opportunities to tailor documentation, reducing the paperwork required to pass milestone decision reviews, making the process seem relatively straightforward.

The tailoring process is an acknowledgement that documentation will not be available or mature at milestone reviews. However, the reality is that the product office in charge of the radar acquisition will face resistance to the deviation from the norm by stakeholder gatekeepers who own a supporting document. The approach to tailoring must be deliberate, with careful consideration of the interdependencies. Closing the gap requires a thoughtful approach and active leadership.

MILESTONE C TEAM

The product office established a working group to determine the documentation and processes necessary to enter into Milestone C. One key objective was to streamline the process and best tailor

required documentation. In support of this objective, the working group collaborated on a master schedule to identify the various dependencies to track and link urgent materiel release activities to Milestone C documentation.

All working group members have responsibilities in the rapid prototyping program. Intimate familiarity with the program enables the team to identify opportunities for tailoring that are not specified in any regulation or policy. Subject matter understanding helps the product office to tailor documents to transition to a follow-up major-capability acquisition program. Data from prototype radar testing is key to the development of Milestone C documents. The strategy is informed by firsthand knowledge of the process for testing prototype capability and collecting data. Accurate predictions of when documentation is mature helps members of the Milestone C team to tailor documentation.

Production, fielding and sustainment of a modern radar must not be delayed.

A RAND report on tailoring the acquisition process identified that omitting or reducing documents is possible but faces institutional resistance, and that stakeholder agreement is necessary to tailor documents. The product office identifies and contacts document stakeholders for concurrence before staffing, thereby addressing the challenges identified in the RAND report. A best practice is to report tailoring candidates in the acquisition strategy report for review by the milestone reviewer. If the milestone reviewer agrees with the acquisition strategy to tailor the specified documents, then it provides top cover for the product office as the tailoring strategy is socialized to stakeholders.

NIGHT FLIGHT
A flight test of the Terminal High Altitude Area Defense weapon system in March. The test integrated with and fired two Patriot Advanced Capability-3 Missile Segment Enhanced interceptors. The mid-tier acquisition pathway helped rapidly develop prototype sensors. (Photo by Missile Defense Agency)

RAPID PROTOTYPING INFORMS REQUIREMENT

Successful entrance into Milestone C will depend on prototyping activities. The activities include developmental testing and evaluation, road mobility, environmental testing and even an operational test of the radar to determine if its performance fulfills the requirements. The performance is then analyzed and documented to support the transition to Milestone C. The production and testing of the radar prototypes will provide critical data to support the Milestone C decision and transition into a major-capability acquisition program.

In the transition plan, the prototypes act as a proof of principle with the expectation that they will provide a residual operating capability after an operational assessment is complete. In a standard acquisition pathway, requirements are well defined by the time prototypes are produced. With newer technology, it is difficult to predict system capabilities. The

INTEGRATED AIR AND MISSILE DEFENSE BATTLE COMMAND SYSTEM

The Project Office for Integrated Fires Mission Command's Integrated Air and Missile Defense Battle Command System serves as the command-and-control system in the Army Integrated Air and Missile Defense architecture and links all the individual components to provide a common operating air picture. The command-and-control system is responsible for integration and compatibility with all subsystems, including the lower-tier air and missile defense sensor, legacy radars and launchers, Sentinel, indirect-fire protection capability, and Link 16.

The user community and the Program Executive Office for Missiles and Space direct the software planning priorities to deliver the required capabilities as needed. This is no small feat and requires constant leadership communication, reprioritization, and adjustment to meet the individual subsystems' mandates or delivery dates. For example, at the worker bee level, the lower-tier air and missile defense sensor product office works with the indirect-fire protection capability team to identify resource conflicts and collaborates in joint system engineering integration and test working groups to prioritize the limited programming resources to support development, test and fielding timelines.

capabilities demonstrated in the radar prototypes will inform an updated radar capability-development document. That document is critical for a Milestone C transition, being heavily referenced by other Milestone C documents.

A challenge with this acquisition pathway is that staffing these documents begins before capabilities are fully developed and understood, as the testing has not been completed yet. In a manufacturing process, this would be akin to changing the design of a key component after production has already started. Without careful planning, this could lead to delays and affect the entire system. Predicting and preventing adverse impacts will require careful proactive management of this process. This is only possible through active stakeholder management and engaged leadership.

STAKEHOLDER MANAGEMENT

With the development of a new system, it is not easy to forecast when prototypes will be available to support test events. The radar's success is not possible without exceptional support, cooperation and flexibility from all stakeholders. This concept has proven itself through test plan development. Leaders regularly engaged with various community members to ensure resources were coordinated and reserved for testing by the team at White Sands Missile Range, New Mexico, targeting support from the Army Space and Missile Defense Command and the Office of the Director of Operational Test and Evaluation.

Engagement with the Air and Missile Defense Cross-Functional Team and the Army capability manager, Army Air and Missile Defense Command, will remain critical as the capability development document is defined. Communicating early and often, helps manage stakeholder expectations about capabilities. The radar has incorporated multiple Soldier engagements and training events to solicit feedback on the system's design. For example, Soldiers' experience and feedback drove the design change to the primary array's stowage locks to prevent damage during transportation. Collaboration among user representatives, industry and government experts allows for assessing the radar's capabilities from an operational perspective. The operational perspective then informs the development of a concept of operations that fits the radar into the greater Army Integrated Air and Missile Defense system-of-systems architecture.

SYSTEM-OF-SYSTEMS DYNAMIC

The radar will operate as a "sensor on the net," supporting the Army's Integrated Air and Missile Defense command-and-control structure with other sensors and shooters to provide an "any sensor, best shooter" approach. This unique construct requires

FULL CIRCLE

Stars and the northern lights illuminate a Patriot missile launcher at a training at Eielson Air Force Base, Alaska, March 4. The new Lower-Tier Air and Missile Defense Sensor will help fulfill Congress's priority with 360-degree networked radar coverage. (Image by U.S. Air Force Staff Sgt. Dylan Murakami)

The radar will act as the eyes and ears of the Army Integrated Air and Missile Defense, providing data for a network of launchers to intercept threats.

coordination with all stakeholders, including user representatives of multiple project offices, to determine how the Army will develop and employ the system.

The radar's integration into the Army's Integrated Air and Missile Defense system-of-systems allows convergent development paths with associated air and missile defense systems. In this case, rapid prototyping informs requirements, leveraging prototypes to assess how to field, sustain and fight with the Lower-Tier Air and Missile Defense Sensor as a component of the Army Integrated Air and Missile Defense System of Systems.

This is what enables the radar to function as a network sensor. That means that the command-and-control structure commands any connected surface-to-air missile launchers and sensors. Access to multiple radars provides a better picture and increased defended range and coverage for our warfighters. With that information, the best launcher defeats the threat.

The radar acquisition team collaborates with other project offices and industry partners to align the complex system-of-systems requirements to integrate the radar's capabilities with the holistic Army Integrated Air and Missile Defense system-of-systems capabilities. The effectiveness of the system-of-systems is assessed within the Program Executive Office for Missiles and Space integrated-fires test campaign, which demonstrates capabilities resulting from the concerted effort of four program offices, industry partners and supporting agencies and organizations. The integrated-fires test campaign is the culminating test event where the Program Executive Office for Missiles and Space systems test and operate in a system-of-systems configuration and demonstrate the Army Integrated Air and Missile Defense concept.

CONCLUSION

The Lower-Tier Air and Missile Defense Sensor is the next-generation radar within the emerging Army Integrated Air and Missile Defense architecture that will replace the Army's legacy radar, provide more air and missile defense coverage, and exploit the full capabilities of the Patriot Advanced Capability – 3 Missile Segment Enhancement. To deliver capability to the warfighter faster, the Army chose the mid-tier acquisition pathway to field the latest state-of-the-art technology in an aggressive timeline.

Success requires that senior leaders accept, proactively manage and mitigate risk to support the adaptive acquisition process. Leaders must have a realistic assessment of system capabilities and limitations, understand performance tradeoffs and effectively articulate them to all stakeholders. Failure to communicate and collaborate effectively with all stakeholders can be detrimental to the success of any program, especially one that is executing a rapid prototyping effort while simultaneously working toward the transition to a major-capability acquisition.

Developing a modernized digital radar system that incorporates new technology to meet Army requirements is an impressive feat. It is possible because of collaboration between stakeholders to design a system with significant capability for our warfighters. The Lower-Tier Air and Missile Defense Sensor will push boundaries as a radar. The program management associated with such a technological achievement should also push boundaries. The acquisition processes should not hinder the delivery of systems that help us fight and win.

For more information, go to ***https://msl.army.mil/Pages/STARE/default.html****.*

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IT'S ALL ABOUT THE MISSION

MATTHEW ADAMS

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TITLE: Financial manager

YEARS OF SERVICE IN WORKFORCE: 13

DAWIA CERTIFICATIONS: Level III in business-financial management

EDUCATION: MBA, Florida Institute of Technology; B.A. in accounting, Moravian College

Matthew Adams is a case study in why people choose to devote their careers to the U.S. Army as government civilians. According to the Bureau of Labor Statistics, the desire to make a positive difference nearly always tops the list of the biggest draws of federal work—and the job security and opportunities for career growth aren't far behind. For Adams, his "aha! moment" about the importance of the Army acquisition mission happened during his first acquisition job. "Working in a program management office, you are constantly procuring items to field and sustain the fleet," he said. "My first acquisition position was a journey-level financial management analyst, supporting a small survey program. It was amazing to see items that were procured by our office make it to the field for Soldiers to use."

Adams began his Army career in 2008, working as an engineering technician. In that job, he "was reviewing technical data drawings to support procurements," he said, adding that he was drawn to the mission and the possibilities for growth as an Army civilian, and that he knew he had found the right place to build a career. After about five years, he transitioned to financial analyst at the Armaments Research and Development Center in 2013, which is now the Combat Capabilities Development Command Armaments Center, at Picatinny Arsenal, New Jersey.

Today, more than 13 years after that first experience, Adams works as the financial lead for a program management office at the Joint Program Executive Office for Armaments and Ammunition (JPEO A&A) at Picatinny Arsenal. "At Program Manager Towed Artillery Systems [PM TAS], we are part of a team that develops, equips and sustains towed cannon artillery and survey systems for Soldiers, Marines and international partners," he said. "Being a part of the Army Acquisition Workforce, you get the opportunity to see technologies from infancy to the grave."

And PM TAS has technologies in spades—several models of towed howitzer, the howitzer digitization mission and M119 digital fire control systems, the M111A1 navigation and surveying system, and even the 122 mm D30 nonstandard howitzer. "People are sometimes surprised by the size and scope of the work that we accomplish at Picatinny Arsenal," he said. "A lot of locals don't even realize that this work, and so many other efforts that are vital to our military, have been done at Picatinny Arsenal, right in their back yards, for a hundred years."

Recently, Adams completed a five-month developmental assignment with the deputy assistant secretary of the Army for plans, programs and resources (DASA(PPR)), something he found very helpful for his overall understanding of the acquisition enterprise. "Being able to spend some time doing a developmental assignment at the Pentagon was very beneficial in helping me see the bigger picture. Most people don't realize how many

"Being a part of the Army Acquisition Workforce, you get the opportunity to see technologies from infancy to the grave."

FUN FACT

Most people don't realize towed cannon artillery—like the one pictured—is developed, equipped and sustained at Picatinny Arsenal, New Jersey. (Photo by Sgt. 1st Class Theresa Gualdarama)

priorities that the Army needs to resource to be the decisive force," he said. Applying resources to Army programs requires a delicate and deliberate balancing act, navigating many competing priorities and keeping a sharp focus on the bottom line—equipping Soldiers. "The development assignment was eye opening to see how many different programs exist in the Army. It really puts your program into perspective."

When he offers career advice to junior acquisition personnel, he encourages them to take advantage of the many opportunities for growth and education that exist in the Army Acquisition Workforce. "Explore as many opportunities as you can," he said. "There are so many programs and assignments available to you, which will help you to grow and become more effective in your career. Don't rule out trying something new, just because it's unfamiliar or uncomfortable. Give it a shot." Equally as important, he said, is having a plan for your career. Organizing his day is an important first step, he said. "Planning is a key to success. Having a plan at the beginning of the day can set you up for success." No plan survives first contact with the enemy, and each new day will present its challenges, but Adams said that having a plan for each day helps to keep him on track. "Things are always going to pop up, and urgent meetings will still come in, but staying focused on my plan is a way to keep myself focused."

Outside of work, you can often find Adams on the golf course—something that he enjoys, and that also has commonalities with his work. "When time permits, I enjoy trying to squeeze in a round of golf. Anyone who plays golf can tell you, it is a game that teaches you patience. That is a very valuable skill to have with everyday work. It's about keeping things in perspective—you can't get everything done in one day."

Adams has learned, both in his work and in his free time, that it's important to keep the end goal in mind. With patience, perspective and determination, he stays focused on the goal of providing the best equipment to American Soldiers and joint partners. For Adams and countless others in the acquisition workforce, it's all about the mission.

— ELLEN SUMMEY

PLAN OF ACTION

Decision dominance enables combatant commanders to take decisive advantage in any situation. (Photo by Sgt. David Vermilyea, U.S. Army European Command)

UNSTOPPABLE PLANS

How to create first-contact-proof plans that are resilient in the face of opposition.

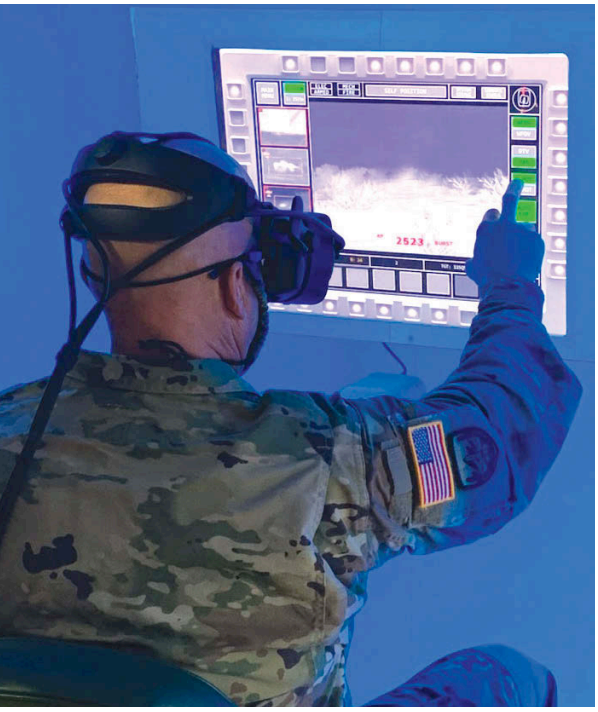
This is the second article in a three-part series on decision dominance. The first, "Decision Dominance," appeared in the Spring edition.

by Richard A. Nabors, D.M., Jacqueline A. Randall and Nathan Burkholder

Not long ago, people exclusively used paper maps to navigate. Many of us can remember at some point having a Rand McNally map tucked behind or under our seat in the car and pulling it out across the dash or steering wheel while on a trip. Most of us haven't used a paper map to navigate for many years. The problem with paper maps is threefold: They don't immediately tell you where you are on the map, they don't plot a course to your destination and they don't update based on changes in the environment. Paper maps are not interactive and don't avoid possible pitfalls and identify alternate routes when travel changes happen that affect you.

Several years ago, Waze, Google Maps and other apps popularized interactive navigation applications for smartphones, providing a solution to this problem by offering interactive navigation capabilities. By using real-time data from smartphone users, these tools help drivers find different routes to get to their destinations, avoiding traffic jams, crashes and even police cars that are on the lookout for speeders.

In many ways, these tools are an excellent example of how access to real-time sensor and communication data allows drivers to make better informed and more rapid decisions as travel conditions change moment to moment. As environments change, these interactive navigation tools help drivers proactively avoid issues and stay one step ahead of their opponents, be it other drivers or even traffic



VIRTUAL VIGILANCE
Currently, decision dominance in action includes providing augmented reality information directly into the heads-up display of a warfighter, enabling the warfighter to know where they are in relation to a target immediately. (Photo by Edric Thompson, U.S. Army C5ISR Center)

enforcement. Before these tools, if you missed a milestone, you might not find out until you had driven 10 minutes in the wrong direction. You would have to stop, pull over and make a new plan. If there were an accident or construction, you wouldn't know and would find yourself stopped dead in traffic. If you were competing in a challenge such as "The Amazing Race," having a navigation capability currently found on our smart phones would give you a significant advantage over your competition using paper maps.

In the U.S. military, there is another word for the same concept: decision dominance. Decision superiority is not new. It's a simple notion: The side that makes quicker decisions will be more likely to prevail.

The implications of this doctrine, however, are anything but simple. It led to a sophisticated and complex theory for how militaries should organize themselves to make the best decisions about what information they need, when they need it, where it needs to be sent and who is qualified to receive it and act on it.

HISTORY OF DECISION DOMINANCE

As an idea, decision dominance has been around since before the Roman Empire. Decision dominance generates superior decision-making through increased understanding of one's enemy and environment. It also represents using military capabilities as part of a holistic approach to shaping the opposition. Currently, decision dominance in action includes providing augmented reality information directly into the heads-up display of a warfighter, allowing the warfighter to know where they are in relation to a target immediately. The sensors that inform augmented reality capabilities improve a Soldier's ability to discern a friend from an adversary at safe distances. This real-time situational understanding of the battlespace allows the warfighter to make quicker, well-formed decisions faster than an adversary.

With advances in technology and the exponential increase in data, the definition of decision dominance has evolved to include the ability to make decisions at every level of a military operation. For example, it is not enough for a Washington, D.C.-based commander to know what troops on the ground need, they must also have all the information they need to respond within seconds or minutes.

In the mid-20th century, Air Force Col. John Boyd developed a famous decision-making process known as the OODA loop to help fighter jet pilots make prompt and accurate decisions. OODA stands for observation, orientation, decision and action. See Figure 1. It is a continuous cycle of information gathering and decision-making that must be executed quickly with minimal friction or confusion to achieve success. The side that is able to have the fastest possible time between their OODA loop decision cycles will generate significant advantages for itself in achieving dominance over their adversaries. This begs the question: How can the decision loop cycle be reduced and optimized?

Decision dominance is about making the enemy decide to quit before they even start fighting you.

Weeks before the 2003 Iraq War, former U.S. Air Force Lt. Col. Merrick E. Krause wrote one of the first articles on decision dominance for Defense Horizons, a National Defense University publication. Titled "Decision Dominance: Exploiting Transformational Asymmetries," the article explained that decision dominance was increasingly significant because the nature of war was changing in the 21st century.

"Decision dominance is now possible by exploiting technology and innovation to achieve long-term success through affordable and precise effects-based planning. This concept is a departure from the traditional Napoleonic war-fighting philosophies of attrition or annihilation," Krause wrote.

Early last year, Gen. James McConville, the Army chief of staff, published a report

titled "Army Multi-Domain Transformation: Ready to Win in Competition and Conflict." The unclassified version of the report explained that sensor data, communications and artificial intelligence were vital to achieving decision dominance in today's world.

"Artificial intelligence, autonomy and robotics will continue to change the character of operational campaigns, resulting in a battlefield that is faster, more lethal, and distributed," the report said.

"Decision dominance is enabled by convergence, the ability to see, sense, communicate, shoot, and move at speed and scale, connecting all sensors with the best shooter and the right C2 [command and control] node," the report added.

To achieve decision dominance, the U.S. Army maintains the C5ISR (Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance) Center. The center's core objective is to deliver technologies and capabilities that make it easier for tactical and strategic decision-makers to act decisively and execute their missions with great accuracy, efficiency and effectiveness.

UNSTOPPABLE PLANS

Through decision dominance it is possible and advantageous to develop and sustain unstoppable plans that allow tactical and strategic leaders to remain resilient in the face of opposition. Unstoppable plans are devised proactively, keeping yourself one step ahead of the adversary and shaping the environment to limit and direct what options your opponent has available. Unstoppable plans are not limited to any specific domain such as air, sea or land. Achieving decision dominance in one area of operation often affects other domains since it's virtually impossible to create an unstoppable plan without considering all aspects of combat.

While Boyd's OODA loop—developed more than half a century ago—remains relevant today, to achieve decision dominance requires an additional model (or plan) that incorporates the time needed to support the processes for faster decision cycles. Broadly, the approach depends on the convergence of three intersecting circles: climate, orientation and destination. Said another way, to have an unstoppable plan, you need to be able to know your current **orientation** while reacting to an evolving **climate** so that you can reach your **destination** in time to be effective. See Figure 2.

These elements of orientation, climate and destination are not only true for navigation (such as with the navigation apps) they are

FIGURE 1: OODA LOOP

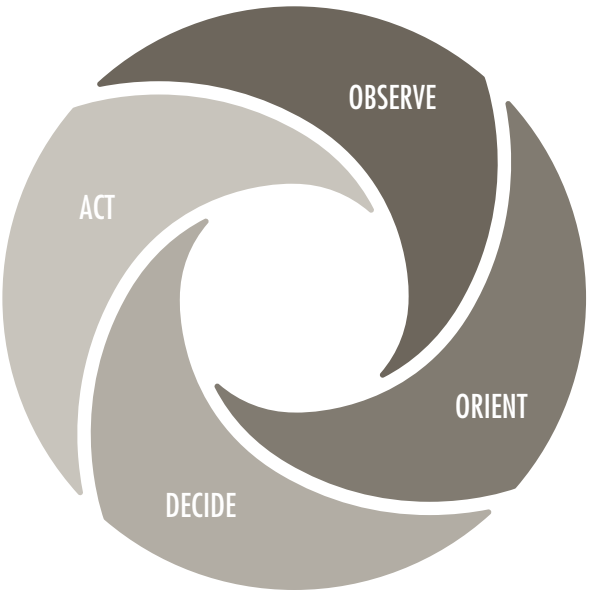
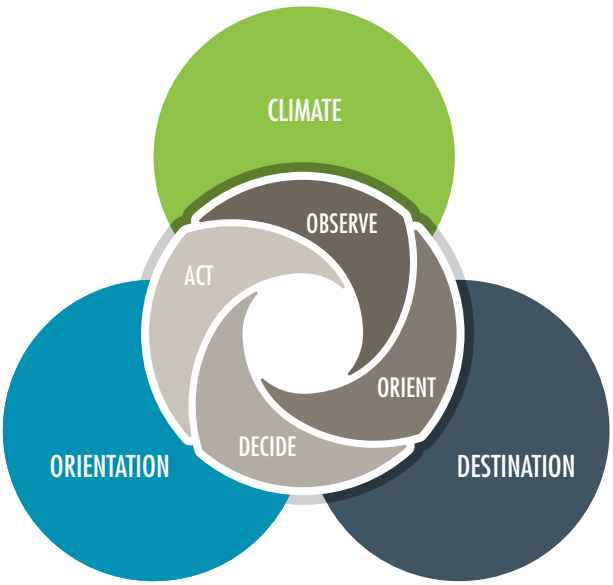


FIGURE 2: SITUATIONALLY AWARE OODA LOOP



also true at both the tactical and strategic level. Transformational technologies are those technologies that help bring each of these circles close together by reducing the time and effort required for the OODA process to take place. For the tactical user this could be something like an integrated sensor architecture that enables units on the ground to integrate real-time intelligence data with their immediate environment via a heads up display, all while being directed through an urban environment by an artificial intelligence algorithm designed to minimize human contact with civilians. For an acquisition leader, this could be real-time portfolio investment optimization based on evolving third-party trend reports and published industry investment roadmaps.

Many organizations and individuals have one or more of these circles in place but the process of communicating, networking and integrating among them is fractured, static, laborious and costly. Transformational technologies bridge the gaps and pull the circles closer together until they overlap. And when all three circles intersect, unstoppable plans are possible.

Unstoppable plans are devised proactively, keeping yourself one step ahead of the adversary and shaping the environment to limit and direct what options your opponent has available.

FROM WAR OF ATTRITION TO WAR OF DECISION

As Krause explained in his 2003 article, the goal of decision dominance is not to destroy the enemy, but to make them surrender or not fight you in the first place. It's about moving past attrition warfare, where two parties keep killing each other until one side quits. Decision dominance is about making the enemy decide to quit before they even start fighting you.

The first step in achieving decision dominance is understanding what it takes for your opponent to surrender or not fight at all. This will help you develop a platform and strategy for countering your adversary. The second step is to develop a plan that can handle anything the enemy throws at you and be able to adjust in real time as needed.

Thus, decision dominance relies on having accurate knowledge of what drives your opponent's decisions, which allows you to be able to counter their moves before they make them. This requires more than just understanding their culture and geography. It's about understanding how they think, what their fears are and what motivates them.

Decision dominance is achieved when you have the right people to execute the plan with accurate knowledge of your opponent's decision-making process and the ability to decide faster than your opponent on what actions to take. The most important aspect of decision dominance is to understand what your opponent's strategy and intentions are, so you don't fall into their traps or get caught off guard by an unexpected attack.

It is through the knowledge of the opponent's decision-making process that combatant commanders can react to their enemy with speed and precision, maneuvering them out of advantageous positions or bringing them under attack from multiple directions at once. Decision dominance enables combatant commanders to take decisive advantage in any situation.

"It is increasingly critical to move toward a strategy that does not rely on attrition or annihilation and that affects the mechanisms permitting the enemy to be defeated economically," wrote Krause.

"Deliberate and methodical application of this decision dominance strategy will promote the goal of full-spectrum dominance by shaping and dominating an adversary's decision-making cycle and understanding how, when and why the enemy leader will realize defeat."

CONCLUSION

In this new paradigm we see how decision dominance has become a highly desirable end state that provides both tactical and strategic planners with a spectrum of tools and options for mitigating threats. In some instances, this can be done without the need for violence or kinetic effects. Decision dominance is achieved with the ability to create unstoppable plans that adapt to a changing environment and fully integrate your current state with your objective outcomes. This adaptability, the ability to spring back to a steady state after dealing with a crisis (decision point), is what gives power and advantage to one side over another and will be one of the critical factors affecting the future conflicts that the U.S. and other countries face.

Transformational technologies that link and connect between platforms, intelligence and missions will play a key role in making resilience possible by shortening the OODA loop decision cycles that shape the tactical, strategic and acquisition landscapes. And just like Waze, this will allow the U.S. military to always keep moving, to never be stopped, to adjust and become unstoppable.

For more information on the C5ISR Center and its mission, go to ***https://c5isr.ccdc.army.mil/.***

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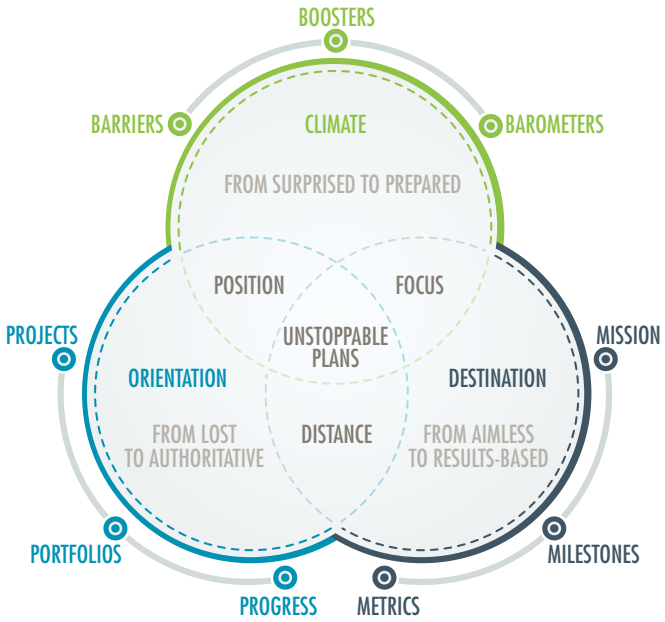
JACQUELINE A. RANDALL is a DOD contractor with AnaVation LLC supporting the C5ISR Research and Technology Integration (RTI) Directorate. She holds a B.A. in psychology from Siena College. She is a certified associate in project management.

NATHAN BURKHOLDER is a strategic analyst for KITEWIRE Inc. who supports C5ISR RTI. He holds a B.S. in engineering from Messiah College.

FIGURE 3: DOMINANT OODA LOOP



Orientation
How to move away from feeling lost to being authoritative? Whether it's knowing how much ammunition, water or fuel you have left or knowing about long-term portfolio investments, orientation is all about figuring out and characterizing your current state and understanding how all the pieces fit together in a structured framework. For example, recently many within the Pentagon have seen the value in moving away from platform-focused investments and strategic planning towards an integrated portfolio approach.

Climate
It's been said, "No plan survives first contact with the enemy." How to move from surprised to being prepared? A changing climate affects acquisition, strategy and execution. The ability to identify and react to the barriers, boosters and barometers affecting your plan allows you to not only survive first contact but to remain dominant over time.

Destination
How to move from aimless to results-based? If you don't know your mission, milestones and metrics you can't have an unstoppable plan. Recent publications such as Christian Brose's "The Kill Chain: Defending America in the Future of High-Tech Warfare" point out how the emergence of new technologies and the growing military threat posed by rivals, such as China, have placed America at grave risk of losing a future war. Without a holistic destination in mind, investments and military planning become aimless and chaotic. By mapping the missions, metric and milestone decisions become results-based rather than personality-based, and greater opportunities can emerge. See Figure 3.

MORE TO THE STORY

The article "Carbon Copy" in the Spring 2022 edition of Army AL&T magazine introduced readers to Calgon Carbon and the need for an alternate supplier. In this follow-up letter, a company representative describes its continued dedication to supply carbon for the DOD.

by Sam Yates

Calgon Carbon has been the sole supplier [of activated carbon for use in protective filtration] for the United States military for 80 years. In 1942, the military recognized the need for a domestic source of activated-carbon production for their CBRN [chemical, biological, radiological and nuclear protection] carbon because of the conflict in the Pacific. Up to this point, CBRN carbon was sourced from coconut, which was located in southeast Asia. The conflict in the Pacific theater during World War II caused a loss of reliable access to these coconut sources.

With the resulting loss of sources of coconut-based activated carbons, the military partnered with Pittsburgh Coke and Chemical, a predecessor company to Calgon Carbon, to develop a means for producing respirator-grade activated carbon from domestic coal sources. This was key, as activated carbon is not mined, but is a manufactured product. If the base activated carbon does not have the appropriate characteristics, the final impregnated product will not perform as needed. Characteristics such as the pore structure, density and moisture levels all have significant impact on the final product's ability to perform.

Pittsburgh Coke and Chemical developed the process for commercially producing an activated carbon for the World War II effort. Named ASC, an initialism for the ingredients embedded in it [activated carbon, silver and copper], this carbon formulation was developed by the U.S. Army as the first CBRN protection carbon for the military services. Since 1942, Calgon Carbon has been the exclusive supplier of respirator and collective protection filter carbons for the military. In addition, during the 1990's Calgon Carbon invented ASZM TEDA carbon, a chrome-free carbon which replaced ASC, and we developed the process to commercially produce it.

During the 80 years that Calgon Carbon has been supplying the DOD, we have never missed meeting all the DOD technical requirements, including during all war efforts and deployments.

In the late 2000s, Calgon Carbon approached DOD about supporting an ASZM TEDA expansion to ensure sufficient surge capacity for ASZM TEDA production. We proactively engaged the government with the concern that, if a sudden surge in demand were to occur similar in magnitude to the initial Iraq and Afghanistan deployments, the ramp-up time might be slower than needed. We proposed expanding our capacity with a second, grassroots production line to ensure a continued uninterrupted supply of ASZM TEDA to meet the DOD's needs and provide an increased rapid ramp-up capacity.

A BIG RESPONSIBILITY
Calgon Carbon has taken the responsibility in providing a secure supply of completely domestically produced CBRN protection carbon to protect warfighters very seriously. (Photo courtesy of Calgon Carbon)

Once the Joint Project Manager for CBRN Protection agreed to support this expansion using Defense Production Act Title III funding, a request for quotes (RFQ) was released. This got the attention of new manufacturers. Awards were made to both Calgon Carbon and a new manufacturer. Once the award was made, it was recognized by the CBRN technical community that the specification for ASZM TEDA under MIL DTL 32101A [the existing military standard for qualifying for ASZM-TEDA] was designed assuming the inventor of ASZM TEDA, Calgon Carbon, would be the only supplier moving forward. The CBRN technical community recognized the new manufacturer did not control the production of their base activated carbon and that their process differed from the historical process. Therefore, they intervened to rewrite the military specification to include a first article test requirement that replicated the testing done when ASZM TEDA was first invented by Calgon Carbon.

In addition to completing a grassroots ASZM TEDA production plant at our carbon production facility in Bay St. Louis, Mississippi, we have taken additional steps to strengthen the overall supply chain for ASZM TEDA. Calgon Carbon increased the base carbon production capacity. We are building a new base-carbon production line, at our own cost, co-located at the same facility with the new ASZM TEDA production line. Eighty years later, Calgon Carbon is not only continuing to meet the DOD's requirements for ASZM TEDA while we complete our new facility, but we will also have the existing facility in reserve should it be needed after the new plant is in production.

Calgon Carbon has taken our responsibility in providing a secure supply of completely domestically produced CBRN protection carbon to protect our warfighters very seriously. Our second ASZM TEDA line is scheduled to be producing material in Q3 of 2022 and our expanded base carbon capacity is scheduled to be online in Q1 of 2023. It is a point of corporate pride that we have been relied upon for these 80 years no matter what the international conflict.

For more information, go to ***https://www.calgoncarbon.com/*** *or email the author at* ***samuel.yates@kuraray.com****.*

SAM YATES is a technical marketing manager at Calgon Carbon Corporation in the Innovative Carbon Technologies group. He has been with Calgon Carbon since 2021, working in the respirator, home water filtration, dialysis, cigarette and aquarium markets. He holds a B.A. in chemical engineering from Purdue University.

BEYOND THE BASICS

The Army Acquisition Workforce is now working under a new and improved framework.

On February 15, the Army implemented "Back-to-Basics"—a talent management initiative meant to streamline acquisition workforce functional areas and prioritize training resources.

The previous 14 Army acquisition career fields are now six functional areas with seven certification tracks, which are more closely aligned with our acquisition modernization priorities. (See Figure 1.)

The Back-to-Basics initiative also required that we reevaluate which positions make up the Army Acquisition Workforce, focusing on those professionals who develop, acquire and sustain operational capability. That effort resulted in decoding out some positions of the Army Acquisition Workforce. Our total workforce numbers are now just over 32,000 compared to the more than 40,000 under the previous framework. We're a more focused workforce, aligning better with the needs of the acquisition enterprise.

HOW IT STARTED

The Defense Acquisition Workforce Improvement Act (DAWIA) became law in 1990. Around that time I was a young Army captain, and I remember the race to get certified in your acquisition career field. This was a new requirement. There was also a general sense that the more certifications you had the more competitive you would be as a candidate for promotion.

I recall the first level of certification being a big lift. I took ACQ 101 at Hanscom Air Force Base with a diverse group of acquisition professionals from whom I learned a great deal and, in all candor, probably more than from the course itself. The group at my table consisted of an Air Force officer from the B-52 follow-on operational test and evaluation program, an Army civilian from the Patriot Missile program, a Navy officer working Phalanx sustainment, a food scientist from Natick Soldier Systems Center, and me. As I recall, the course itself was three weeks long, and included a wealth of information, such as an introduction to all major acquisition functions. We went through the Program Manager's Handbook in its entirety; learned a lot about planning, programming, budgeting and execution; and discussed case studies on predominantly Acquisition Category (ACAT) I programs. For many of us, it would be another 20 years before we would have the opportunity to work on a major defense acquisition program. Others would never receive that chance.

Over about the next year and a half, I took all of the Defense Acquisition University (DAU) coursework I needed for Level II certification in both program management and systems engineering, as well as Level I qualifying courses in most of the other (six at the time, if I recall correctly) acquisition career fields. As the number of career fields expanded and the workforce grew, I noticed that there was tremendous overlap between classes, both within the career field as well as between career fields. Such was the repetition that as much of half the training was often a repeat

You and your direct supervisor are now in the driver's seat.

of what I already knew or had learned in previous courses. It seemed a refresher of training content became more and more necessary as we changed jobs—our minds a bit fuzzy on all the content we learned in that ACQ 101 class so many years ago.

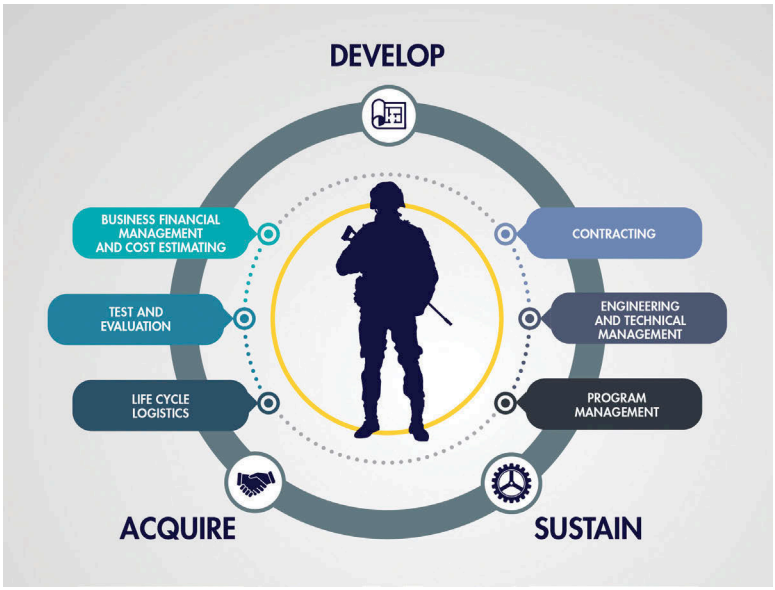
HOW IT'S GOING

Back-to-Basics was the first major reform of the defense acquisition management framework since my time as a captain back in the 1990s, and it was a necessary one.

The Army continues to face limited resources, especially training resources. But more importantly, this transition serves as a reminder of what's important with regard to individual and workforce professional development.

Under the previous system, I think people lost sight of what was truly important, and sometimes confused certification with qualification. Acquisition courses and certifications alone didn't make me a good program manager—that was the result of my overall education, the totality of the institutional learning, the continuous learning offered through DAU and other sources, my on-the-job experiences, and the lessons learned and professional connections I made that really prepared me to advance and take on more responsibility. (See Figure 2.)

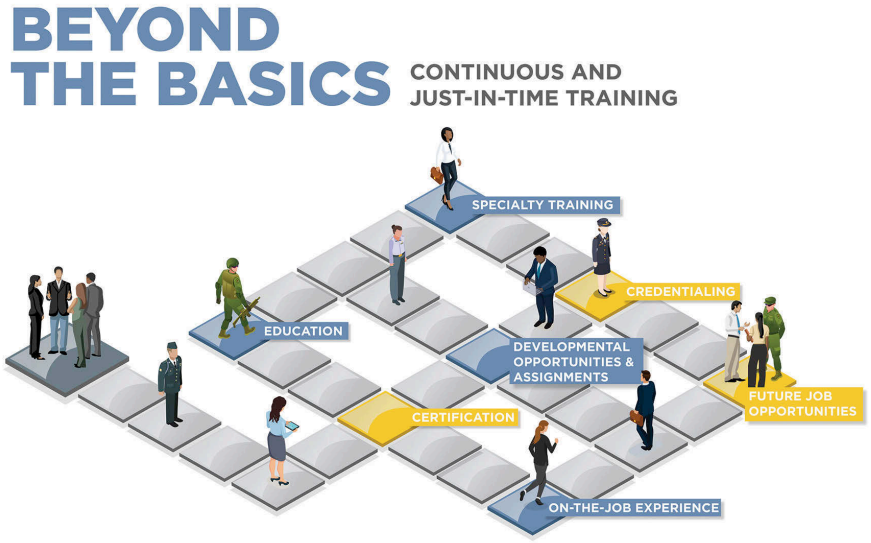
FIGURE 1



FUNCTIONAL AREAS

The six functional areas of the Back-to-Basics framework are business financial management and cost-estimating; test and evaluation; life-cycle logistics; contracting; engineering and technical management; and program management. (Graphics by USAASC)

FIGURE 2



ALL THE RIGHT MOVES

The new Back-to-Basics framework changes certification requirements to functional qualifications in a reduced number of acquisition career fields to help streamline training and emphasize competence over the rote and repetitive memorization.

FIGURE 3

CAREER COLLABORATION
Supervisors and employees collaborate to create the best career path for the employee.

As an Army Acquisition Workforce professional, this is the journey you are now empowered to take for your career. You and your direct supervisor are now in the driver's seat. Discussions about career path need to be on-going and documented in the individual development plan. Supervisors serve as mentors, and provide training recommendations that are relevant, timely and meaningful for the employee, the team and the organization. It's a great position to be in to be able to chart your own path. Our supervisors can grow their employees and encourage them to prepare and move into better, more challenging positions. (See Figure 3.)

Professionalizing the Army Acquisition Workforce is my top priority. We're doing all we can to prepare our professionals to take on some of the most challenging acquisition assignments. Quality training and depth of experience—learning your craft and doing the job is what will enable our success.

CHECK IT OFF

I understand moving into Back-to-Basics is a big shift. To set yourself up for success, I recommend you take the following actions:

- Check your Acquisition Career Record Brief in CAPPMIS to ensure all information is correct.
- Update your resume in USA Jobs to reflect the new certification structure.
- Review and understand certification requirements, which can be found on our Back-to-Basics website at **https://asc.army.mil/web/dacm-office/back-to-basics/**.
- Review your updated career path.
- Continuously engage with your supervisor to discuss educational and developmental opportunities.
- Update your individual development plan (IDP) regularly.

Your first-line supervisor should be your first point of contact for all issues related to Back-to-Basics, but my team is here for you too. Our acquisition career managers are standing by to fix any issues or clarify guidance.

Ninth Annual
Major General Harold J. "Harry" Greene
Awards for Acquisition Writing

"I was very lucky. Over the years, I was honored to have jobs where I could work with great people, and we could get great things done. We've accomplished a lot, but there is still a lot of work to do."

-Major General Harold J. Greene

The 2022 Major General Harold J. "Harry" Greene Awards for Acquisition Writing provide a platform for critical thinking and writing about how the Army can best deliver capabilities to Soldiers - both now and in the future. Share your ideas, expertise, experiences, and solutions by submitting your essay in one of the following categories:

- Acquisition Reform
- Future Operations
- Innovation
- Lessons Learned

The competition is open to everyone, and wide participation is encouraged among the Department of Defense acquisition workforce. Submission requirements are available at:
https://www.army.mil/asaalt

U.S.ARMY

NICK MOULTRIE

COMMAND/ORGANIZATION: Program Executive Office for Missiles and Space, Strategic and Operational Rockets and Missiles Project Office

TITLE: International program management specialist

YEARS OF SERVICE IN WORKFORCE: 6

YEARS OF MILITARY SERVICE: 3.5

DAWIA CERTIFICATIONS: Level III program management

EDUCATION: B.S. in commerce and business administration, University of Alabama

AWARDS: Good Conduct Medal (2013), Army Achievement Medal (2013), Army Certificate of Achievement (2012 and 2013), Order of the Silver Spur (2012), Army Commendation Medal (2011), Order of the Combat Spur (2011)

LOCALLY GROWN, INTERNATIONALLY KNOWN

Nick Moultrie has the kind of job that has enabled him to travel around the world and back—and, according to him, he wouldn't have it any other way.

As an international program management specialist, Moultrie has done a fair amount of traveling. In this role, he ensures for the development and execution of international armaments cooperation programs between the U.S. Army and our allies related to the Multiple Launch Rocket System (MLRS) family of launchers and munitions. In a sense, he's an arms dealer—just not the kind typically portrayed on the big screen.

"People always find it surprising that being an international arms dealer is not quite like depicted by [actor] Nicolas Cage in the movie 'Lord of War,' " he said. Though Moultrie's acquisition role might not be as dramatic as Cage's, it's far less risky, a lot more professional and unquestionably necessary for preparing our Soldiers for battle.

"My work is mainly focused on achieving synchronization of MLRS capability requirements between the United States and our allies and developing international agreements to support the development of future weapon systems capabilities," he said. His role is critical in ensuring that Soldiers are equipped with state-of-the-art weaponry. "I find great satisfaction in being able to interface with our allied nations and continue succinct partnerships among our defense programs."

Before Moultrie became part of the Army Acquisition Workforce, he served as a Soldier from 2010 to 2013—spending one year overseas in Iraq—and then worked as a contractor for the U.S. Army in his hometown of Huntsville, Alabama, at Redstone Arsenal. His first Army acquisition position was a systems engineering and technical assistance support contractor, working for cooperative programs within the Program Executive Office for Missiles and Space, Strategic and Operational Rockets and Missiles project office. Shortly thereafter, he made the transition to being a government civilian employee, working in the same office but managing his own foreign (and future potential partners) MLRS Precision Strike Missile programs. "Having the ability to coordinate with various functional groups to solve complex issues is what I personally enjoyed the most about the position," he said. "But the most important part of having a career within the Army Acquisition Workforce is the ability to take advantage of opportunities to expand your field of knowledge, since there is so much to learn with many lessons that could be implemented into any area of expertise."

For Moultrie, the international realm seemed most appealing. "The idea of being an 'international man of mystery' " he joked, was too good to pass up. But really, he said that it was having the opportunity to travel and get a better understanding of other cultures that mainly drew him to international armaments—particularly, weapon-system design and production. "I love being able to tour different production facilities and learn 'how the omelet is

made,' " he said. "And my job allows me to not only experience U.S. production, but also foreign co-production facilities."

"Being more focused on the international armaments cooperation side of international programs, I took an opportunity to learn more about the foreign military sales [FMS] side of the house, which has broadened my understanding of the security assistance process," he said. "Armaments cooperation focuses more on the cooperative research, development and production of a product. Security assistance encompasses a large portfolio of procurement programs, FMS being one of them. In some cases, an international program can involve a hybrid ACSA [acquisition and cross servicing agreements] approach." He said that being able to understand the processes and benefits of each side "will set you up to better be able to meet the partner's requirements and put together a synchronous program."

Moultrie said career development programs hosted by the Defense Acquisition University (DAU) have also been valuable in furthering his career. "DAU is beneficial in the fact that it is mandatory," he said, so that everyone is provided with the same foundational knowledge and educational tools as they relate to your area of expertise. He said Defense Security Cooperation University (DSCU) courses have been much more informative for his line of work, and recently became a requirement for security cooperation employees to be certified both in DAU Level III program management, and DSCU's Security Cooperation Workforce certification.

According to Moultrie, there's an endless supply of knowledge to be acquired and shared both inside and outside of work—even after you've learned and experienced something yourself, there is always more to learn from someone else's experience. "Be a sponge. Soak up knowledge," he said. And he would advise junior acquisition personnel to "seek out those with experience and pick their brains. Take as many educational assignments as you can, and do not be afraid to question processes." Moultrie also said he would strongly encourage taking advantage of every opportunity to travel for work "within reason."

However Moultrie's definition of "within reason" might vary slightly from someone else's. Outside of work he said he might be known as "that guy who sails." During his time off, he enjoys bareboating in exotic locations—renting a sail boat for a week or more, whether it be a monohull or catamaran, and setting sail. "I first got into it when my dad invited me on a sailing trip he was embarking on to the British Virgin Islands in 2018," he said. "It does not have a thing to do with my work, however, I am still trying to convince leadership that a teambuilding trip to Abaco [an island in the Bahamas] is warranted."

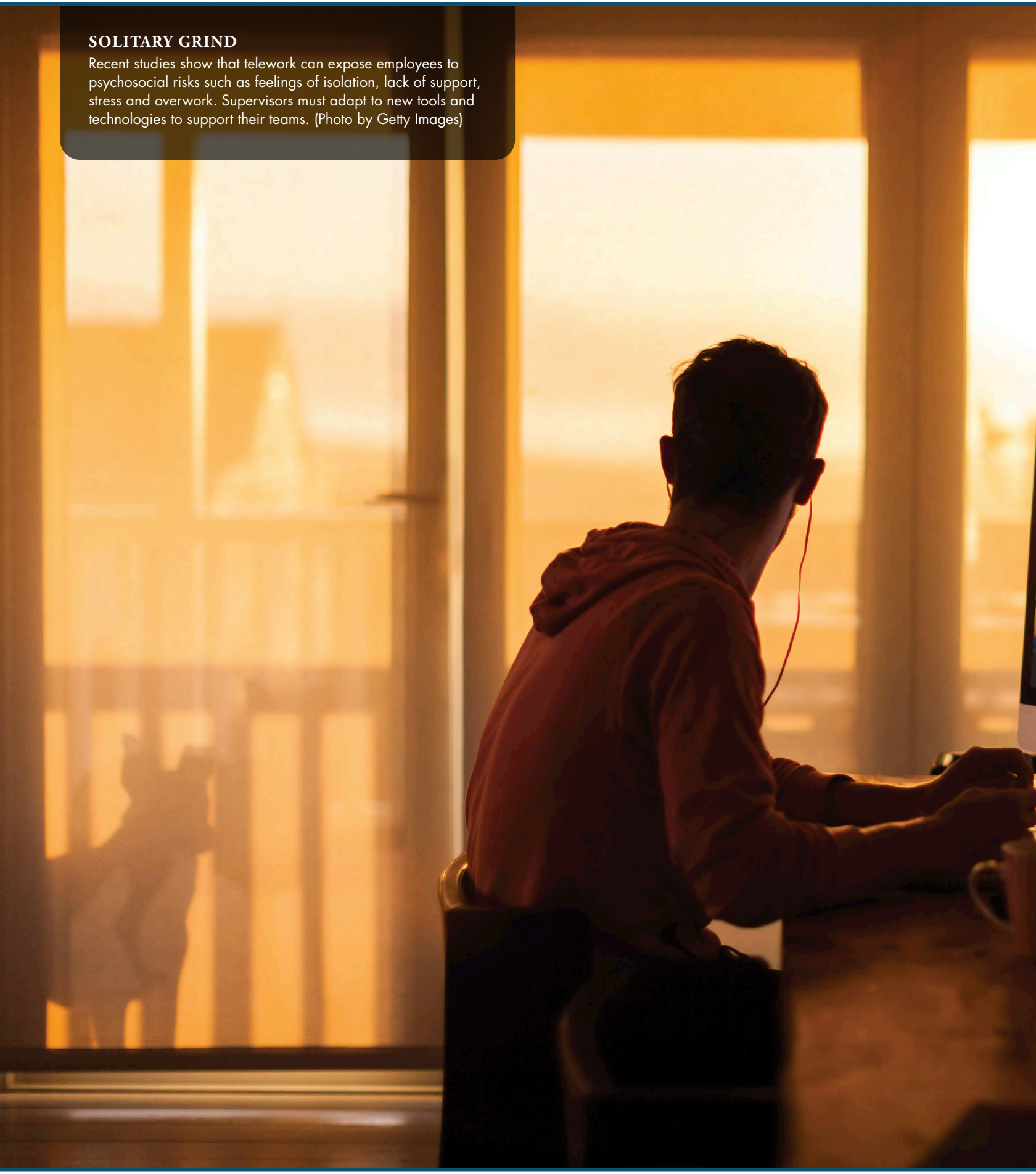
An outside-the-box thinker, Moultrie is never out of new ideas nor is he willing to accept anything at face value. "The government pays you to be a thinker, not a doer," he joked once again, adding that the most important lesson he's learned in the course of his career is to think things through before accepting the first idea that's presented. "I just think there are some people who will move out on an action before putting too much thought into it," he said. "My personal belief is that it is more important for me to think through a problem or task and give my leadership a fair assessment, rather than agreeing with the first suggestion thrown out there—learn from the best and do not be afraid to shake things up."

—CHERYL MARINO

A BREAK IN THE ACTION

Moultrie poses with some members of the Iraqi Army at Al-Ghuzlani Warrior Training Center while on deployment in Mosul, Iraq, in 2011. (Photo provided by Moultrie)

"The most important part of having a career within the Army Acquisition Workforce is the ability to take advantage of opportunities to expand your field of knowledge."



SOLITARY GRIND
Recent studies show that telework can expose employees to psychosocial risks such as feelings of isolation, lack of support, stress and overwork. Supervisors must adapt to new tools and technologies to support their teams. (Photo by Getty Images)

CHAT ME ON TEAMS

U.S. Army telework is here to stay, which means supervisors need to update leadership skills.

by Timothy James Keilty and John Z. "Jack" Burke

In terms of everyday life, 2020 was a transformative year for the world. How we interact, socialize, do business—no facet of life was untouched by COVID-19. The Army, and in particular the acquisition workforce, was no exception. It forced us to change the way we conducted everyday business. No longer were we permitted to come to work five days a week, conduct in-person meetings and do business as usual, yet the mission never stopped. As a result, we were required to rapidly transition from the old ways to new ways, and evolve with the latest guidance and best business practices.

Before March 2020, if you heard the word "zoom," you just assumed a nearby child was playing with a toy racecar—now, when you hear it, you're ready for work. Whether you're in favor of telework, entirely against it or still on the fence, it's difficult to argue against the benefits of it. Equally, telework brings inherent challenges in communication, leadership, accountability and organizational culture. One thing is clear, telework is here to stay—and there are best practices that leaders can take into account to efficiently lead in a remote environment.

CREATE CHANGE...FAST

Like many other organizations, DOD did not have the luxury of hiring a change consultant to observe, formulate and recommend a change plan over time. Instead, it was thrown into the fire by the pandemic.

FIGURE 1

KOTTER'S 8-STEP MODEL

Kotter's multi-step organizational change management model assumes that organizations should change over time, not overnight. (Graphic by USAASC)

if not years. There is no short supply of change models, but one of the most well-known models is Kotter's Eight-Step Change Model, seen in Figure 1. Kotter designed a systematic plan to change an organization over time—not overnight. The pandemic handled Step One—create a sense of urgency. However, DOD did not have time to complete Steps Two through Four—forming a powerful coalition, creating a vision for change and communicating that vision. Instead, DOD jumped from Step One to Steps Five and Six: Remove obstacles and create short-term wins.

Initial challenges were easy to identify—network connection, not enough equipment and lack of meeting space were all part of the initial problem set. These hurdles the Army overcame relatively quickly (once we had Microsoft Teams) and acquired the requisite hardware. Other challenges have been cultural acceptance and leader adaptation. These challenges include how people communicate effectively and lead and build a team in a virtual environment—and were not so easily overcome. To be honest, we're still working on it and probably will be for some time. (Learn more about Kotter's theory in "Change Agent" from Army AL&T's Spring 2019 edition.)

COMMUNICATION IN TELEWORK

There is an argument that the most fruitful conversations happen before and after a scheduled meeting—the so-called "meeting before the meeting." We've all been there; everyone gets to the conference room 15 to 20 minutes early before the boss walks in, and that's when the real conversation (meeting) occurs. Then the meeting happens, and then the "meeting after the meeting" takes place to identify additional tasks or adjustments needed. If these pre- and post-meetings don't happen, could an organization become inefficient and lose critical information?

Constant communication is the heartbeat of an organization. When you're all in the office, it's easy to poke your head into someone's cubicle or office to chat, but when separated, the level of drop-off in communications is significant. In a telework environment, that issue can be further exacerbated. Email is stale, old and inefficient because it does not happen at the real-time speed of a conversation. One of the tools in Microsoft Teams that DOD may be underutilizing is the chat function. The chat, group chat and file-sharing functions of Microsoft Teams provide the means to keep the conversation alive in a telework environment. It is

GOODBYE TO THE DROP BY

When everyone is in the office, it's easy to poke your head into someone's cubicle or office to chat, but when separated, the level of drop-off in communications is significant. (Photo by Getty Images)

CHAT IS WHERE IT'S AT
The chat, group chat and file-sharing functions of Microsoft Teams provide the means to keep the conversation alive in a telework environment. (Photo by Getty Images)

how people get real-time updates; more importantly, you keep the entire team in the conversation. It is how you poke your head into someone's cubicle in a telework environment.

If you doubt that instant messaging is more productive than email, ask Wall Street. From the early 2000s, one of the main forms of communication was AOL Instant Messaging (AIM). Yes, the same platform that teenagers used to communicate in the late 1990s was how a large part of the financial sector of America communicated. In fact, according to the Wall Street Journal, it was the primary form of communication for the financial center until the AIM platform shut down in 2017.

LEADERSHIP IN TELEWORK

How does a leader lead in a telework environment? This is a valid question that supervisors have been trying to answer since March 2020. There is no one-size-fits-all option, but rather it is situational.

Peter Northouse's situational leadership theory is composed of both directive and supportive dimensions of leadership. Leaders must appropriately judge a situation on how to lead their team. There are four leadership styles within situational leadership theory: delegating, supporting, coaching and directing. Leaders need to assess what their organizational goals are, understand their team members' personalities and skill sets, and then choose the most effective leadership style. For example, a competent engineer who has been on the team for 10 years may receive a delegating style of leadership and can telework five days a week. Conversely, an eager entry-level member just out of college trying to prove themselves may receive a directing or coaching style of leadership, and should only telework two days a week.

Equally as important as choosing the right leadership style during telework, leaders must continue to support their team. One undesirable aspect brought to light during the telework era has been the increase of mental health issues in the workforce. Many are naturally social beings who enjoy interaction and communication. Recent studies show that telework can expose employees to psychosocial risks such as

THE NEW ZOOM
Before March 2020, the word "zoom," meant a nearby child was playing with a toy racecar—now, it means you're ready for work. (Photo by Getty Images)

feelings of isolation, lack of support, stress and overwork. These reasons underscore the importance for supervisors of routinely checking in with their team. This will vary from team to team and must be continually reassessed.

Leaders should review these five tips for effectively leading a team in a remote environment from CompuVision, an IT management support services and consulting firm:

- Video conference—ensure cameras are turned on.
- Connect often—check in with team members and allow for quick interactions to review key tasks or milestones.
- Chat first, email second—chats are quick and effective, and don't experience the same delays as email.
- Listen—use one-on-one time with employees to understand their unique situation. Check in and ask questions.
- Profile pictures—employees should maintain professional profile pictures to help others recognize them when they have to meet in person.

CONCLUSION

The world we live in has changed and we must adapt. Telework benefits organizations and individuals, but it does not come without challenges. Now, more than ever, leaders must be effective communicators using new technology platforms like Microsoft Teams. Leaders need to understand that there is not a one-size-fits-all telework policy. Knowing their team members provides invaluable feedback on how they should exercise situational leadership. Telework is here to stay; let us learn how to do it well.

MAJ. TIM KEILTY is an assistant product manager within the Program Executive Office for Missiles and Space at Redstone Arsenal, Alabama. He holds an M.A. in organizational psychology from Teachers College, Columbia University and a B.S. from the United States Military Academy.

MAJ. JOHN Z. "JACK" BURKE is an assistant product manager within the Program Executive Office for Missiles and Space at Aberdeen Proving Ground, Maryland. He holds an MBA and a B.A. in political science, both from California State University San Marcos.

Whether you're in favor of telework, entirely against it or still on the fence, it's difficult to argue against the benefits of it.

CAREER NAVIGATOR

FEELING THE BURN(OUT)

Overworked and overwhelmed?
You may be experiencing burnout.

by Jacqueline M. Hames

In this era of side hustles and the glorification of workaholics, it's hard to establish professional boundaries, especially if multiple jobs are necessary to make ends meet. Work—whether actual tasks or simply work-related thoughts and anxieties—have crept into our collective downtime. Paired with two years of pandemic restrictions and any number of personal stressors, the workforce is primed for it—burnout.

THE SIGNS

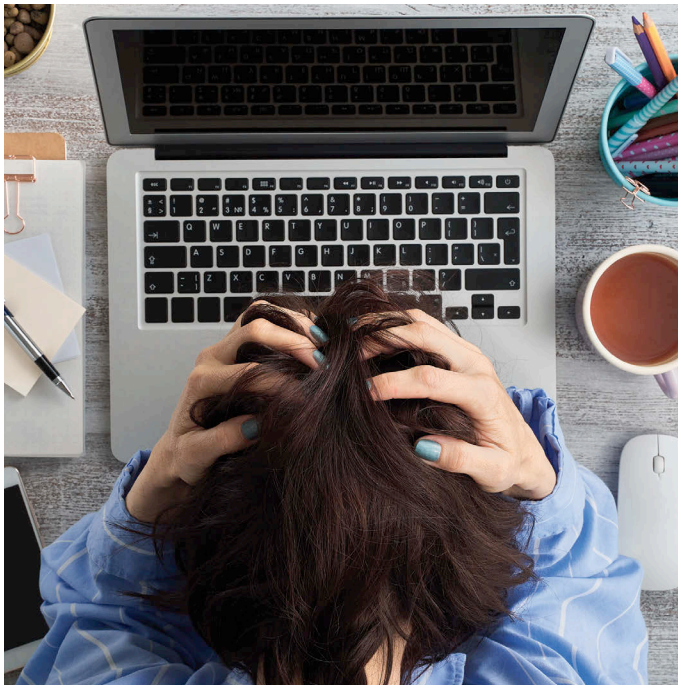
For people teleworking, there is no morning commute in which we can mentally gear up, and no commute home during which we can decompress, and no physical distance between us and the office-provided equipment. Those working at locations in person, like healthcare workers and other essential personnel, or those doing physical jobs like welding, are frequently making up for being understaffed and lacking resources by putting in extra time.

Workplace burnout or job burnout, as defined by an article from the Mayo Clinic, "is a special type of work-related stress—a state of physical or emotional exhaustion that also involves a sense of reduced accomplishment and loss of personal identity." It can be the result of several things: Lack of control, unclear job expectations, a dysfunctional workplace, extremes of activity, lack of social support and lack of a work-life balance, the article continued—all factors that the collective workforce experienced during the pandemic.

Some signs of burnout, as listed on WebMD, include:

- Exhaustion and trouble sleeping.
- Cynicism.
- Feelings of uselessness.
- Depression.
- Extreme job dissatisfaction.
- Irritability or anger.
- Trouble concentrating.
- Frequent headaches.
- Pain in your gut.
- Use of alcohol, drugs or other unhealthy habits as coping mechanisms.

Corporations and the government are now calling for a full return to the office. That prospect is daunting for some—even if people enjoy being in the office.



TIME TO STEP AWAY

Many tend to spend too much time at their desks, whether it's working remotely or at the office. Build movement or exercise into your routine. Just move with a regular exercise routine or maybe a 15-minute dance break after that long meeting. (Photos by Getty Images)

In April 2022, Deputy Secretary of Defense Kathleen Hicks issued the memorandum, "Army Workplace Guidance for Final Reentry of Civilian Personnel," reflecting guidance from DOD. The Army's guidance is that all civilian employees will be given 30 days advance notice in writing before being asked to return to the office, "absent an urgent or compelling mission need." It also states that "telework flexibilities should be broadly extended to telework-eligible employees, when practicable and subject to mission requirements."

But, after a few years, before- and after-work schedules have been drastically adjusted to accommodate certain flexibilities, including "sleeping in." Personnel have also adjusted wardrobes (ah, sweatpants), exercise habits and even physical locations, occasionally moving to a different area to be nearer to family or other support systems. Launching back into a pre-pandemic work routine for some is going to be difficult, to say the least, perhaps bordering on overwhelming.

RISKY BUSINESS

As the workforce moves back into the office—at least partially—preventing and managing burnout will be crucial. In 2020 alone, 57 percent of federal employees reported feeling burned out; one in three of those attributed the feelings to the COVID-19 pandemic, according to a Federal Employee Viewpoint Survey from Eagle Hill Consulting. Time pressures, poor communication and heavy workloads were the biggest sources of burnout.

While employee burnout is a continued risk, it can be prevented or mitigated, and employers can play a big role in that process. The January article, "In 2022, public employers face hiring challenges, opportunity" from American City & County said that employers—in both the public and private sectors—could help prevent job burnout with initiatives like wellness programs, flexible work-from-home arrangements, employee assistance programs and nontraditional benefits, such as student loan repayment and holistic health programs.

The Army's own robust Employee Assistance Program has entirely free services, including screenings and assessments, and short-term counseling and referral for problems that may affect job performance or well-being.

CONCLUSION

Employees who find themselves experiencing symptoms can do a few things to help stop burnout in its tracks, according to a Federal Employee Education and Assistance Fund article. Some things to try are:

- **Keep a balanced schedule.** Set your work boundaries and maintain them—no more "extra hours." Take regular breaks and try to plan your downtime in advance to better protect it.
- **Build movement or exercise into your routine.** Whether you're establishing a regular exercise routine or just taking a 15-minute dance break after that long meeting, just move.
- **Plan your vacation (or staycation).** Not only is it fun to plan all your glorious adventures, or all that time you'll be relaxing in peace, it also will give you something to look forward to—and it will give coworkers time to prepare for your absence.
- **Talk to your supervisor**, especially if you're already feeling burned out, and ask how you can modify your workday to better accommodate your needs.

Prioritizing regular self-care is also critical in both prevention and recovery from burnout, so make sure that you're doing the things that make you happy as often as you can. And if you're having

DON'T WAIT

Burnout can lead to more serious mental health issues. If you or someone you know is experiencing a mental health crisis, reach out immediately.

Veterans and service members can use the Military Crisis Line (go to **https://www.veteranscrisisline.net/get-help/military-crisis-line**) to phone or chat. In the U.S., call 800-273-8255 and press 1, which will take you to the Veterans Crisis Line. From the Military Crisis Line website:

- In Europe, call 00800-1273-8255 or DSN 118.
- In Korea, call 0808-555-118 or DSN 118.
- You can also use the Crisis Chat and request a call from a responder.

Civilians and the general public can use:

- The National Suicide Prevention Lifeline at 1-800-273-8255 (TALK).
- The Substance Abuse and Mental Health Service Administration National Helpline at 1-800-662-HELP (4357).

For more detailed information and resilience resources, read "When the Going is Tough, Get Help" from Army AL&T's Spring 2021 issue.

trouble, reach out—connect with a friend or family member, or the Employee Assistance Program.

*For more information on burnout or how to get help, go to **https://www.armyresilience.army.mil/ASAP/pages/Employee-Assistance.html** or **https://www.samhsa.gov/**.*

JACQUELINE M. HAMES is an editor with Army AL&T magazine. She holds a B.A. in creative writing from Christopher Newport University. She has more than 10 years of experience writing and editing news and feature articles for publication.

EASING INTO THE WORKDAY

Work schedules have been adjusted to accommodate certain flexibilities, enabling personnel to adjust wardrobes, exercise habits and even physical location so they can do their job from just about anywhere.

CHRISTINA LAWSON

COMMAND/ORGANIZATION: Program Executive Office for Missiles and Space, Strategic and Operational Rockets and Missiles Project Office

TITLE: Acquisition analyst

YEARS OF SERVICE IN WORKFORCE: 10

DAWIA CERTIFICATIONS: Level III in contracting

EDUCATION: B.S. in business management, Athens State University

AWARDS: Civilian Service Commendation Medal (2019), Civilian Service Achievement Medal (2020), STORM Employee of the Quarter (Oct.–Dec. 2021)

A LITTLE PERSONALITY CAN GO A LONG WAY

The decisions Christina Lawson makes have significant outcomes. Her role as an acquisition professional supporting the Field Artillery Launchers (FAL) Product Office portfolio involves collaboration with numerous teammates from across the Strategic and Operational Rockets and Missiles (STORM) Project Office and Army Contracting Command-Redstone Arsenal, Alabama, to develop the documentation for successful contract awards.

But when describing her job to others, Lawson tends to put it into more simplistic terms. "I write contracts for huge trucks that fire rockets and missiles and blow stuff up," she tells them. A description to which, she said, the response is either "HOW COOL!" or "Oh, I see..." It all just depends on the audience.

"Honestly, there's not a way to make writing a contract that is hundreds of pages long sound super fun and exciting," Lawson said of her role as an analyst. So she resorts to what she calls the "elevator speech"—the few lines that you give to someone trying to make small talk in an elevator. She's found that this approach, which she said she is "still working on" mastering, can be effective in almost any situation—particularly in breaking the ice or when trying to use fewer words to explain something more complex or difficult to understand.

Lawson began her government career as a summer-hire in 2010, where she scanned large volumes of files, particularly contracts, into digital copies to cut down on the paper copies of massive documents. "I had no idea at the time that those very contracts would be the type of documents I would eventually work with," she said.

Lawson continued that following year as a cooperative student—taking classes toward her undergraduate degree while working full time—in the Precision Fires Rocket and Missile Systems Project Office (now the STORM Project Office), directly supporting the program manager for the FAL Product Office. "I didn't have a background in a specific skill set, although I was taking classes towards my Level I Defense Acquisition Workforce Improvement Act Program Management certification," she said. "The opportunity to move to the acquisition division within the same project office presented itself, so I jumped on the chance to pursue something new." This marked the beginning of her journey with the Army Acquisition Workforce as an acquisition analyst.

"At the ripe age of 22, I was drawn to the professionalism I saw in the individuals who represented the acquisition division. The expertise and confidence they displayed in public forums was something I wanted to possess myself," she said, adding that she never would have made it this far without a mentorship.

"I had so many formal [and] informal mentors that I relied on day in and day out for the first few years of my acquisition career and still do from time to time. They were my

personal cheerleaders—always encouraging me, challenging me or even 'bringing me back to my senses' when I almost made the decision to leave the government," Lawson said. "At the time, I was young and never envisioned 'acquisition analyst' as what I wanted to be when I grew up. I guess you could say I was still trying to figure things out, and I was exploring my options." It was during this exploration that her mentor convinced her to stay, she said.

"One of my fears is disappointing others," Lawson admits. "My mentor at the time expressed how proud he was of me and how much he believed that I would go on to do great things if I just stuck it out, so needless to say, I left that conversation with a renewed confidence and decided to stick around."

Lawson said the guidance of her mentors was so valuable that she would pass along that same advice to junior acquisition personnel and especially "encourage them to never be afraid to ask questions and stick with it." She said that coming into the world of acquisition can be both intimidating and overwhelming. "I think I was afraid, for a good six months, to answer emails without asking my mentor if my response was correct and responding with an 'I'm not sure, let me get back to you' more times than I can count, but if you stay loyal to this career field, it will become one of the most rewarding positions you will ever have," she said.

"One of my mentors told me, 'Always say yes when leadership asks the workforce for volunteers for special assignments [or] deployments.' Even though I have developed personally and professionally in my career without taking on extended or traveling assignments, I do wish I would have said yes a few more times when life was less hectic."

And she said life can get pretty hectic. When she's not serving as a team business advisor at work, Lawson is advising a different kind of team, in a very different capacity, at home. "People [outside of work] would probably say that I'm a girl mom who lives on a farm," she said—seemingly the opposite of how she might be viewed at work. "The only thing this has in common with my work is that both my work and home life are crazy and busy. Between taking care of three hilarious, dramatic and into-everything girls under the age of six, along with helping my husband take care of our farm animals, it's chaos all the time," she said. But Lawson has figured out how to balance work and family life, and so far it's working out pretty well.

In addition to juggling work and family, Lawson said a career development program called High5!, offered by an outside consulting company, which she completed in 2019, was extremely helpful and the "best class she has ever taken." The program promoted the expanded benefits of effective team communication and collaboration, she said, and "was geared toward understanding both your unique personality and that of colleagues, and was amazingly accurate at generating your personality profile and displaying details of your possible strengths and weaknesses, effective communication techniques and suggestions for development—my results showed that I like to be involved, but also care about meaningful relationships with people."

At the end of the day, the most rewarding part of Lawson's job is working with cross-functional teams to support a major weapon system, and bringing the 15-years-dormant Multiple Launch Rocket System (MLRS) production line back to life to support one of the Army's top modernization priorities—Long Range Precision Fires. "Upon fielding, the MLRS M270A2 Launcher will offer new technology and increased crew protection," she said, which achieves the ultimate goal of "keeping our nation's Soldiers safer and equipping them with the most up-to-date capabilities." And that makes it all worthwhile.

—CHERYL MARINO

WORK-LIFE, BALANCED
Lawson and her daughter Heidi on "Take Your Child to Work Day" in front of the M270A1 static display at the STORM Project Office. (Photo provided by Lawson)

ON THE MOVE

1

2

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

1: ASA(ALT) WELCOMES NEW STRATCOM DIRECTOR

Jamal Beck assumed duties as the director of strategic communication for the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (OASA(ALT)) at the Pentagon on March 14. In his more than 20 years of communications experience, Beck has served as the chief of public affairs at the Joint Intermediate Force Capabilities Office and the Joint Non-Lethal Weapons Program, the deputy chief of the executive communications branch in the Office of the Chief of Army Reserve, and the public affairs chief at the Army Geospatial Center. (Photo by Brian Landon, ASA(ALT))

2: CHANGE OF RESPONSIBILITY, DEVELOPMENTAL MOVE AT ASA(ALT)

Debra Dawson assumed the developmental role as acting strategic communications director at OASA(ALT) from June 2021 to March 2022. Dawson served as both acting director of strategic communications and senior subject matter expert in charge of planning, coordinating and facilitating end-to-end professional support on all matters of engagement with defense and commercial industry partners. Dawson began her 20-year career with the Army as a supervisory public affairs specialist at the Program Executive Office for Soldier, Fort Belvoir, Virginia, and was later deployed to Afghanistan as a civilian deputy to the ASA(ALT) at Bagram Air Force Base. Dawson has since returned to her role as the G-9 (installations) director at the U.S. Army Combat Capabilities Development Command (DEVCOM) Soldier Center in Natick, Massachusetts. (Photo by Brian Landon, ASA(ALT))

3

U.S. ARMY ACQUISITION SUPPORT CENTER

3: USAASC DEPUTY HONORED FOR 28-YEAR CAREER

Col. Ralph T. Borja, left, celebrated his retirement from active duty at a ceremony hosted by his brother, **Col. (Ret.) Robert W. Borja**, May 12 at the U.S. Army Museum at Fort Belvoir, Virginia. Borja had served as the deputy director of the U.S. Army Acquisition Support Center (USAASC) since July 2019, and was previously the commander of the 408th Contracting Support Brigade at Camp Arifjan, Kuwait. He was commissioned as a field artillery officer in 1994 after graduating from the University of Guam. (Photo by Ellen Summey, USAASC)

4


4

U.S. ARMY MEDICAL LOGISTICS COMMAND

4: PROMOTION AT AMLC

Army Medical Logistics Command's (AMLC) **Command Chief Warrant Officer Lee Nelson**, right, accepts his promotion to the rank of chief warrant officer 5 during a ceremony at Fort Detrick, Maryland, on April 1. **Col. Deon Maxwell**, AMLC's assistant chief of staff for support, administered the oath of office. Nelson is an expert biomedical equipment specialist with 26 years of military service. (Photo by C.J. Lovelace, AMLC Public Affairs)

PROGRAM EXECUTIVE OFFICE FOR AVIATION

1: CHANGE OF CHARTER AND POST CEREMONY RETIREMENT

Lt. Col. Nick Yerby, center, accepts the charter and responsibility as product manager for the Program Executive Office for Aviation's Apache Development and Modernization Product Office from **Col. Jay Maher**, Apache Helicopters project manager, during a ceremony held February 24 at Redstone Arsenal, Alabama. **Lt. Col. Matthew Peterson**, seated, retired from the Army following the change of responsibility ceremony. Peterson received the Legion of Merit and Army Aviation Association of America' Order of Saint Michael, Bronze Award for significant contributions to the Army Aviation community after 20 years of service. (Photo by Belinda Bazinet)

2: RETIREMENT CAPS 25-YEAR CAREER

Col. Greg Fortier, right, accepts his certificate of retirement from **Gabe Camarillo**, undersecretary of the Army, during a ceremony held March 31 at the Huntsville Botanical Garden in Alabama. Fortier, who became the first Future Attack Reconnaissance Aircraft project manager in 2019, relinquished responsibility to **Col. Kevin Chaney**, not pictured, in December 2021. Fortier retires from the Army with more than 25 years of service. (Photo by David Hylton)

3: PROMOTION AND ASSUMPTION OF CHARTER AT FLRAA

Lt. Col. John Plitsch, right, was promoted to his current rank on March 11 by **Col. David Phillips**, left, project manager for PEO Aviation's Future Long Range Assault Aircraft (FLRAA). Upon his promotion, Plitsch also assumed leadership as the product lead for FLRAA's new modernization product office. (Photo courtesy of Iron Mountain Solutions)


4


4

PROGRAM EXECUTIVE OFFICE COMMAND, CONTROL, COMMUNICATIONS-TACTICAL

4: PROMOTION AT PEO C3T

Col. Brandon Baer, right, was promoted from lieutenant colonel during a ceremony hosted by **Maj. Gen. Robert Collins**, program executive officer for Command, Control, Communications-Tactical (C3T) at Aberdeen Proving Ground, Maryland on April 1. His next assignment will be at the Office of the Secretary of Defense. Baer's last duty assignment was as product manager for Helicopter and Multi-Mission Radios within PEO C3T, where he led the inaugural Integrated Tactical Network effort in addition to his duties leading air-to-ground, high frequency, and other Army tactical radio network modernization efforts. Baer will graduate from the Eisenhower School of National Security and Resources Strategy at National Defense University in June.

U.S. ARMY AVIATION AND MISSILE COMMAND

5: ASSUMPTION OF DUTIES AT AMCOM G3

Col. David Bunker assumed the duties as the G-3 at the U.S. Army Aviation and Missile Command (AMCOM), Redstone Arsenal, Alabama, on May 13. Bunker previously served as the military deputy at the AMCOM Logistics Center.

5

THE CHIEF OF STAFF OF THE ARMY ANNOUNCES THE FOLLOWING OFFICER ASSIGNMENTS:

Maj. Gen. Robert M. Collins, program executive officer for Command, Control and Communication-Tactical, Aberdeen Proving Ground, Maryland, to deputy for acquisition and systems management, Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology), Washington, D.C.

Maj. Gen. Anthony W. Potts, program executive officer for Soldier, Fort Belvoir, Virginia, to program executive officer for Command, Control and Communication-Tactical, Aberdeen Proving Ground, Maryland.

Brig. Gen. Ronald R. Ragin, commanding general, 13th Expeditionary Sustainment Command, Fort Hood, Texas, to deputy chief of staff for logistics and operations, United States Army Materiel Command, Redstone Arsenal, Alabama.

Brig. Gen. John T. Reim Jr., director, Defense Security Cooperation Management Office-Afghanistan, Qatar, to program executive officer at the Joint Program Executive Office for Armaments and Ammunition, commanding general, Picatinny Arsenal, New Jersey.

Maj. Gen. Maria B. Barrett to commanding general, United States Army Cyber Command, Fort Gordon, Georgia. She most recently served as commanding general, United States Army Network Enterprise Technology Command, Fort Huachuca, Arizona.

Maj. Gen. David Wilson, commanding general, 8th Theater Sustainment Command, Fort Shafter, Hawaii, to commanding general, United States Army Sustainment Command, Rock Island, Illinois.

Brig. Gen. John L. Rafferty, Jr., director, Long Range Precision Fires Cross-Functional Team, Fort Sill, Oklahoma to chief of public affairs, Office of the Secretary of the Army, Washington, D.C.

THE FOLLOWING OFFICERS WERE CONFIRMED BY THE SENATE:

Lt. Gen. Randy A. George, for appointment to the rank of general and assignment as vice chief of staff of the Army, Washington, D.C. He is currently serving as senior military assistant to the Secretary of Defense, Washington, D.C.

Lt. Gen. James J. Mingus, for appointment to the rank of lieutenant general and assignment as director, joint staff, Washington, D.C. He is currently serving as director for Operations, J-3, Joint Staff, Washington, D.C.

THEN & NOW
1962 - 2022

BEFORE SOFTWARE, THERE WERE COMPUTERS

The Army's urgent wartime need created the computer industry in the mid-20th century. Can it pull another rabbit out of a hat to address today's software acquisition challenges?

by Steve Stark

During World War II, the Army had an intractable problem that required a novel solution: New weapons that needed firing tables were coming online, but the process for creating the tables was so laborious that the human brains that calculated them couldn't keep up. From that need, the mid-20th century's computer industry was born. Now the Army faces different challenges in software acquisition.

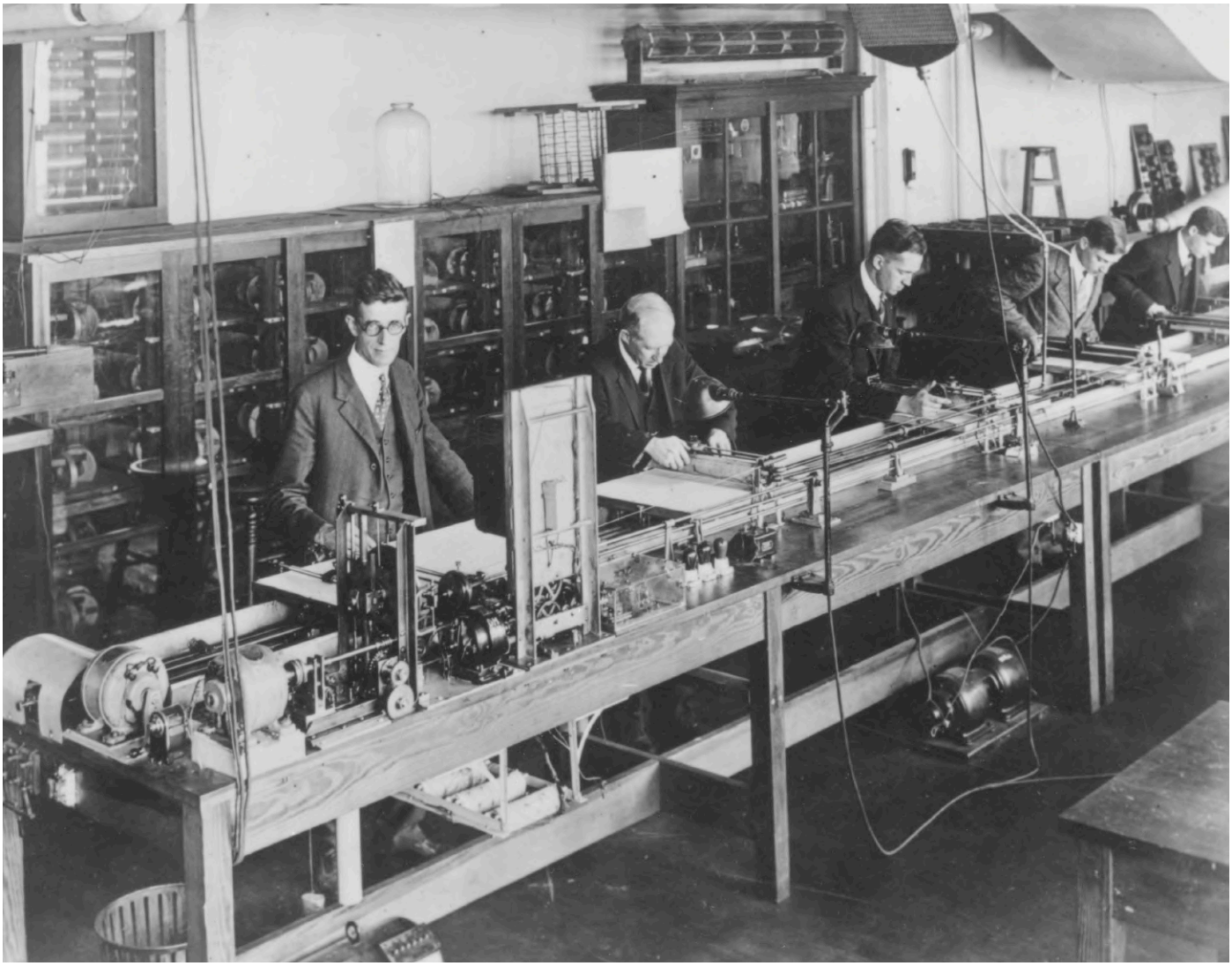
In "Gigantic Computer Industry Sired by Army"s World War Needs," from the December 1963-January 1964 edition of Army Research and Development, the predecessor to Army AL&T, Daniel Marder and W. D. Dickinson, wrote that "Today's multi-billion [sic] dollar computer industry …was spawned as a result of the U.S. Army's urgent need for enormous amounts of firing tables and other ballistic data during World War II." At the time, Dickinson was assistant to the director of the Army's Ballistic Research Laboratories at Aberdeen Proving Ground, Maryland, part of the Army Research Office.

Weapons that lobbed munitions far beyond what a Soldier could see were difficult to aim. Firing tables were the solution. They consisted of calculations that considered the weight of the munition, the power of the propellant and the angle of the howitzer, for example, and told how to set the weapon before firing. Figuring all that meant a lot of calculations—for human computers.

SOFTWARE-FREE COMPUTERS

To relieve considerable backlogs, a group at the U.S. Army Ballistic Research Laboratories (BRL) at Aberdeen Proving Ground, led by the officer-in-charge of computations, Lt. Col. Paul N. Gillon, set out to "revolutionize methods of calculations." BRL, "in addition to its own Bush Differential Analyzer, had been using another 'Bush machine' at the University of Pennsylvania," according to the article.

Vannevar Bush had invented the differential analyzer in the 1920s, and it was a mechanical computer that computed digits by means of mechanics similar to the way that adding machines



THE FIRST OF ITS KIND

Number crunching circa 1935: U.S. electrical engineer and scientist Vannevar Bush (1890 - 1974) at the left, where an electrical brain solves mathematical problems far too complex for the human mind. (Photo by General Photographic Agency/Getty Images)

and cash registers did. The computer was powered by electricity, but it was not electronic.

"It was here [at BRL] that the idea was originated by Dr. J. Mauchly for an entirely new type of computational machinery—a machine that would calculate by the lightning impulses of electron tubes." Mauchly, with assistance of J. P. Eckert Jr., "prepared the original outline of the technical concepts underlying electronic computer design." They would use the Bush machine as a model and create an electronic prototype that could do the calculations not only faster but without the physical limitations of metal plates and gears that the mechanical computer used. Mauchly and Eckert were "the scientists credited with the invention of the Electronic Numerical Integrator and Computer (ENIAC)," according to the Massachusetts Institute of Technology.

As important as software would be, no one gave a lot of thought to it. During World War II, the only sort of software that

existed were literal soft wares—linens, clothing and the like—sold in the "software" sections of department stores. Even in the early editions of Army Research and Development, software either didn't appear or was referred to as "so-called software." It seemed incidental to the all-important computer itself.

ENIAC's predecessor mechanical computers are important to understanding why computer hardware and software seemed inseparable. Such machines were sophisticated but narrowly purposed. The coding was in the hardware. To change the output, the user changed the settings of the hardware. ENIAC was modeled on that, as were the original mainframes. Those early electronic computers were in high demand and available by appointment only, and the users would bring their own software on punch cards or magnetic tape.

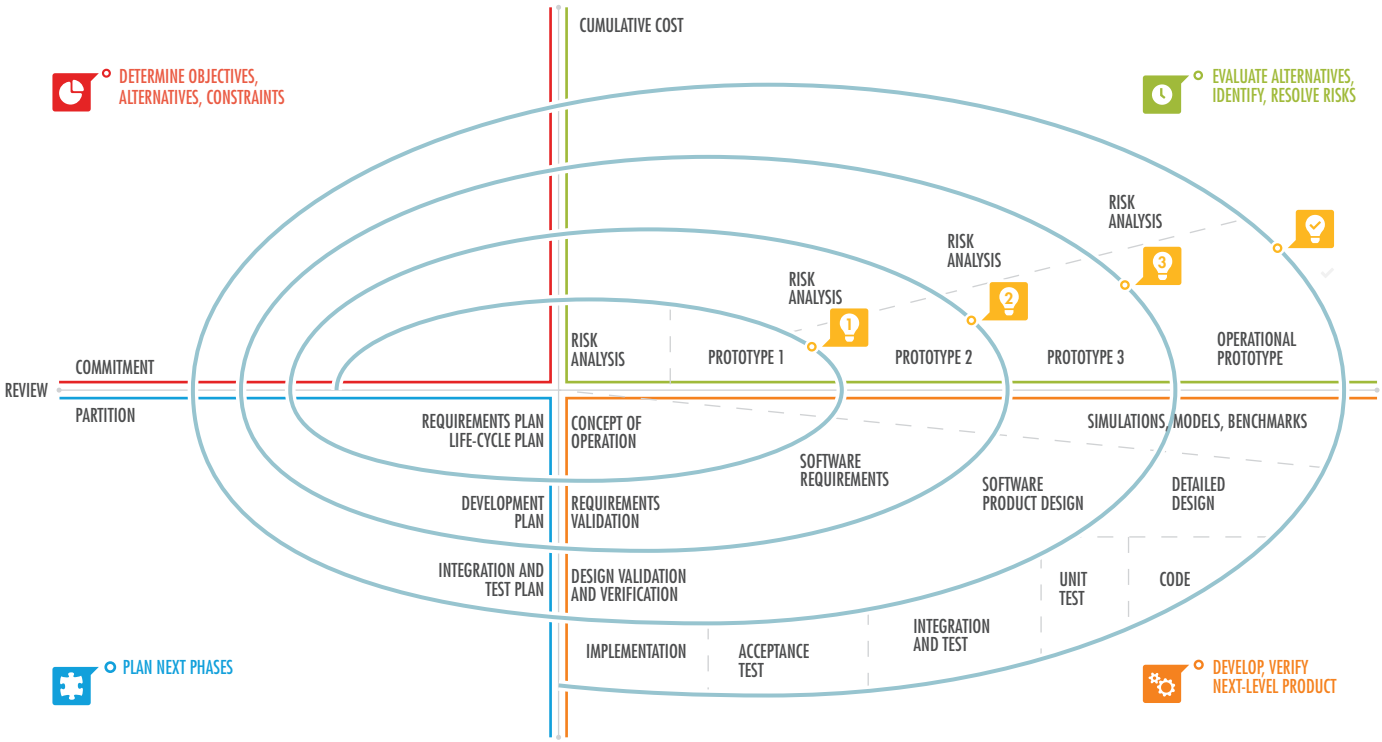
When it became clear what ENIAC and its successors could do with numbers, users quickly envisioned what else they might do.

WATERFALL

In the 1960s, software as an engineering specialty was still in its infancy, and had only recently been designated "software engineering" to help give it the credibility it deserved alongside computer science. These days, the software-centered businesses of Google, Meta, Amazon and Apple are worth trillions of dollars. All make some kind of hardware, but the magic and the money live in the software.

Once software became a fact of life, it almost immediately was in crisis. In the mid to late 1960s and for much of the next 20 years, the industry considered software bloated, buggy, over budget,

FIGURE 1



ITERATIONS

Barry Boehm described a spiral model of development that more closely tracks with the way software is made today, in continuous iterations. (Graphics adapted by USAASC from Boehm's 1986 paper "A Spiral Model of Software Development and Enhancement")

dangerous, and there were insufficient software engineers to keep it on schedule.

In recent years, DOD stakeholders and reformers have lamented the "waterfall" method of software development, which, despite its advanced age, still has not been retired.

The graphic that led to the name—in a paper by Winston W. Royce, Ph.D., called "Managing the Development of Large Software Systems"—was more a description of how things were done in 1970 and less a suggestion of how they should be done. The name appears to have come later, in a 1976 paper by T. E. Bell and T. A. Thayer of the TRW Defense and Space Systems Group, "Software Requirements: Are They Really a Problem?" A 1988 paper by Barry Boehm, also from TRW, described "A Spiral Model of Software Development and Enhancement." Boehm wrote that the waterfall had improved upon the "stage-wise" (or stage-by-stage) method, but he sought to replace it with spiral development, "an iterative and risk-driven model of software development" that would fix waterfall's shortcomings.

In some respects, the waterfall method matched the way that Congress funded (and still funds) DOD's software acquisition: Create extensive requirements and develop everything with a particular end state in mind. That works for trucks and tanks, but it doesn't fit software as well as iterative development methods like DevSecOps and Agile, contemporary methods used by nearly all commercial developers, and which the Army would like to emulate.

CONCLUSION

In the last few years as it has struggled with software acquisition, DOD promulgated different pathways for acquiring different kinds of systems. Software is one pathway in the Adaptive Acquisition Framework that intends to simplify and streamline acquisition.

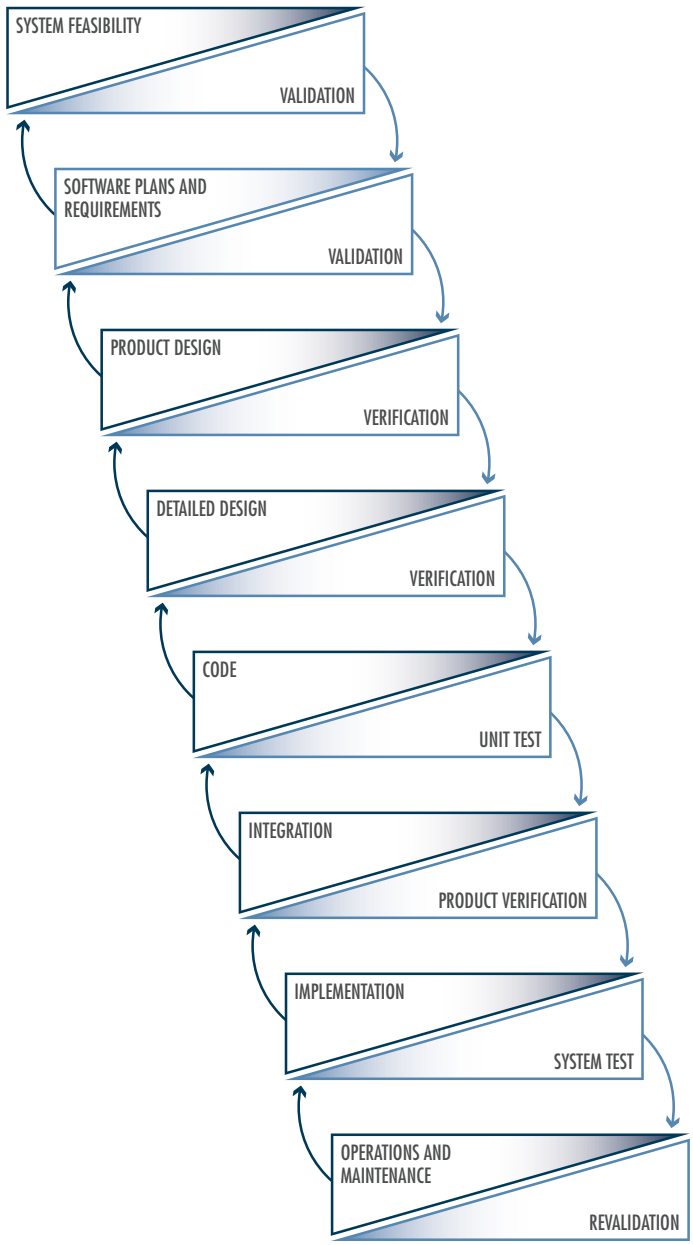
Establishing that pathway didn't suddenly make software acquisition better, but it is helping to change the DOD approach. According to reporting by the Government Accountability Office, "GAO's 'Agile Assessment Guide' emphasizes the early and continuous delivery of working software to users, and industry recommends delivery as frequently as every 2 weeks for Agile programs. Yet, as of June 2021, only six of 36 weapon programs that reported using Agile also reported delivering software to users in less than 3 months."

EVOLVING TECHNOLOGY
Technology is ever changing. Years ago information was stored on one computer and a floppy disk was used to transfer data to another computer. Today, devices can interact, sync up and share data with multiple devices instantaneously. (Photo by Getty Images)

Big problems facing DOD today, GAO said, are "staffing challenges related to software development, such as difficulty hiring

Early electronic computers were in high demand and available by appointment only.

FIGURE 2



THE WATERFALL METHOD

Royce didn't actually name the waterfall methodology—he used the illustration to describe how software was developed in the early era. It first seems to have earned the moniker a few years later.

government and contractor staff." Competition for talent is so intense that it's been called a war. In 1945, the Army replaced hundreds of people doing the math for firing tables with a revolutionary, first-of-its-kind machine that spawned an entirely new industry.

The magic and the money live in the software.

Back then, the issue that the Army faced wasn't a personnel problem. Indeed, the Army showed that it was a technological problem, and then solved it with an entirely new solution. Today's "staffing challenges" also may not, in the end, have a personnel solution. Whether the solution will be technological, only time will tell.

Solutions to challenges tend to create other, unforeseen challenges. Back in the 1940s, no one could have foreseen the lack of sufficient talent for the Army's software needs because most people weren't clear on what software was. Today, that model has flipped. Software is central and computers are commodities.

The Army isn't likely to find another magical rabbit in a hat that will make all its software acquisition woes dissolve. Instead, the solution will come—as it did then—when smart people look to recreate tools and processes that make the available talent sufficient to the task. Colorless money—funding not lashed to research, development, test and evaluation, for example—has its proponents, and may be part of the solution, but only a part. Whatever the ultimate solution, it seems inevitable that it will pose new challenges.

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Saving work, the old fashioned way. (Photo by Getty Images)

For more information on the issues facing Army acquisition—yesterday and today—go to https://asc.army.mil/web/magazine/alt-magazine-archive/.

STEVE STARK is senior editor of Army AL&T. He holds an M.A. in creative writing from Hollins University and a B.A. in English from George Mason University. In addition to more than two decades of editing and writing about the military, science and technology, he is, as Stephen Stark, the best-selling ghostwriter of several consumer-health oriented books and an award-winning novelist.

COMPUTING CIRCA 1984
The original Apple Macintosh computer was considered revolutionary when it debuted with point-and-click capabilities and a single floppy disk drive. (Photo by Getty Images)

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"Broadly speaking, we cannot separate data and software or data and AI. We must be deliberate about software. We have to think about data before developing software or creating algorithms and AI."

—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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