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BUILDING THE ACQUISITION TEAM

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Rapid acquisition serves urgent need, sets an award-winning example

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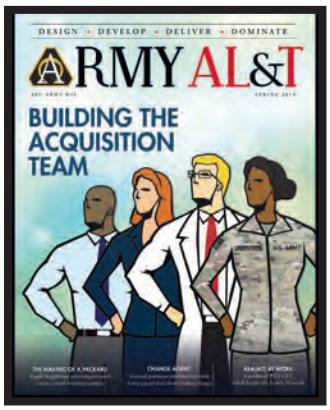

ON THE COVER

In the same way that the decisions we make today with our military will shape the fighting force of tomorrow, so, too, will the decisions we make with respect to the Army Acquisition Workforce shape the materiel that the future force will have at its disposal.

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From the Editor-in-Chief

If you're an acquisition professional and not a big fan of the television series "How It's Made," you should be. The show is a behind-the-scenes look at the manufacture of everyday things. Something as externally simple as a golf ball is actually pretty complicated to make, what with the rubber core, injection molding, and the science behind the dimples, not to mention the scientists, engineers and machines behind the production. Again and again, the program shows what everyone in acquisition understands: Simple is hard.

We know this because the U.S. Army Acquisition Workforce is behind the best, most technically sophisticated equipment in the world for the best Army in the world—but also works to make it as simple as possible to use, as the article "Learning on the Go" on Page 19 shows. An essential element of that is the painstaking scientific research and development, production, testing and logistics that go into it. From inception to fielding and then upgrades, there is an army of acquisition professionals behind everything we make—and we make everything. Creating these products takes a large and highly skilled team of experts. It's the makeup of that team, and their experience, that is at the core of discussion within Army acquisition leadership today.

The Army Acquisition Workforce comprises approximately 1,267 military officers and 418 enlisted personnel and approximately 40,000 civilians across 13 career fields—from engineering to contracting—who work side by side with their industry partners to create the products Soldiers need. But how do you put together the right team with the right skills to 1) compete with private industry for talent, and 2) have the same competencies as their industry partners, if not higher? When you are sitting across the table from a contractor negotiating a multimillion-dollar deal on behalf of the U.S. government, or when you are producing advanced weaponry, you need to be the A-team.

To build that team, Dr. Bruce D. Jette, the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and Army acquisition executive, is spearheading a number of initiatives to identify and recruit talent, such as an acquisition-focused recruiting cell; college scholarships with utilization tours after graduation; and pay incentives. It's worth noting that the Office of the ASA(ALT) is not facing this issue alone: It is linked to the Army Talent Management Strategy as the Army grapples with the same issue across the enterprise. Through new data-mining tools such as the Integrated Personnel and Pay System – Army, we will be able to identify and recruit the talent we need to negotiate the best deal for the taxpayer and ensure that the work the government receives is up to the standards our Soldiers deserve.

In this issue, Dr. Jette addresses his vision of how to build the workforce of the future. Dr. John P. Kotter, professor emeritus at Harvard Business School and world-renowned author of more than 20 books, explores leadership and change in "Change Agent" on Page 70. "The Making of a Packard" (Page 10) showcases how the Army put together an expert team to plan and execute the rapid acquisition of electronic warfare capabilities, in the process setting an award-winning example for others. And "The Need for Speed" (Page 33) shows how DOD, with help from Congress, is upending the acquisition status quo.

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Starting with this issue, we have a new platform for the digital version of the magazine. It offers a much improved, highly mobile-friendly reading experience. Additionally, on Page 24 you'll notice a new "ASA(ALT) at Work" feature wherein we profile our program executive offices and other organizations under ASA(ALT) to explain what they do and how that work supports the warfighter. Those new features, and other changes you've raised in our readership surveys and other reviews, are becoming standard operating procedure to make Army AL&T more useful to you, our readers and contributors.

Finally, speaking of the contributions you make to this magazine, I want to shout out to the ALTies award recipients—the winners and runners-up. The ALTies are annual awards presented to those people across the acquisition enterprise who devoted time and talent to write a commentary, take a photo, write an article or build a graphic—or to write an article that was so engaging, so compelling, that it was viewed the most by our readers. You can see a full list of the awardees on Page 120.

We hope that the work of the 2018 ALTies recipients will inspire you to turn an idea into an article of your own—possibly a future ALTies winner! Drop us a line at **ArmyALT@gmail.com**. We would love to hear from you. Ciao.

Nelson McCouch III
Editor-in-Chief

BRIDGE TO THE FUTURE

The Army Talent Management Strategy will serve as a bridge between the current and future personnel management systems. As the Army moves forward with modernization, the acquisition enterprise must also modernize to meet the needs of future warfighters and the challenges of the competitive marketplace for talent. (Image by U.S. Army Acquisition Support Center and Getty Images)

BUILDING THE ARMY ACQUISITION TEAM

Materiel isn't the only thing in need of modernizing. The acquisition enterprise is taking a new approach, too.

During this critical time of sweeping change in the Army, as modernizing Army materiel gains traction and speed, the acquisition enterprise must also take the opportunity to modernize itself. This historic moment requires us to effect the changes that will ensure not only that we build the best acquisition team to meet the needs of future warfighters, but also meet the challenges of the marketplace.

In the same way that the decisions we make today with our military will shape the fighting force of tomorrow, so, too, will the decisions we make with respect to the acquisition workforce shape the materiel that the future force will have at its disposal.

One thing is clear: With either civilian or military Army Acquisition Workforce members, we cannot build the Army acquisition team the way that industry does. That does not mean we cannot emulate industry methods in the best way we can.

Think about it: Today, when a contractor comes to the table to negotiate the contract they've just won a bid on, they bring their A-team. Let's say it's a major contract, and they've already spent as much as or more than $1 million on their capture effort. There is nothing wrong with that—it's a matter of them surviving and prospering. But right now, when the Army is negotiating that contract, we most likely would have a Defense Acquisition Workforce Improvement Act (DAWIA) Level III certified contracting officer with about six months of formal training and at least four years of contracting experience, potentially sitting across the table from a team of Wharton-educated MBAs and Harvard-educated lawyers. That's not a level playing field.

We are not going to level that playing field overnight. The new talent management strategy that the Army is developing, along with our own corresponding acquisition talent management plan—the Human Capital Strategic Plan—is the beginning of a long march to build the right team. We will accomplish this by wisely using all of the people, data and technology available to us to help us speed acquisition, improve the quality of our products, help make our efforts vastly more cost-effective and meet our solemn commitment to our Soldiers.

That commitment is represented in the Army's six modernization priorities: We will execute requirements as rapidly as feasibly possible, as efficiently as possible and at the best price possible to bring the Army's future equipment and weapon systems from design to delivery. Our challenge is that we have an industrial-age acquisition system with an industrial-age culture and mindset. We cannot fully achieve our modernization goals and regain our historic overmatch capabilities without dragging this system, along with how we organize talent, into the digital age.

A TALENT STRATEGY

Last year, Secretary of the Army Dr. Mark T. Esper launched the Army Talent Management Task Force. That task force is at the vanguard of a new Army view on talent and provides the basis for a new, Armywide talent management strategy that, in the near term, is focused primarily on the military side of the workforce.

To be sure, Army talent management writ large is different from acquisition workforce talent management. The new Army Talent Management Strategy is designed to acquire, develop, employ and retain the best officers—including future acquisition officers—and will act as the blueprint for the total Army.

As the secretary has said, talent management should be a deliberate, data-driven approach to the processes and systems that enable the Army to better manage its officer corps. Before we acquire talent, however, we must understand what we want these new acquisition officers to do. When we understand that, we can better understand the mix of knowledge, skills, behaviors and preferences that we want to look for in accessions to acquisition.

This is critical to the Army because there is considerable competition for the top talent in America today. This is not, as Dr. E. Casey Wardynski, assistant secretary of the Army for manpower and reserve affairs, said recently, a "come as you are" Army. We need people who not only are technologically adept, resilient and problem-solving, but also who reflect and share the values of our nation.

In Army acquisition, our job is to get those talented people to join our ranks. Unlike industry, which can pull in talent wherever it needs it and from wherever it can find it, the Army has no "lateral entry," as Wardynski noted. Officer or enlisted, people in the current system generally start at the bottom and work their way up. That means it's considerably harder for us because we have to start developing our military acquisition talent at the bottom, too, and make acquisition attractive to the people with the skills, knowledge, behaviors and preferences that the Army acquisition enterprise needs.

In many areas on the civilian side of the acquisition workforce, that is also often true. In some fields, such as contracting, the way the Army does business is so different from the way industry does; starting as an intern is often the way people find their way into acquisition. Even civilians who come "laterally" into acquisition—after retiring from military service or from industry—still have to learn how the Army does business.

NEW TOOLS, OLD CHALLENGES

The Army Talent Management Strategy will provide the tools to create a bridge between the current and future systems. With the rollout of the Integrated Personnel and Pay System – Army (IPPS-A) to the regular Army, we at last will have a tool that will help us gather the detailed data we need to identify and recruit the talent we need for the future.

This will help us develop the talent marketplace that Esper has spoken of in recent months—transparent, data-rich and governed by business rules that will help match officers' talents to assignments and engender trust among commanders, officers and the Army. When IPPS-A rolls out to the civilian workforce, we can further develop our knowledge of who our people are and what we need them to do.

The challenges are manifold, and the challenge of changing the culture in the Army is central among them. The current system for officer assignments was created in 1980 with the enactment of the Defense Officer Personnel Management Act. It is a rigid, conveyor-belt system that's highly centralized and often based too much on an officer's time in service. With assignments managed from the top, all officers follow what is essentially a standard career path. They often have little choice in where they go and what they do.

Basing assignments on talents, knowledge, skills, behavior and preferences makes much more sense. "Talent-based branching" began at West Point in 2012 and gathered detailed insight into the unique talents of each new officer. Not only that, it also gathered the unique demands of each Army basic branch. That, along with technology, has enabled the development of the talent marketplace.

Using the talent marketplace, the Army will place officers in the assignments in which they are most likely to be engaged, productive and satisfied—and engaged, productive and satisfied is a great way to retain talent. The Army's new Assignment Interactive Module 2.0, which facilitates the assignment marketplace, will help officers find their own sweet spot. We have to make every effort for acquisition to be that.

But, of course, it's not just about officers picking and choosing where they want to go. It's about where they're needed. It's also about officers having the training and education they need to succeed at acquisition. At my direction, the Army Director for Acquisition Career Management (DACM) Office has launched the Functional Area (FA) 51 (acquisition) Officer Advanced Education Implementation Plan.

Recent history shows that the vast majority of officers, when they access into FA 51, do not have an acquisition-relevant degree. Approximately 75 percent of officers do not have a business degree relevant to acquisition. Only 15-20 percent of officers have a graduate degree with sufficient business credits. Of those with a relevant graduate degree, 6-10 percent will require a business certificate program to go along with the DAWIA training they will receive at the Army Acquisition Center of Excellence in Huntsville, Alabama. The new authorities that the National Defense Authorization Act (NDAA) for Fiscal Year 2019 gave us will help to do some of that. Much of what we must do will

THE VIEW FROM THE TOP
Secretary of the Army Dr. Mark T. Esper and Lt. Gen. Thomas C. Seamands, deputy chief of staff, G-1 (Personnel), visit Fort Knox, Kentucky, in April 2018 to discuss talent management with the senior leadership of the U.S. Army Human Resources Command. (U.S. Army photo by Master Sgt. Brian Hamilton)

require cultural change—and everyone understands that's difficult. We must also work to make acquisition careers highly rewarding and therefore sought after by top Army talent.

Among other things, the FY19 NDAA loosened some of that rigidity in the current system and gave the Army some flexibility to determine the characteristics of our future, talent-based system.

Authorities enacted in the FY19 NDAA that apply to the acquisition workforce, and that we are studying and looking to leverage, are:

- **Direct commission up to O-6 (colonel):** The Army can access private sector expertise up to the rank of colonel for both the active and reserve components.
- **Opting out of a promotion board:** An officer can opt out of a promotion board—or get off the conveyor belt temporarily—to avoid the career impact of seeking advanced education, broadening assignments or assignments of significant value that affect the competitiveness for promotion.

We are looking at both of these (and more) to help us acquire and develop the talent we need. Let's take the second one first. Opting out of a promotion board would mean that an officer wouldn't be "punished" for taking the opportunity to get, for example, a doctoral degree, and miss out on future promotions because he or she is no longer on that conveyor belt. It would also mean that we could hand-pick talent to pursue such studies to the considerable advantage of Army acquisition and then retain that talent. We don't want to pay for someone to get a Ph.D. and then force them out of the Army. Few other Army organizations absolutely need people with doctoral degrees in the way that the Army Acquisition Workforce does.

As to the direct-commission authority, it would mean that, should the Army decide it needs a particular expertise, it could hire an expert and bring that person into our ranks. Such assignments, however, would be temporary.

There are contrary perspectives on this. Some think that bringing someone with needed expertise into the Army temporarily at the O-6 level could greatly benefit the Army. Others believe putting such individuals in uniform could endanger the legitimacy of the very important operational perspective of acquisition officers who came into the Army Acquisition Corps the old-fashioned way.

ON THE CIVILIAN SIDE

Other than potentially making civilians temporary Soldiers, what about the civilian side of acquisition? At my direction, the DACM Office is pursuing a number of initiatives in that realm, such as an acquisition-focused recruiting cell, college scholarships and pay, just to name a few.

Secretary Esper has a vision that we would all do well to understand. He is fully aware that he has three distinct populations who serve the Army: officers, noncommissioned officers and civilians. The Army will pilot its Talent Management Strategy first with officers. When it has gathered sufficient data and developed an understanding of how the talent marketplace works, it will continue that pilot by including noncommissioned officers.

Only when those much smaller cohorts have helped us iron out any issues with the implementation of the strategy will we to begin to roll it out to civilians. As you are probably aware, civilian acquisition members make up approximately 96 percent of the workforce, and their jobs are governed by a much different set of regulations. It's a harder nut to crack and vital to get it right.

There is no question that there is much work to be done and we cannot do it all at once, but in the very near future, when we meet contractors at the table to negotiate a contract, we will be on a level playing field.

PROTOTYPE FEEDBACK

Staff Sgt. Brett McCaskill, assigned to 2nd Brigade, 2nd Infantry Division, and Sgt. 1st Class Ryan Beach, with 2nd Armored Brigade Combat Team, 1st Armored Division (2/1 AD), make adjustments as they deploy their new electronic warfare equipment during training at Fort Bliss, Texas, in December. (U.S. Army photo by Staff Sgt. Felicia Jagdatt, 2/1 AD)

THE MAKING OF A PACKARD

Rapid acquisition of electronic warfare capabilities served an urgent need, and in the process set an award-winning example of phased prototyping, experimentation and fielding with creative resourcing.

by Nancy Jones-Bonbrest, John Higgins and Claire Heininger

In March 2014, before the rest of the world could react, Russia invaded Crimea, then annexed the region, a peninsula at the southern end of Ukraine. Russia's subsequent actions in Ukraine revealed electronic warfare (EW) capabilities that not only overwhelmed Ukraine but could rival those of the United States. The U.S. Army Europe (USAREUR) commanding general at the time, Lt. Gen. Ben Hodges, determined that electronic warfare was a critical strategic gap and pushed an operational needs statement to the Pentagon for quick action.

In response, the Army moved electronic warfare to the top of its list for rapid acquisition and endorsed a new approach—phased prototyping, experimentation and fielding—that would incorporate Soldier feedback throughout, infuse new technology as it became available and quickly deliver incremental upgrades to reduce operational risk while informing program-of-record (POR) capabilities currently under development but not yet ready for fielding. This strategy required a creative resourcing approach that combined existing funds, reprogramming actions and a new rapid prototyping program, and ultimately entailed more than 100 separate contract actions.

To formulate and execute the plan, the secretary and chief of staff of the Army tapped the then-newly formed Rapid Capabilities Office (now the Rapid Capabilities and Critical Technologies Office, or RCCTO) and the Project Manager for Electronic Warfare and Cyber (PM EW&C), part of the Program Executive Office for Intelligence, Electronic Warfare and Sensors (PEO IEW&S), to lead the execution of the project, working directly with operational units such as the 2nd Cavalry Regiment in Europe. Less than a year after the project's approval, the Army fielded new electronic warfare prototypes to select units in Europe, giving Soldiers the ability to implement electronic protection for their own formations, detect and understand enemy activity in the electromagnetic spectrum, and disrupt adversaries through electronic attack effects.

For their efforts in addressing this urgent operational need, the RCCTO and PM EW&C received the 2018 David Packard Excellence in Acquisition Award. The Packard is DOD's most prestigious acquisition team award. It is given annually to a few select recipients across the armed services and defense agencies for significant contributions demonstrating exemplary innovation and best acquisition practices.

The award-winning effort required teamwork, innovation, a user-centric attitude and a willingness to accept that the prototypes being fielded were just that. They were not completely perfect solutions, but instead incremental advances, with the capability improving at each step as the effort progressed.

On the following pages, you'll read about several of the key players who made the Army's electronic warfare project a

Packard Award-winning reality. However, they are only several of many. Scores of people within the organizations contributed to the success of the project, as did many other individuals and organizations across and outside DOD who were brought in to find new ways to successfully expedite the traditional acquisition process. From EW officers to Army headquarters staff, from cybersecurity experts within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) to the U.S. Army Test and Evaluation Command, from the Army's Rapid Equipping Force to industry partners and many others, the achievements leading to the Packard were a team effort that reflects the best of what the Army can do when the stakes are high. Here is a look behind the curtain.

AWARD WINNERS

The team received the 2018 David Packard Excellence in Acquisition Award in February. From left are Ken Strayer, deputy project manager for PM EW&C; Doug Wiltsie, former RCO executive director; Brandon Little-Darku, RCCTO engineer; Hon. David L. Norquist, performing the duties of the U.S. deputy secretary of defense; Lt. Col. Eric Bowen, former product manager for Prophet; Hon. Ellen M. Lord, undersecretary of defense for acquisition and sustainment; Tanya Skeen, former RCO executive director; Vanessa Pittman, RCCTO business manager; Col. Kevin Finch, project manager for EW&C; and Marty Hagenston, Col., USA, Ret., former project manager for EW&C. (DOD photo by U.S. Army Sgt. Amber I. Smith)

THE DIRECTOR: DOUG WILTSIE

"The big thing for us was speed. Where we had the opportunity to take risks, we did. It started with our board of directors [BOD], which at the time comprised the secretary of the Army, chief of staff of the Army and Army acquisition executive. We briefed the BOD, but there was no requirement to brief anyone else, due to the RCO's unique charter. So the approval cycle was significantly shorter. The power of the BOD was it allowed us to bring in a broad end-to-end solution for the type of capability we needed to provide. And then, working with the unit, we developed what the specific requirements would be for mounted, dismounted, and planning and management systems. We developed an incremental strategy that increased the capability performance over time. We got prototypes into the hands of the users, who got to train on the equipment and give us continuous feedback on the performance and how to improve it. With this strategy, we fielded the first increment in one year, which was very impressive."

The power of teamwork: "The user was actually in the lead of this project the entire time. From the delivery of the concept of operations to the performance of the system they wanted, the Soldiers and the EWOs [electronic warfare officers] in those brigades really helped shape how the system was going to operate. They were committed to the incremental strategy, where we put elementary pieces of equipment into their hands first, knowing that the capability was going to get better over time. PM EW&C was the other critical element to this project. The Rapid Capabilities Office had unique authorities but limited people to put on this project, so we partnered with PM EW&C to develop the solutions, prioritize the increments, develop the sustainment process,

then together work on a funding strategy for every increment. It was a great partnership."

Advice for rapid prototyping: "It starts with the user. The rapid approach is really a team sport, and the users are the critical piece on that team."

THE PROJECT MANAGER THEN: COL. MARTY HAGENSTON (USA, RET.)

"Commanders are severely limited in what they can bring to the electromagnetic spectrum fight. These limitations and lack of options are driving the operational need for EW capabilities." The operational needs statement (ONS) from U.S. Army Europe "became part of the larger materiel development strategy by design. It provided a mechanism from which to rapidly equip forward presence and rotational forces with initial capabilities, then iterate those based on direct user feedback.

"The ONS provided a superb venue for risk reduction for projected programs, some of which were years away from starting. Not only did the Army benefit from a materiel standpoint, but the effort also drove doctrine, training, organizational design, and tactics, techniques and procedures." The entire spectrum of doctrine, organization, training, materiel, leadership and education, personnel, facilities and policy benefited, Hagenston said. Likewise, the ONS greatly benefited from programs of record that were underway. These included the Electronic Warfare Planning and Management Tool; Prophet Enhanced; Duke; and Versatile Radio Observation and Direction Modular Adaptive Transmitter, developed by the Intelligence and Information Warfare Directorate of what is now the U.S. Army Combat Capabilities Development Command's C5ISR (Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance and Reconnaissance) Center. "The team was able to leverage these programs, which helped our velocity by providing a critical foundation for the ONS."

The key to success: "The real force behind the success of this effort was the teamwork, leadership support, stable resources and direct access to the customer. The approach itself was simple. First, we took what we had and adapted it to the operational problem. This served as Phase 1, or the minimum viable product. Once we deployed Phase 1, 12 months from receiving resources, we were able to take the direct user feedback and prototype something closer to what the units wanted. This served as Phase 2. Through all of the phases, the capabilities evolved based on direct user feedback. Our team carefully listened to the feedback and worked in those changes. In many cases it was done on the spot, while other changes were saved to the next logical insertion point."

Advice for rapid prototyping: "First, get intimate with the operational problem. Second, get the minimum viable product out quickly and really listen to the direct user feedback. Finally, iterate as fast as possible based on the direct user feedback. Velocity is the real advantage."

THE PROJECT MANAGER NOW: COL. KEVIN FINCH

"Rapid prototyping will have a very positive effect on the long-term POR. It also shows us the current state of industry. Specifically, in the EW specialty, rapid prototyping coupled with quick reaction capabilities [QRCs] has effectively informed the community on possible innovative solutions that help the U.S. pace the threat. The QRCs we are currently fielding to the force have enabled the program office to determine if innovative solutions are viable for long-term PORs. In FY20, PM EW&C will use the lessons learned

"Perfection is the enemy of 'good enough' and the endless pursuit of perfection will always be a hindrance to getting the required capabilities to the end user."

1 Capt. Brigid Calhoun, 173rd Infantry Brigade Combat Team (Airborne), briefs Dr. Bruce D. Jette, ASA(ALT); Brig. Gen. Joel Tyler, commanding general of the Joint Modernization Command; and Doug Wiltsie, former RCO director, at the Joint Warfighter Assessment in Hohenfels, Germany, in April 2018. Military and civilian officials attended to see how the event helps the Army evaluate emerging concepts, integrate new technologies and promote interoperability. (U.S. Army photo)

2 Soldiers from the 2nd Cavalry Regiment (2CR) tested several electronic warfare prototypes, including the Counter-Unmanned Aircraft System Mobile Integrated Capability, a mounted system that combines electronic warfare, radar and optic capabilities to detect, identify and defeat unmanned aerial threats. (U.S. Army photo)

3 Delivery and training for an integrated package of mounted, dismounted, and command-and-control electronic warfare systems began in January 2018, and Soldiers from the 173rd Airborne Brigade and the 2nd Armored Brigade Combat Team, 1st Infantry Division were the first to receive the new electronic warfare prototypes. (U.S. Army photo)

4 Soldiers from the 2CR conduct joint operations with Polish troops in May 2018 at the Hohenfels Training Area in Germany. Feedback on electronic warfare capabilities and other prototypes fielded to the 2CR helped drive improvements. (U.S. Army photo by Sgt. Devon Bistarkey, 2CR Public Affairs)

THE MAKING OF A PACKARD: THE WINNER'S CIRCLE

5 The 2nd Brigade Combat Team, 101st Airborne Division participated in Network Integration Evaluation 17.2 at Fort Bliss, Texas, in 2017, and provided feedback on the electronic warfare prototypes. (U.S. Army photo by Spc. Jordan Buck, 55th Combat Camera)

6 Getting a prototype into Soldiers' hands gave developers direct access to user feedback that allowed them to quickly hone an electronic warfare system and fill a capability gap. (U.S. Army photo by Staff Sgt. Sean Callahan, 40th Public Affairs)

7 Electronic warfare Soldiers gather around Raven Claw, the battle management system fielded with the electronic warfare prototypes. Designed using direct user feedback from electronic warfare personnel, the system can operate in networked, disconnected, intermittent or latent environments, and doesn't rely on a host server or external data. (Photo by John Higgins, PEO IEW&S)

from the QRC and rapid prototypes to inform the development of the long-term Terrestrial Layer System."

What are the next steps for the effort? "The ONS for Europe maintains the ongoing effort until the POR comes on board. We have already provided an initial capability and are on schedule to provide a Phase 2 capability in FY19. This new capability will provide a significant improvement over Phase 1 while informing both the development of the POR and the Army's decision-making on fielding quantities and timelines.

Also, with "The U.S. Army in Multi-Domain Operations, 2028" concept published, capabilities in the electromagnetic spectrum [EMS], cyber and space will become better integrated into operations. Niche systems will no longer operate in stovepipes, but will become integrated and synchronized with operations occurring in all the domains: land, air, sea, cyber and space. Systems such as the [Electronic Warfare Planning and Management Tool], which links and synchronizes the EMS to the tactical commander, will become increasingly important."

Advice for rapid prototyping: "Implementing a rapid approach has to be a collaborative team process built on the adaptation of lessons learned and best practices. As PM EW&C moves into the second iteration of our rapid processes, hard timelines closely linked to the operational force's needs will drive timely and responsive decision-making. Ultimately, the success of a rapid approach is highly dependent on buy-in from all the team members, including industry partners and external stakeholders."

> **"The user was actually in the lead of this project the entire time. From the delivery of the concept of operations to the performance of the system they wanted, the Soldiers and the EWOs in those brigades really helped shape how the system was going to operate."**

THE PRODUCT MANAGER: LT. COL. ERIC BOWEN

"This is the outcome of a Soldier-inclusive, Soldier-driven endeavor. Their feedback laid the blueprint that guided our multiphased approach, serving as our engine of innovation. We had continuous engagements with Soldiers who received the equipment, including from Stryker, armor and airborne infantry brigades. Although the initial phase repurposed existing equipment, the feedback identified additional enhancements needed, such as how information was presented to the operator, how it was reported to higher headquarters and how it should be installed in the vehicles for optimal use. This feedback also identified a need for additional vehicle platforms that would support light, expeditionary operations, as well as for sensors that Soldiers could easily carry and operate during dismounted operations. These capabilities, which we didn't address initially, were prioritized for the follow-on delivery phases."

The toughest challenge? "The 'horizontal' or system-of-systems integration and end-to-end engineering, because various sensors needed to function as a networked set. To make it all work, we needed to stitch together existing sensors that existed as both PORs and QRCs, in order to provide a common operating picture to our EW planning and management tool."

Advice for rapid prototyping: "Keep priority on delivering the product on time. You are subject to the tyranny of time, and the solution delivered will not be perfect. It never will be. There are no more 'drive-by fieldings,' so forge a solid commitment with the user, who will shape development before delivery—and cultivate that relationship to fix, improve and maintain the equipment to ensure mission success. You are delivering more than just materiel; these capabilities will influence doctrine, change organizations and challenge policy to enable commanders and higher Army echelons to respond to rapidly evolving worldwide threats."

THE MONEY: SONJA HOLZINGER (PM EW&C)

"This rapid prototyping approach dictated an agile, adaptive business model. That meant the two business teams had to come together and determine how much the effort would cost, what type of funding was needed, what contract vehicles should be used and what resources were available."

AND VANESSA PITTMAN (RCCTO)

"Early on, as the acquisition strategy and technical requirements were being refined, we implemented a tailored work breakdown structure into all cost estimating efforts. This enabled the teams to accurately account for all costs associated with rapid prototyping and develop a cost estimate, which was later used as the basis for the spend plans. Throughout the whole process, strong collaboration and daily communication was the key. PM EW&C Business Management Division was heavily engaged in identifying what funds were needed and where they should be sent. The RCCTO Business Management Division was responsible for ensuring funds were provided on time and in the amount needed. The two teams worked as one toward accomplishing the same goal. The USAREUR ONS was executed almost 100 percent within the cost estimate, on time and without any unfunded requirements."

What contracting mechanisms were used? "The business teams worked together to develop a funding strategy to ensure the effort was fully funded. Initially we reallocated existing funds for this effort. We also utilized mechanisms such as below-threshold and above-threshold reprogramming actions. We successfully applied for and received funding from the Office of the Secretary of Defense Rapid Prototyping Program. To meet a very tight timeline for delivery, we also worked closely with [the U.S.] Army Contracting Command, as well as the Navy and Air Force contracting commands, for select contracting actions.

"We coordinated execution of more than 100 contract actions, including contract modifications, task orders and delivery orders. In some instances, because of the urgency of the requirement and the government's interest to start contract work early, we used un-definitized contract actions."

Advice for rapid prototyping: "This is a great approach to quickly provide needed capabilities to our warfighters. Constant collaboration and communication with the project manager, contracting team, business team and all stakeholders involved in your program is a must. This allows you to identify and address any risks or issues early."

"The ONS provided a superb venue for risk reduction for projected programs, some of which were years away from starting."

THE ENGINEER: BRANDON LITTLE-DARKU

"As the project lead and lead systems engineer on EW for the RCCTO, I worked in close partnership with the PM EW&C team and my counterpart there, Lt. Col. Bowen, to develop and deliver this capability. Having a strategic focus and directing this capability not to the entire Army, but to brigade-and-below operations within the European theater, proved a key to our success. Focusing on the units aligned to USAREUR and understanding their concept of operations helped to scope not only the capabilities required of the various systems, but also how they needed to be integrated into the formations and the tactical mission command network. That, paired with early and continuous engagement with the brigade combat teams

aligned to USAREUR, helped scope the effort and shape the overall phased approach for addressing the operational requirements."

The toughest challenge? "Making sure we met all the requirements possible, which included establishing a networked EW capability that could interoperate with Army mission command systems, while also meeting our delivery timeline. The team included a great set of dedicated professionals within the RCCTO and the PM, and across our partners throughout the Army, that made this unprecedented effort a success."

Advice for rapid prototyping: "Perfection is the enemy of 'good enough' when building your acquisition strategy and scoping out the phases of the capability. Time will always be one of the critical measures of success, and the burdens associated with the endless pursuit of perfection will always be a hindrance to getting the required capabilities to the end user. Working directly with the users early in the process, and then continuing to receive their input and operational feedback throughout the process, proved key to making sure we developed and delivered what they needed to meet their mission."

THE USER: CAPT. SEAN LYNCH, (2ND CAVALRY REGIMENT)

"This equipment provides additional sensors that units can leverage to help build a common operating picture and drive the targeting process. It provides commanders with additional options to more effectively shape their areas of responsibility, while also addressing theaterwide challenges from near-peer competitors and NATO adversaries. These assets can be seamlessly integrated within a Stryker formation, require no reliance on joint air platforms, and can provide immediate direction finding or geolocating capability of enemy emitters to maneuver commanders at the lowest levels. The Army can continue to build on this momentum by solidifying what the primary mission or role of ground-based electronic warfare is and how the Army feels it should be equipped to accomplish it."

How did partnering with the acquisition team early work for your unit? "Exceedingly well. Our team was fortunate to be able to participate in multiple Network Integration Evaluations, simulation exercises, and testing events both pre- and post-fielding. This gave our regimental planning team and tactical operators several instances to provide direct, candid feedback to the engineers, acquisition team and decision-makers involved in the project. We were able to see our ideas and feedback incorporated almost immediately, and knew with high confidence what we were receiving as the end user. This also served to get Soldier buy-in at the lowest levels, and they became more vested in providing comprehensive and meaningful feedback. It also removed a lot of unnecessary guesswork and ensured all parties had a shared understanding and shared expectations of the scope of the fielding."

Advice for rapid prototyping: "Partner early and consistently with the acquisition team before, during and after equipment fielding. Know those aspects of the equipment that are more important to you and your Soldiers, and be prepared to communicate those requirements clearly. It's also important to build a plan on how to go about stressing new systems, capturing relevant information, and how you envision the systems or equipment will be employed."

For more information on the Army RCCTO, go to ***https://rapidcapabilitiesoffice.army.mil/****. For more information on PEO IEW&S and PM EW&C, go to* ***https://peoiews.army.mil/****.*

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LEARNING on the GO

Acquisition Soldiers field forward-deployed SFAB tactical network modernization on the fly.

GREEN SUITER

Having a "green suiter" leading the fielding efforts makes coordination with units much easier, said Capt. Jonathan Dodge. As the assistant product manager for Helicopter and Multi-Mission Radios assigned to the PM for Tactical Radios, he helped SFAB teams set up their radio networks and accompanied them on missions to identify and troubleshoot any issues with new equipment. (U.S. Army photo by Sgt. 1st Class Larry Brew, 1st SFAB)

by Amy Walker

The Army is pushing full steam ahead with network modernization efforts that are making today's forces more mobile, expeditionary, simple and hardened. To inform rapid modernization, it is leveraging developmental operations (DevOps) constructs and other expedited acquisition processes to field innovative expeditionary tactical network and radio communication equipment packages to new and existing unit formations.

This incremental DevOps process is a proven industry practice that places developers side by side with Soldiers and commanders in operational units, thus enabling the Army to evaluate potential technology concepts and solutions earlier and more frequently, collect feedback in real time and generate new requirements as needed. As part of this process, the Army is putting lessons learned and Soldier feedback to work to continually enhance satellite and radio tactical network transport equipment, as well as the way it is fielded and employed on the battlefield.

The Army is standing up new unit formations, such as security force assistance brigades (SFABs), which are providing advise-and-assist support to Afghan Security Forces. The 1st SFAB returned from its nine-month deployment to its home station at Fort Benning, Georgia, in December. The 2nd SFAB from Fort Bragg, North Carolina, is taking its place this spring. The Army has begun fielding efforts for the 3rd SFAB at Fort Hood, Texas, and the 4th SFAB at Fort Carson, Colorado.

While traditional fielding, from planning to deployment, can take up to two years to complete, the Army stood up, equipped, trained and prepared the 1st SFAB for deployment to Afghanistan in less than a year. The unit deployed with the equipment needed to carry out its mission safely and effectively; however, because of the condensed timeline, the program offices had to complete fielding some of the non-mission essential equipment after boots had already hit foreign soil.

TACTICAL CONNECTION

The PM for Tactical Network provided new equipment training on SCOUT satellite terminals to the 1st SFAB in Afghanistan in September. The SCOUT training showed that the Soldiers' network experience varied widely, leading to the refinement of training to teach the operators what they need to know based on what equipment they'll be operating and at what level. (U.S. Army photo)

Capt. Domoniqué Hittner, assistant product manager for Satellite Communications assigned to the Project Manager (PM) for Tactical Network, and Capt. Jonathan Dodge, assistant product manager for Helicopter and Multi-Mission Radios assigned to the PM for Tactical Radios (PM TR), were deployed in Afghanistan with their fielding teams in support of these first SFAB fieldings. Both organizations are part of the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T). Hittner and Dodge worked hand-in-hand with the unit, including Maj. Anthony Nocchi, communication officer (S-6) for the 1st SFAB. In this Q&A, the three officers provide the insights and lessons they learned on fielding and training forward-deployed units in today's rapid acquisition environment.

Amy Walker: How do the capabilities you helped field support the SFAB mission?

Hittner: SFABs require expeditionary communications equipment so they can rapidly deploy to theater and can be more agile during their mission support, which encompasses a wide area of operations. As part of the capability set that supports the 1st SFAB's network, our team validated, fielded and trained the unit on SCOUT ground satellite terminals, which provide satellite capability to enable tactical network connectivity. Fielding these easy-to-use systems gives the SFABs a lightweight, easy-to-transport communications capability, which can be scaled up or down to support small team to large brigade-sized elements.

Dodge: The tactical radios we fielded in Afghanistan included the Leader Radio and single-channel, data-only radios. These radios supported the secure but unclassified (SBU) network that enabled the Soldiers to pass data across the network from their end-user devices. Additionally, during deployment, PM TR installed the mounted configuration of the Leader Radio on the 1st SFAB's vehicles, which provided connectivity so commanders had better access to situational awareness data. The vehicle systems we integrated helped to provide SBU network data and voice communications seamlessly between mounted and dismounted elements. The SBU network enables units to connect into

commercial networks to share data, imagery and messaging among team members.

Walker: Were there any benefits in fielding a forward-deployed unit versus one at home station?

Nocchi: The benefit lay in the ability to really focus on the new equipment training. The Soldiers were all in the same location and could dedicate additional time to hands-on training with the new equipment without some of the competing requirements found at home station. While I'd prefer to field new equipment before deploying, the project managers were very supportive and we were generally successful. The 1st SFAB owes a lot of its success with the new systems to the acquisition community for fielding equipment as fast as they could, getting the manufacturer to provide the equipment and then following up with outstanding training and support.

Hittner: Timelines, the unit's availability and equipment production will always play a factor in new equipment training and fielding. Any time you are fielding in the continental United States, the unit has a great deal of other mandatory training and preparatory efforts to focus on, especially the SFABs. These new units are setting a new stage to fight on. So on top of preparing for their missions, they have to prepare to become a new formation, so there are a lot of tasks involved—live fires, additional training, monitoring, all the different tasks needed to get the unit prepared to serve in its new capacity.

"We are streamlining training to make it shorter and more intuitive to match the needs of a new generation of Soldiers."

Because we fielded the 1st SFAB while they were deployed, we received dedicated time to focus purely on training. They were able to pick it up faster, and it saved the unit a lot of time. We were also able to support the unit through all of its reception, staging, onward movement and integration events and in-country tasks required to operate in that area of responsibility.

Dodge: Our embedded team provided mission essential training and support to the 1st SFAB's lower tactical internet [radio] network. Because I was deployed with our team, I was able to travel to over a dozen locations in Afghanistan over a period of four months to assist with fielding and training.

In total, we fielded over 500 radios and integrated systems into 66 vehicle platforms spread out over Afghanistan. I was able to assist SFAB advisory teams in setting up their radio networks and accompanied them on missions to identify and troubleshoot any issues with new equipment. As part of the developmental operations construct, the Soldier feedback we were able to gather on product performance allowed us to make positive changes to the unit's communications architecture while they were still in theater.

Walker: Did you do anything different as far as the training itself was concerned?

Nocchi: The SCOUT training went well but required some refinement, which was expected due to the circumstances and makeup of the class: Some Soldiers had extensive network experience and some had very little. We are recommending and attempting to schedule new equipment training for general purpose users and new equipment training for technical users and Signal officers, which will teach the operators what they need to know based on what equipment they'll be operating and at what level.

PATCHED IN
Security force assistance brigades provide advise-and-assist support to Afghan Security Forces. They require expeditionary-resilient network communications to support their missions. (U.S. Army photo)

Hittner: The PM Tactical Network training team designed and developed a training set for the SCOUT system to support the unit's specific mission requirements, enabling them to successfully perform their mission training completion. We put the unit's feedback to work and developed a condensed general user training set to support new SFAB Soldiers. PM Tactical Network takes Soldier feedback from training events and shapes training packages to suit a unit's needs, taking into account missions, Soldiers' military occupational specialties, age groups, etc. With the numerous rapid acquisition efforts the Army is conducting, the PM is staying

innovative in the way we train by delivering a concise yet diverse training set.

We are streamlining training, making it shorter and more user-friendly, more intuitive and more technologically enhanced to match the needs and expectations of a new generation of Soldiers. We reworded manuals and reduced portions of the training to make them more clear and suitable for general users, and we employed a lot of hands-on training.

Walker: What lessons did you learn from your deployment that could help future fielding efforts or other PM fielding deployments?

Dodge: Having a "green suiter" lead fielding efforts makes coordination with units much easier, as we understand how operational units work and can thus better plan around their mission. Coordination and ensuring that the project manager is on the same page as the unit are essential. I was closely tied with the brigade and battalion staff to keep them aware of all acquisition efforts, so they could redirect me as necessary in support of their missions and timelines. While the program office is responsible for fielding, the unit should be the driving factor in determining who gets assets first. The unit is the customer!

We are also continuing to use Soldier feedback to implement changes to streamline and improve fielding and training. For example, when we first started fielding the 1st SFAB, some of the radios were fielded incrementally as parts became available, rather than fielding the system as a complete set. But we learned quickly that it was more efficient to field the entire system at once to enable the unit to train as they fight.

Hittner: New formations like the SFABs rely on us for guidance in the fielding and training process. I wouldn't say we had any significant challenges, but [we had] opportunities to learn. You don't know what you don't know until you are there on the ground, so we conducted thorough site visits to see what assets were there. One thing the site visits revealed was the need to coordinate shipping. We streamlined supply support by proactively and very closely cross-coordinating across entities before shipping, including the unit on the ground, the warehouse and the shipping entities. It is also important to closely monitor tracking numbers to stay ahead of any unforeseen shipping issues and to keep a fluid shipping line from point A to point B.

Synchronization is key to fulfilling the unit's requirements. A lot of planning and coordination enabled us to expedite shipping and we are able to provide a smooth, fairly seamless transition of equipment from the United States to Afghanistan. The next time we go back to field another forward-deployed unit, the lessons learned will make everything more expeditious.

This fielding effort has also made coordination with our vendors much smoother and our relationships with all of our PM logisticians and the units forward-deployed much stronger. The Army often talks about being ready to deploy and support any time we are called, and that includes the acquisition community, folks in the background, all the civilians and all of the partners. It's important that we can rapidly pull together to make these missions successful, whether supporting from home station or deployed with the

TRAINING TEAM

Capt. Domoniqué Hittner, far right, assistant product manager for Satellite Communications assigned to the PM for Tactical Network, observed that it was important to conduct thorough site visits to see what assets were available. "You don't know what you don't know until you are there on the ground," said Hittner, shown here with her fellow team members who provided new equipment training and fielding to the 1st SFAB in Afghanistan in September. (U.S. Army photo)

SUCCESSFUL TEAMWORK

Capt. Jonathan Dodge, right, assistant product manager for Helicopter and Multi-Mission Radios for PM Tactical Radios, worked closely with Maj. Anthony Nocchi, communication officer for the 1st SFAB, during tactical radio fieldings in 2018. (U.S. Army photo by Sgt. 1st Class Larry Brew, 1st SFAB)

READY TO ADVISE AND ASSIST

Advisers from the 1st SFAB's Task Force Southeast prepare for a mission with their Afghan National Army partners in April 2018 after being trained on their communications gear, Advisor Platform Lightning, by PEO C3T personnel. The software-defined 2-Channel Leader Radio provides data and voice communications via multiple waveforms, and supports the Army's network modernization strategy. (U.S. Army photo by Maj. Matthew Fontaine, 1st SFAB)

unit. Units will always need new technologies. If we have the ability to field them all in the U.S., that's great; if not, we need to remain flexible.

To enable your team and others to be successful, it's important to understand the scope of the mission and really project the plan out as far as you can with the information you have at hand, and be flexible enough to overcome the changes and potential roadblocks that may arise down the road. Remaining flexible has been vital to the success of this last fielding, and it will definitely help us with future fieldings as well. It's important to note that this mission is ongoing.

I think the biggest takeaway is to just give Soldiers grace when they are deployed. Everyone that has worn this green suit before understands what it's like to be deployed, whether it's missing your family or just the many things happening there, all of the expectations, the hard work, the long hours that you put in, and the time you have to sit back and reflect. Do anything you can to support them.

For more information, go to the PEO C3T website at ***http://peoc3t.army.mil/c3t/*** *or contact the PEO C3T Public Affairs Office at 443-395-6489 or* ***usarmy.APG.peo-c3t.mbx.pao-peoc3t@mail.mil****.*

AMY WALKER has been the public affairs lead at PM Tactical Network for the last nine years, and was the public affairs lead at PEO C3T for the previous two. She has covered most of the Army's major tactical network transport modernization effort, including Army, joint and coalition fielding and training events worldwide. She holds a B.A. in psychology, with emphasis in marketing and English, from the College of New Jersey.

At Work

Profile: PROGRAM EXECUTIVE OFFICE FOR Command, Control and Communications – Tactical

The first in a new series, ASA(ALT) at Work, which looks into ASA(ALT) organizations, what they do and where they do it.

Led by Maj. Gen. David G. Bassett and headquartered at Aberdeen Proving Ground, Maryland, PEO C3T comprises a workforce of more than 1,600 personnel in 15 states and around the world who acquire, field and support the communications networks, radios, satellite systems and other hardware and software Soldiers require for information dominance on the battlefield. PEO C3T also has operational units that field and train Soldiers on new network equipment.

Photo courtesy of PEO C3T

Photo by Joint Readiness Training Center Public Affairs Office

What should we know about PEO C3T?

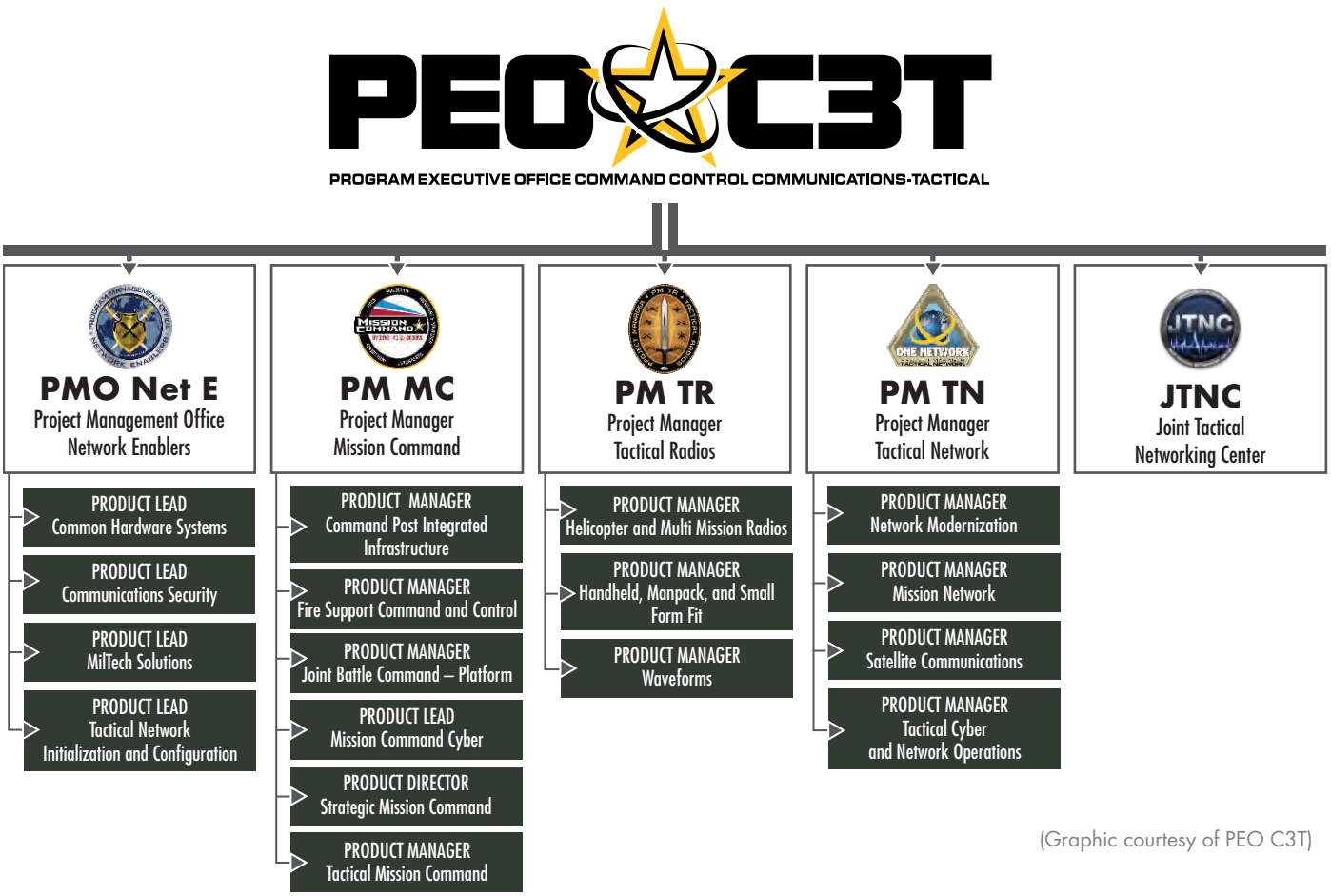
PEO C3T is building a network that is …

Expeditionary, to allow commanders to promptly deploy anywhere and conduct operations upon arrival.

Mobile, so that commanders can command from the plane, from the tactical operations center, or while fighting alongside their troops.

Hardened by cyber and electronic warfare capabilities and by offering multiple communications pathways to make it harder for adversaries to identify how Soldiers are sharing data.

Simple, so that any Soldier, not just network experts, can communicate using radios and other devices.



(Graphic courtesy of PEO C3T)

WHERE DOES PEO C3T FIT INTO THE BIGGER PICTURE?

The Army Network Cross-Functional Team identifies capability gaps—what Soldiers need from the Army network—and then conducts assessments, user experimentations and technical demonstrations to find potential ways to fill them.

Then PEO C3T runs the baton from "idea" to "product in the field"—it takes that list of potential solutions and partners with organizations in research and development (like the U.S. Army Communications-Electronics Research, Development and Engineering Center) and testing (the U.S. Army Test and Evaluation Command) to develop and acquire the ones that work best.

WHAT HAVE YOU FIELDED LATELY?

Security force assistance brigades in Afghanistan recently got PEO C3T's newest effort, which is being called the Integrated Tactical Network: not a new product, but a new combination of the Army's current tactical network environment (radios, applications, devices and network transport) with new commercial components (radios, gateways, applications and cellular services) and transport capabilities so Soldiers can communicate in areas with limited or disabled bandwidth. (See related story, "Learning on the Go," Page 19.)

The other key ingredient: It's unclassified. Most Soldiers conducting operations in tactical settings aren't talking about classified information. But until now, the networks

continued on next page ▼

they used to communicate had to be able to handle classified material—which meant more regulatory boxes to check and more security training. The Integrated Tactical Network drops those requirements.

"This isn't a new network. We're not replacing anything. What we're doing is we're basically taking a program of record and we're looking at injecting commercial off-the-shelf items to see where we can enhance or improve our capabilities," said Lt. Col. Brandon Baer, product manager for Helicopter and Multi Mission Radios

▶ PEO C3T is all about how Soldiers communicate—the satellite terminals that send internet and phone signals to the command post, radios, the network that Soldiers connect to in the field, mission command software and apps. PEO C3T's goal is to deliver a network that lets Soldiers dominate across all domains. The work's already in progress, with a target end date in 2028. (Photo by PEO C3T)

▲ But the "win in 2028" network isn't in a lab somewhere under development. Pieces of it are in the field already, being tested and used. The approach is incremental: Add something new, let Soldiers test it—the 1st Battalion, 508th Parachute Regiment (1/508 PIR) of the 82nd Airborne Division just tested a new combination of network components, some commercial, some government —fix, repeat. (Photo by PEO C3T)

▲ "In contrast to other Army programs, where somebody that we're not even interacting with decides what we need and pushes it down, the ability to work closely with the developers of the software and hardware has been great," said Capt. Matthew Risenmay, higher headquarters company commander for the 1/508 PIR. "If you don't have contact with the people that are developing it, you run into problems and you have to deal with the problems for a long time." (Photo by PEO C3T)

Biggest success? *Integrating commercial off-the-shelf products into the Army's network.*

"It gives us an opportunity to keep up with industry and tweak things as we go, with user feedback, and also inject capabilities depending on what the unit has [and] what the unit's missions are."

— Lt. Col. Brandon Baer

(Photo by Amy Walker, PM Tactical Network/PEO C3T Public Affairs)

Biggest challenge?

"Finding ways to make the network more flexible to meet current and future operations. We are currently examining how we can manage the boundaries within our secure network to give us more flexibility at the tactical edge. We're also looking at advanced networking waveforms, which will allow us to conduct a mobile ad-hoc network for our battalion formations that will operate in a variety of situations."

– Kathryn Bailey, PEO C3T Public Affairs

(Photo by Joint Readiness Training Center Public Affairs)

"The overall network strategy is to have a network that's flat, fast, mobile and protected." — Maj. Gen. Peter A. Gallagher, director of the Army Network Cross-Functional Team.

(Photo by PEO C3T)

For more information, contact the PEO C3T Public Affairs Office at ***https://peoc3t.army.mil/c3t/contact-us.php***.

A SYSTEMATIC APPROACH

A collaborative approach to systems biology may hold the key to breakthroughs from pain management and treatment of chronic eye injury to precision medicine—and wise use of funding.

by Dr. Valerie T. DiVito and Dr. Jessica M. Calzola

Nearly 100 of the brightest minds from DOD came together at Fort Detrick, Maryland, for the Integrative and Collaborative Biomedical Research for the 21st Century Workshop on Nov. 29-30. The U.S. Army Medical Research and Materiel Command's (USAMRMC) Systems Biology Collaboration Center sponsored the workshop.

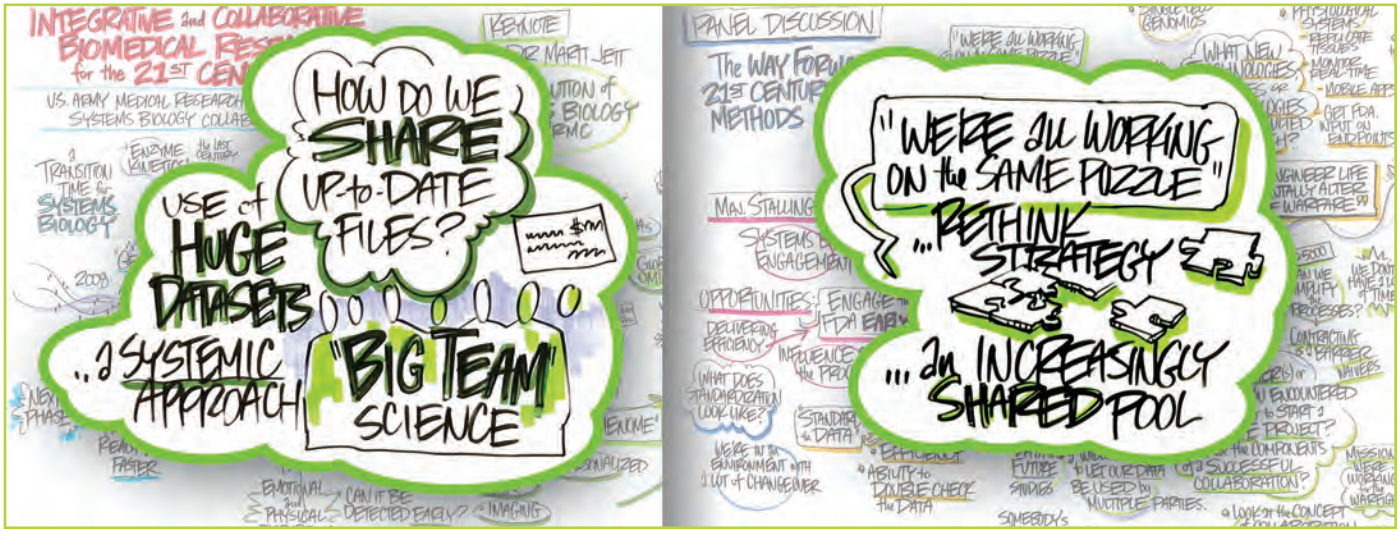
The two-day event was a venue for experts across the Army, Air Force and Navy, as well as other DOD and federal organizations, to discuss technological innovations, capabilities and mutual topics of interest, as well as current and future collaborations.

Representatives from all levels of research within DOD, including lab technicians, research scientists, program managers and directors, came together to develop a shared understanding of the newest system and integrative biological analytical capabilities and to identify opportunities to leverage the technologies for near- and far-term practical applications.

The workshop featured presentations by representatives from 12 organizations, including USAMRMC subordinate commands and others within DOD.

Traditional research methods focus on understanding individual components within a system. But systems and integrative biology approaches take a holistic look to understand the system as a whole through analysis of the networks that make up living organisms. This methodology enables researchers to better understand the whole system (e.g., the whole body) and shows promise to aid researchers in tackling the complexity of warfighter health and performance.

WELCOMING REMARKS
Dr. George Ludwig, USAMRMC's principal assistant for research and technology, welcomes workshop attendees. (Photo by USAMRMC Public Affairs)



WHAT WE'RE TALKING ABOUT

A graphic recording by Jim Nuttle of Strategy Arts LLC depicts the welcome and keynote to the Integrative and Collaborative Biomedical Research for the 21st Century Workshop. Throughout the two-day workshop, Nuttle generated real-time visualizations capturing the remarks and any concepts being discussed; these creations provided immediate feedback that the audience could easily grasp and respond to. (Graphic courtesy of USAMRMC Public Affairs)

Dr. Marti Jett, Army chief scientist for systems biology, presented the keynote address, "Evolution of Systems Biology within USAMRMC." Jett discussed the importance of systems biology and collaborative science as a research approach and recalled challenges of past projects, including the inability to share up-to-date files. "With systems biology, that is one thing that is terribly important—to give each other the information as it's happening," she said. Additionally, Jett noted that collaborative cross-functional research teams have been instrumental to maximizing value from multiple molecular data sets and generating biomarker panels for diagnosing complex diseases such as post-traumatic stress disorder and blood-clotting disorders in combat settings.

Presentations spanned the breadth of complex biomedical issues, from pain management and chronic eye injury to precision medicine and human-agent teaming (i.e., the interaction of the warfighter and intelligence agents). There was an additional focus on how these topics were tackled using integrative and collaborative methodologies. Speakers highlighted projects that use these approaches, as well as core infrastructure and capabilities within their respective organizations and successful principles that have guided collaborations.

For example, Dr. Phil Karl, research dietician with the U.S. Army Medical Research Institute of Environmental Medicine (USARIEM), described examples of collaborative research efforts among USARIEM, the U.S. Army Center for Environmental Health, the Air Force Research Laboratory and the U.S. Army Natick Soldier Research, Development and Engineering Center that used big data and bioinformatics to translate research into novel solutions for the warfighter.

Efforts that analyzed warfighter performance under operational stress (e.g., high altitude, extreme temperature) used integrated data from several genetic disciplines as well as clinical information, such as body temperature and blood pressure, to demonstrate that the microbiome's metabolic byproducts influence performance. The microbiome comprises the diverse populations of bacteria, viruses and fungi that occupy the human body. Future efforts will focus on assessing dietary supplements, which could help warfighters by improving digestion. That could reduce the occurrence of issues like acute mountain sickness and possibly improve cognition.

Dr. Clifton Dalgard, Core director for the American Genome Center of the Collaborative Health Initiative Research Program,

KEYNOTE ADDRESS
Dr. Marti Jett, Army chief scientist for systems biology, presents the keynote "Evolution of Systems Biology within USAMRMC" at the workshop. (Photo by USAMRMC Public Affairs)

> **"This integrative approach to biomedical research provides us an opportunity to get to a level of complexity that we have never been able to get to before."**

hosted at the Uniformed Services University, highlighted the center's whole-genome sample processing and computational capabilities, which are unparalleled within DOD. Currently, the center has 18 genetic sequencers that include state-of-the-art technology. With more than 80 ongoing projects across DOD and collaborations at the National Institutes of Health, the center is helping to assess genetic risks for illnesses like cardiovascular disease and cancer to improve diagnosis and treatment.

In a time when doing more with less is the mantra and fiscal responsibility is more important than ever, this inclusive meeting was pivotal for bringing together those with shared interests and, more importantly, shared goals. It also served as a jumping-off point to ensure continued efficiency by identifying gaps and barriers across the myriad integrative biology research efforts.

One outcome of the meeting was to initiate collaborations that will lead to expedited delivery of tools and solutions. Further, it is anticipated that biomedical research study designs will be more comprehensive as a result of the accessibility and knowledge of supporting research and engineering capabilities across DOD.

Workshop attendees were impressed to learn about the breadth of work and technologies throughout the enterprise. Attendees appreciated the opportunity to see how computational analysis is being applied across a wide range of DOD biomedical research. Additionally, they benefited from seeing targeted, multidimensional studies that integrate several approaches focused on medical application.

In fact, in a survey of workshop attendees, 68 percent of respondents indicated they learned about a new technology, data type or methodology during the workshop. From the Biotechnology High Performance Computing Software Applications Institute's capabilities in the development of machine-learning based algorithms, to the U.S. Army Medical Research Institute of Infectious Diseases' rapid genomic sequencing for disease surveillance, the diversity of possibilities encouraged participants to pursue collaborations.

HANDS-ON TECH

Scientific capabilities developed to promote data collection and collaboration were on display during the working lunch on Nov. 29. Attendees participated in product demonstrations and learned more about how USAMRMC capabilities could improve the efficiency of current and future research efforts. These capability demonstrations included:

- **USAMRMC's SysBioCube**, which functions as an integrated biomedical research data access, management and analysis platform for biomedical research of military relevance. It serves as a central portal for data collection, harmonization, mining and file sharing, and is accessible to all members of the DOD research community, including extramural partners.
- **2B-Alert**, developed by the Biotechnology High Performance Computing Software Applications Institute. It is a smartphone app that uses sleep-wake and caffeine schedules and measurements of past performance (including results from the psychomotor vigilance test) to predict alertness and cognitive performance. The system allows users to input additional data parameters, and lets users or commanders view predicted cognitive performance levels at desired times.
- **PanoramiX**, a platform developed by the Integrative Systems Biology Program at the U.S. Army Center for

Environmental Health Research that enables researchers to visualize the interconnectedness of tailored genome assays with pathological networks and phenotypes for cells or organisms in a data-agnostic manner. This tool allows researchers to easily explore genomic data sets, which tend to be large and difficult to manage, in order to identify interactive networks.

- **Functional Heatmap**, made by the same group that developed PanoramiX. It is an automated and interactive tool enabling pattern recognition in time-series data, providing a means for researchers to identify trends driven by functional changes. This tool translates numerical data, generally from data sets that are very large and cumbersome to manually evaluate, into color-defined visualizations, allowing researchers to more easily identify patterns.

DISCUSSING THE WAY FORWARD

The workshop closed with a panel discussion driven by questions that arose during the two-day event. The group discussed the greatest opportunities for integrative biomedical research as well as the potential to develop disruptive medical capabilities that could change the landscape of force readiness by improving warfighter lethality.

Participants also discussed the extensive bureaucratic inhibitors that delay the establishment of collaborations as well as barriers that prevent effective data sharing, such as concerns about intellectual property and data rights. There was unquestionable agreement that collaboration is essential to avoid duplication of efforts.

Leadership echoed the need for a team approach in support of the warfighter. "We are all working on the same puzzle," said Dr. Ben Petro, acting director of the Office of the Undersecretary of Defense for Research and Engineering. "But you all are working on a puzzle that has millions of pieces. If we are working on the same puzzle, how should we organize ourselves strategically?"

Petro continued, "Reach out to others working on a puzzle and figure out how the piece I'm working on provides [clues] to the larger puzzle. As we find pieces that can help other people, we are sharing. The puzzle is a holistic view of the warfighter across all activities and all health states. The opportunity I see here is convergence."

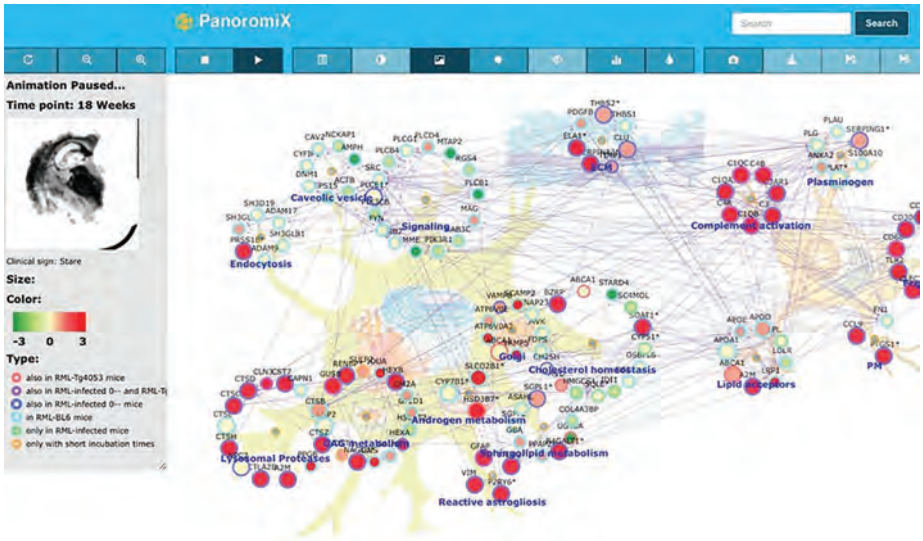
Dr. William Mattes, director of the Division of Systems Biology at the U.S. Food and Drug Administration's National Center for Toxicological Research, discussed the topic of standardization. "When I think of integrative biomedical research, one of the things that catapulted the genomic field was standardizing the data files," he said. "We need to force some standardization, and there are so many opportunities there. It makes it more efficient. Then you aren't duplicating efforts, you are synergizing efforts."

Efficiency is extremely important, said Maj. Jonathan Stallings, acting director of USAMRMC's Office of Regulated Activities. "We should talk about standardization up front," he said. "Collectively, we need to pull minds together and decide what standardization looks like. This would allow us to deliver efficiency in a time when money is precious."

Working together will allow teams to bring ideas to fruition more quickly, according to Dr. George Ludwig, principal assistant for research and technology

INNOVATIVE MILITARY RESEARCH

Dr. Robert Green, professor of medicine at Harvard Medical School and director of the Genomes2People Research Program at Brigham and Women's Hospital and Broad Institute, presents "The MilSeq Project: Enabling Personalized Medicine through Exome Sequencing in the U.S. Air Force" at the workshop. This work is funded by the U.S. Air Force. (Photo by USAMRMC Public Affairs)



MOLECULAR VISUALIZATIONS
An example of the visualization generated by the PanoramiX tool, illustrating networks and interconnections among components within a system. The tool was built using molecular data sets. (Graphic courtesy of USAMRMC)

at USAMRMC. "What can we produce quickly to bring us up to parity with our potential adversaries?" asked Ludwig. "It is not what we can do as individuals, but what we could do collectively to make that actually happen."

Ludwig also mentioned that shared data can be beneficial to peers working on seemingly unrelated projects. "This integrative approach to biomedical research provides us an opportunity to get to a level of complexity that we have never been able to get to before," he said.

CONCLUSION

The two-day workshop demonstrated the current breadth of collaborative and integrative efforts across the enterprise, but also served as a catalyst for future collaborations by bringing researchers together to stimulate discussion and social interaction. Participants surveyed after the workshop indicated in an overwhelming majority—83 percent—that they anticipate starting new collaborations as a result of the networking conducted during the workshop.

"I think it is a fantastic activity, bringing people across departments together to share different approaches to take and different problems to solve," said Petro. "The mission we have here is critical, and no one else can do it."

For more information, contact Dr. Valerie T. DiVito at ***valerie.t.divito.civ@mail.mil****.*

"We are all working on the same puzzle. How do we organize ourselves strategically? The opportunity I see here is convergence."

DR. VALERIE T. DIVITO is currently acting director of the USAMRMC Systems Biology Collaboration Center and director of the Environmental Health Program at the U.S. Army Center for Environmental Health Research. She received a doctorate from Georgetown University and a B.S. from Dickinson College, both in biochemistry and molecular and cellular biology. She is a member of the U.S. Army Acquisition Corps and holds Level III certification in science and technology management as well as Level I certification in program management. She is also a 2017 graduate of the Naval Postgraduate School Advanced Acquisition Program.

DR. JESSICA M. CALZOLA is a program analyst with Leidos, providing program management support to the USAMRMC Systems Biology Collaboration Center. She received a doctorate in microbiology and molecular genetics from Rutgers University and a B.S. in biochemistry from Juniata College. She is also a certified Project Management Professional.

THE NEED FOR SPEED

DOD is fusing new authorities to upend a moribund acquisition status quo.

by Col. Joel D. Babbitt and Dr. Donald Schlomer, Lt. Col., USA (Ret.)

The case for change in peacetime has rarely been made as succinctly as the last two National Defense Strategies. For 17 years, the U.S. military has focused on low-intensity conflicts, bending all of our resources and attention toward defeating the terrorist threat in Afghanistan, Iraq, Syria and Africa. However, with Russia's annexation of Crimea, the debut of Russia's New Generation Warfare using robots in eastern Ukraine, and China's rapid maturation of its navy, rocket forces and military in general, it has become obvious that a new era of peer competition has arrived.

But large enterprises don't change on a dime. It took us 17 years of focus on counterterrorism rather than on near-peer competitors to get to where we are—outranged by Russian artillery, lacking in air defense and discovering that our technological lead has eroded in several other areas as well. To regain our edge in these areas—quickly—is and will be a daunting challenge.

To meet this challenge, Gen. Mark A. Milley, Army chief of staff, is driving structural changes, and Congress is providing the top cover, through the development of a new four-star headquarters, the U.S. Army Futures Command. The Army Futures Command is breaking organizational friction by prioritizing the Army's research and development, promoting an open dialogue through its cross-functional teams and championing the use of new authorities to break through calcified acquisition processes, thereby ushering in a new era of Army acquisition.

All of this has created quite a bit of buzz in the program offices and in the cube farms of the Pentagon. The need is clear: Army acquisition must no longer be process-oriented, time-consuming and risk-averse, taking years to deliver a product.

Enter the dynamic duo of middle-tier acquisition and other transaction authorities.

MIDDLE-TIER ACQUISITION DOES HAVE RULES

1. Stakeholder members of a middle-tier acquisition program are established under a cross-functional team for the purpose of considering innovative technologies and new capabilities to meet the needs established by combatant commanders or acquisition executives. The stakeholders come from the areas of program management, contracting, testing, finance, science and technology, and logistics. (See Figure 1.)
2. A middle-tier acquisition process requires a validated requirement to request and thus expense funds within the process.
3. The members of a program that uses a middle-tier acquisition process must demonstrate the ability to evaluate the performance of a fielded prototype in an operational environment.
4. Members of the program must provide a path to transition a successful prototype to an approved PM for production and fielding within five years using a middle-tier acquisition process or a traditional acquisition system.
5. A middle-tier acquisition process requires the team members to report the ongoing efforts of the prototype development.

Reporting requirements are:

1. Name of the program: Personal Defense Weapon.
2. Capability gap or issue: Lighter weight and subsonic.
3. Definitive source of the gap or issue: National Defense Strategy.
4. Capability characteristics or solution: New weapon and suppressor.
5. Date funds approved for the validated requirement: Nov. 12, 2018.
6. Funding source: Procurement.
7. Program status or recommendation: Prototype assessment.
8. Date of prototype transition or termination: June 2020.
9. Reason for transition or termination: TBD.
10. Amount of the proposed budget: $5 million.
11. Suggested vendor of the prototype or production vendor: TBD.

So, what is middle-tier acquisition authority? It was introduced under Section 804 of the National Defense Authorization Act for Fiscal Year 2016, Public Law 114-92. This authority provides program managers (PMs) a means to use an existing need to rapidly assess advanced technological prototypes without the bureaucracy and restrictions of new requirements approval, or to rapidly field mature systems based on existing requirements of any form. While it doesn't throw out DOD Instruction 5000.02, "Operation of the Defense Acquisition System," it encourages a minimalist approach to program structure and oversight.

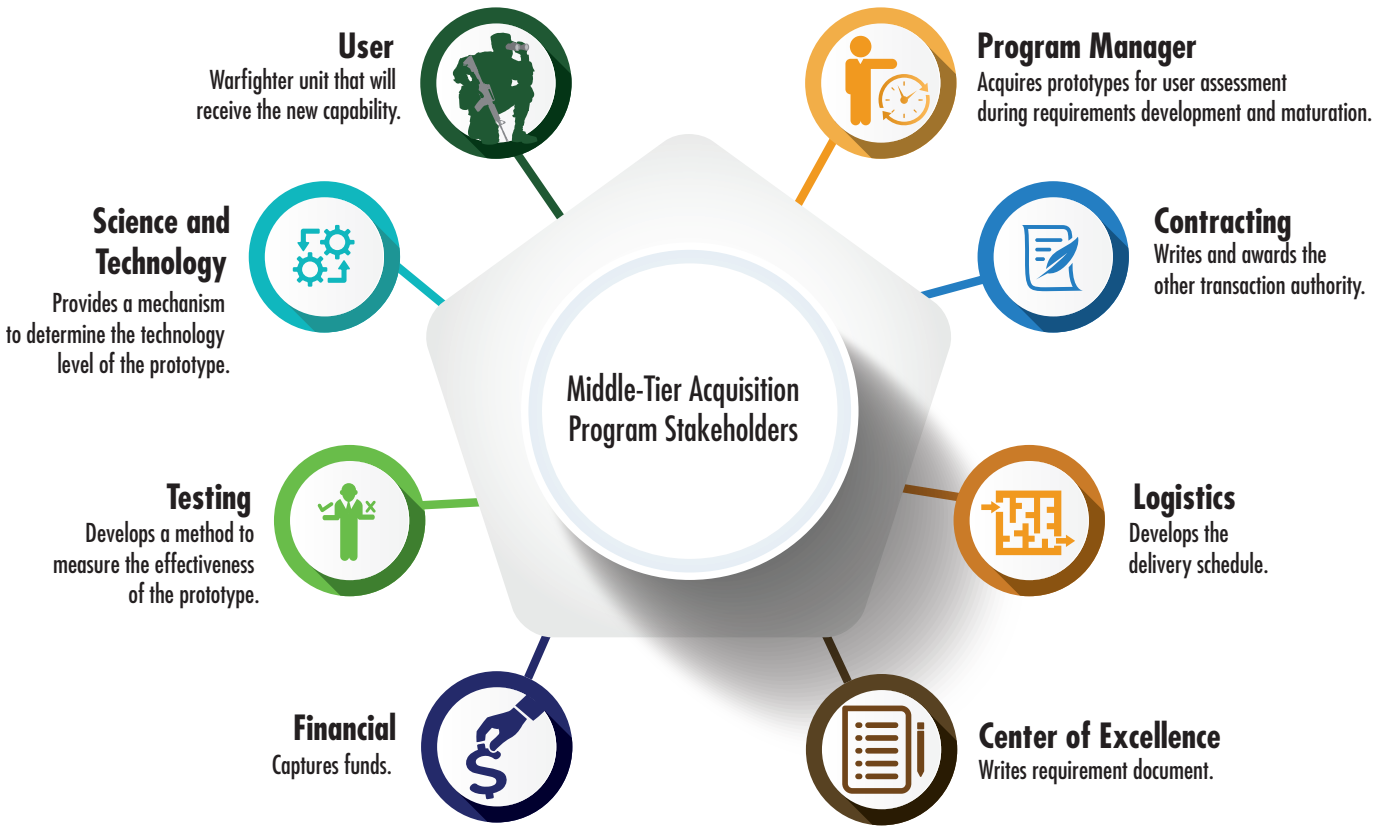
Mid-tier acquisition is a powerful mechanism because it allows you to "soft-start" a new program or rapidly advance an existing one by initiating a rapid prototyping effort. A program manager (PM) can acquire several prototypes for user assessment during the requirements development and maturation process, essentially allowing the users to "buy, try and then decide." The obvious advantages of prototyping early in the process, before a requirement is finalized, are many:

- The user community can see what the actual state of industry is, not just what is stated by our congressional leaders in Washington.
- Users can begin to make mission trade-offs and evaluate the relative priority of each aspect of a capability.
- Industry partners can receive essential feedback much earlier in the process—when the cost of changes is much lower.

If the prototype does not meet the user's need, the PM can scrap it and try another one. Through testing and evaluating prototype alternatives, the PM can ensure that the user is not forced to take something that does not meet the need, as sometimes happens under today's bureaucratic, momentum-based systems—for example, a Navy work uniform that's not designed for use aboard ships.

All you need to use middle-tier acquisition authority is a service acquisition executive's delegation of the authority for either rapid prototyping or rapid fielding. Both authorities are delegated based on any type of need or justification or requirement, be it a capabilities development document, a joint urgent operational needs statement, an operational need statement, an urgent need statement or a directed requirement. The ability to address one of these documents and bypass the need to get a requirement approved through the Joint Capabilities Integration and Development System, paired with the exceptionally slim documentation required for program structure, is the essence and value of middle-tier acquisition.

FIGURE 1



TEAM SUPPORT

The middle-tier acquisition process gives PMs a way to use an existing need to rapidly assess advanced technological prototypes without the bureaucracy and restrictions of new requirements approval, and takes a minimalist approach to program structure and oversight. After requirement approval, the PM or the science and technology member is the lead for acquiring the prototype. (SOURCE: Col. Joel D. Babbitt and Dr. Donald Schlomer)

An important component of middle-tier acquisition is the early coordination and robust involvement of a cross-functional team. These teams are constructed such that each member represents a different function of the acquisition effort and is empowered to address a vital function in acquiring a capability. Each function is necessary for the identification, funding, acquisition and user assessment of a prototype capability. The team includes the person refining the requirement, another developing the test plan, someone capturing the funding required, another determining if current technology exists to achieve the desired capability, and a person writing the request for proposal. Not to mention having the user determining if the capability of the prototype has value.

Having a small, empowered team is the best method to fulfill the purpose of a mid-tier acquisition, allowing for rapid decision-making and delivery of a new capability to the warfighter. The U.S. Special Operations Command (SOCOM) has used a "buy-try-decide" model of acquisition for decades—buying a product or prototype, trying it to see if it meets the need and deciding whether to keep it or buy something else. Currently, SOCOM is buying a prototype personal defense weapon—a weapon halfway between pistol and rifle—to assess its capability through a combat evaluation. Thus, warfighters will use the prototype weapon and undergo an eight- to 12-month in-the-field user assessment. After the evaluation, the milestone decision authority for the weapon will make a decision to either field or scrap the weapon prototype.

A MASSIVE LITTLE EXCLUSION

But what about contracting, you ask? Certainly if we speed up program timelines, traditional contracting will keep the overall process slow, right? Enter other transaction authority, which gives the contracting officer the capacity to enter into an "other transaction agreement"—acquisition-speak for a legally binding contract directed to a specific vendor for the purchase of a prototype. These specific vendors are normally not traditional defense contractors. Their purpose is to show how DOD could use current technology. Such a contract must be for $100 million or less, which means that it's designed for smaller acquisition category (II, III or IV) programs.

Other transaction agreements are nonstandard procurement contracts, and thus not subject to the Federal Acquisition Regulation (FAR). That little exclusion actually has a huge impact and completely reshapes the playing field for DOD contracting. This exclusion could decrease the amount of time to award a contract by 12 months. Other transaction agreements provide small, innovative companies an easier way of contracting with DOD.

The mid-tier acquisition process, teamed with an other transaction agreement for contracting prototypes, provides small vendors the ability to directly compete their prototypes against established DOD vendors—thus allowing the PM to contract directly with the small vendor to acquire those prototypes for user assessment. However, if the prototype meets the user's needs, a contracting officer should issue a request for proposal to all industry partners, using the specifications of the prototype, for a larger contract for full Army fielding.

This follow-on contract award enables the Army to engage competition to obtain the best value in acquiring the new capability in greater numbers. It may not seem fair: Little company develops a great new product that the Army needs, but it's not large enough to produce that product in the quantities and at the price demanded by the Army. The Army isn't being ruthless here, but it is positioning DOD to gain a lot more involvement from small, innovative businesses that don't traditionally sell to DOD. How? Even if the Army pays a small company to develop a breakthrough product but goes on to hire a big company to produce it in the necessary quantities, that's still important business for that small company. And the taxpayer is reaping the benefit.

Having a small, empowered team is the best method to fulfill the purpose of a mid-tier acquisition, allowing for rapid decision-making and delivery of a new capability to the warfighter.

NOT SO FAST

It's important to understand the limitations of an other transaction authority. Congress' intent, made clear in Section 812 of the National Defense Authorization Act of Fiscal Year 2016 and by the $100 million authorization ceiling, was that the mechanism be used for prototyping efforts. Therefore, it's not the tool to contract for full Army fielding. So this kind of agreement is not a cure-all for anyone's contracting woes. Once the user and the acquisition program manager agree to a capability after assessments of multiple prototypes, the PM can proceed with a standard FAR-based contract for full Army fielding of that capability. Thus, a PM will need to find a contracting officer who can do both.

ADDING IT UP

Let's put it all together. What do you get when you mix middle-tier acquisition and other transaction agreements? Speed, plain and simple.

Here's a good example. The Defense Technical Information Center (DTIC) used the middle-tier acquisition process with an other transaction agreement to develop prototypes to mitigate the current threat of shoulder-launched missiles with infrared seekers. DTIC worked with the National Security Technology Accelerator, an organization that searches the world to find companies with capabilities that can directly support the warfighter, and awarded an other transaction agreement for $15.2 million to Photo-Sonics Inc., a small company, to acquire prototypes that may have a capability. Under the mid-tier acquisition authority, Photo-Sonics won a DOD contract in 2018 to pursue this new capability.

Another example is the U.S. Army Missile Research, Development and Engineering Center using an other transaction agreement to engage the Defense Ordnance

SPEAK SOFTLY AND …
The U.S. Army Missile Research, Development and Engineering Center is using an other transaction agreement in the development of a prototype personal defense weapon. (Image courtesy of the authors.)

Even if the Army pays a small company to develop a breakthrough product but goes on to hire a big company to produce it in the necessary quantities, that's still important business for that small company. And the taxpayer is reaping the benefit.

Technology Consortium, a large group of small, innovative companies, to develop that prototype personal defense weapon, which is lighter, more accurate, more lethal and quieter than existing weapons.

CONCLUSION

The need for speed is being driven by the exponential progression of technology and the rise of near-peer competitors. Russia, for example, has developed weapons that last longer, shoot farther and are more accurate than the Army's standard weapons. It is critically important that all of the Army, through the establishment of cross-functional teams, use the middle-tier acquisition process.

Using the mid-tier acquisition authority with the other transaction authority, PMs can rapidly reach out to traditional and nontraditional DOD vendors to close the gap with our adversaries. Working together through these new arrangements, we can quickly and more accurately meet the warfighter's needs.

For more information, contact Dr. Donald Schlomer at ***Donald.Schlomer@Socom.mil*** *or 813-826-1353.*

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DR. DONALD SCHLOMER, LT. COL., USA (RET.), is a government civilian acquisition program manager within the PEO for Special Operations Forces Warrior Systems. He holds a doctorate in business administration from Walden University, specializing in Acquisition Category III requirements generation and in project management; an MBA in finance from Clemson University; and a BBA in information systems from the University of Georgia. He is a graduate of the Quartermaster Officer Advanced Course, and is the 2017 Frank Dilly Award winner for best doctoral dissertation. Schlomer is a retired Signal officer who deployed to Iraq and Afghanistan in support of Operations Iraqi Freedom and Enduring Freedom, respectively. He is Level II certified in program management.

AT YOUR FINGERTIPS

Information is just a click away on the DAU website with acquisition digital prototypes and Other Transactions Guide.

by Michael Bold

You're a program or project manager facing myriad choices when it comes to the acquisition process. Should you use a traditional Federal Acquisition Regulation-based model? Or perhaps an other transaction authority? A rapid prototyping-rapid fielding approach? Which type of contracting strategy should you use—a task order/delivery order? A blanket purchase agreement?

Finding the best approach is now a little less murky thanks to a set of acquisition digital prototypes produced by the Office of the Undersecretary of Defense for Acquisition and Sustainment (OUSD(A&S)) and MITRE Corp. and hosted on the Defense Acquisition University (DAU) website.

The acquisition digital prototypes—the Adaptive Acquisition Framework and the Contracting Cone, as well as an Other Transactions (OT) Guide—were rolled out in late 2018, and are easy-to-use, interactive tools.

The Adaptive Acquisition Framework shows the many different paths an acquisition program can follow and lets users click through the details for each path. Additional pathways, tailored models and new content will be added over time.

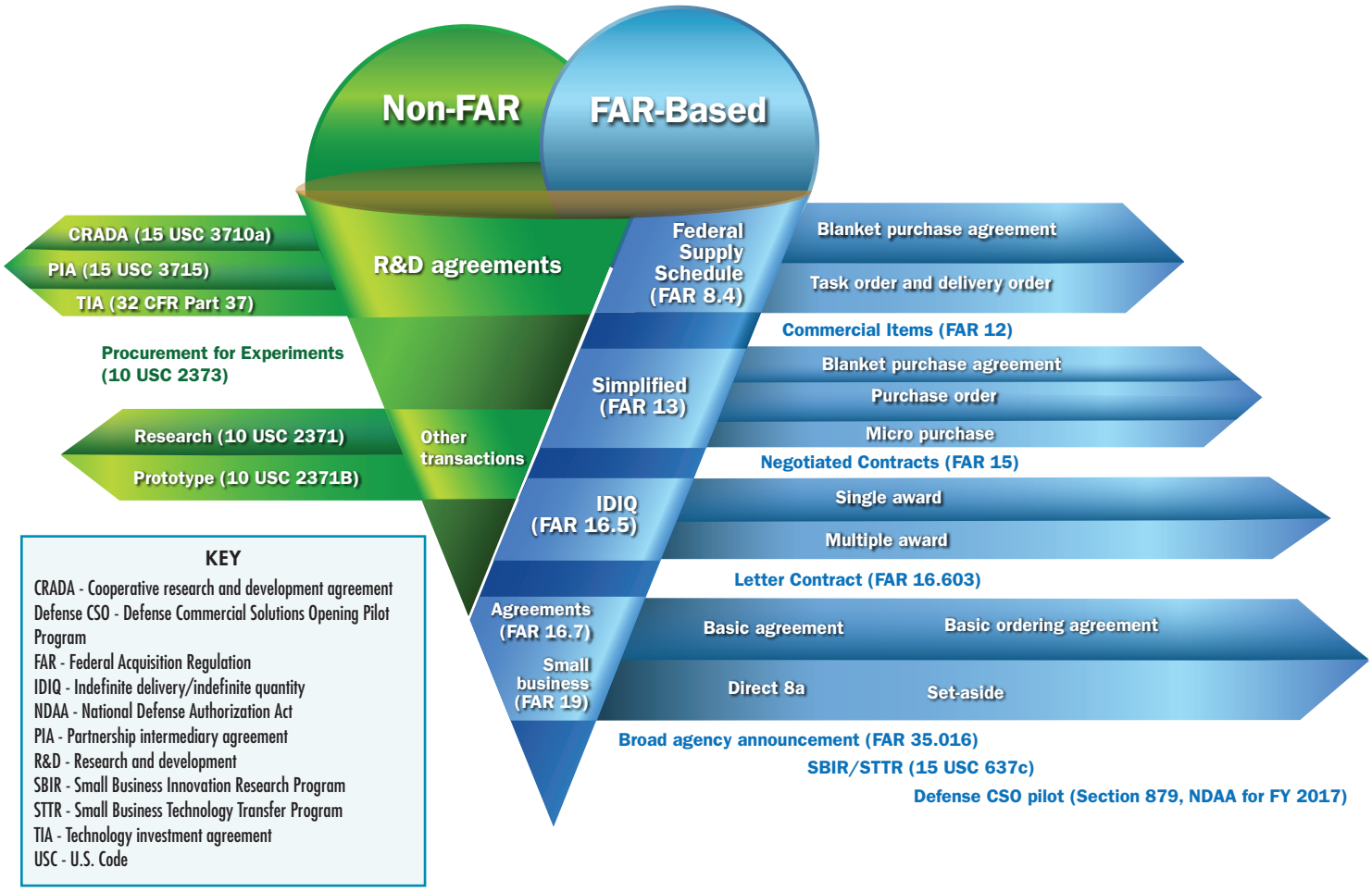
The Contracting Cone outlines the full spectrum of Federal Acquisition Regulation (FAR) and non-FAR contract strategies, and supporting materials provide details about each strategy. The goal of the tool is to provide visibility into new or lesser-known strategies and ensure that the full range of contract strategies is considered. Eventually, "our hope is that every part of the cone will be clickable," said Samuel N. Parks, communications and program analyst at DAU.

The Other Transactions (OT) Guide provides an overview of OTs—legal acquisition instruments other than contracts, grants or cooperative agreements that offer a streamlined method for carrying out prototype projects and transitioning successes into follow-on production—in addition to real-world examples. The guide also includes 10 "myth busters" that debunk some of the most common misconceptions about OTs.

Also available on the DAU website is a 10-episode "Other Transaction Mythbusting Video Series" by DAU Professor Diane Sidebottom, who came to DAU from the Defense Advanced Research Projects Agency (DARPA) and was involved in writing the OT Guide. Congress first authorized the use of OTs in 1958, with the legislation that created NASA. Congress allowed DARPA to use OTs in 1989, and their use was extended to the military services in 1996.

Feedback on the prototypes has been "really positive," said Parks. Nearly 20,000 users have visited the website since it went live in December, he said, and several users across DOD plan to incorporate the tools into contracting and acquisition training programs.

FIGURE 1



A WEALTH OF CHOICES

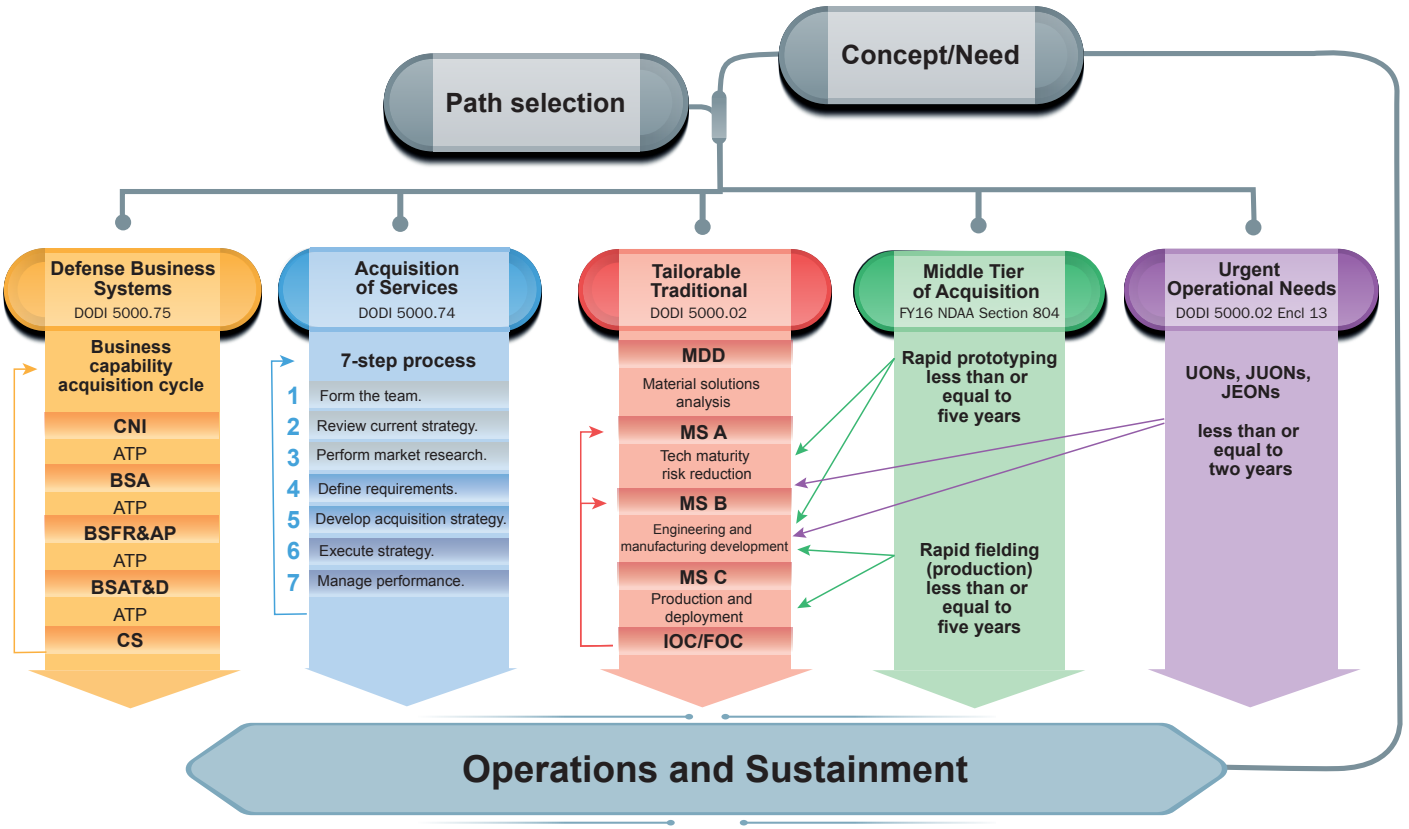
DAU's contracting cone allows users to learn about FAR and non-FAR contract strategies for a variety of contracting scenarios and compare up to three different approaches. The goal is to increase visibility for new and lesser-known options. (Images courtesy of DAU)

IT'S ALL ABOUT OPTIONS

The acquisition digital prototype was driven by Ben FitzGerald and others in the OUSD(A&S). (FitzGerald has since left the Pentagon for a private business opportunity.) FitzGerald is a former senior fellow at the Center for a New American Security and Senate Armed Services Committee staffer who was brought to the Pentagon in December 2017 by the Hon. Ellen M. Lord, the USD(A&S), to oversee the splitting of the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics into the USD(A&S) and the USD for Research and Engineering. As a Senate staffer, FitzGerald helped write a requirement in the National Defense Authorization Act (NDAA) for Fiscal Year 2018 for "digitized acquisition policy." The prototype on the DAU website is an outgrowth of that policy.

"One of the things that we are attempting to do as we implement acquisition reforms is to provide a more flexible acquisition framework, which is where we've come up with this concept of an adaptive acquisition framework that allows programs to apply the right tools, the right acquisition policy, the right contracting tool, to the program that they are running. Because we recognize that there's a wide variety of programs and multiple valid ways to deliver those programs," FitzGerald told Army AL&T in December. "So in seeking to do that in terms of seeking to

FIGURE 2



KEY

ATP - Authority to proceed
BSA - Business solution analysis
BSAT&D - Business system acquisition testing & development
BSFR&AP - Business system functional requirements & acquisition planning
CNI - Capability need identification
CS - Capability support
DODI - DOD Instruction
FOC - Full operational capability
IOC - Initial operational capability
JEON - Joint emergent operational need
JUON - Joint urgent operational need
MDD - Materiel development decision
MS - Milestone
NDAA - National Defense Authorization Act
UON - Urgent operational need

IDENTIFYING THE BEST PATH

The Adaptive Acquisition Framework is one of three interactive tools developed by OUSD to support efforts to streamline acquisition. "These tools help acquisition professionals evaluate all their options," said Ben FitzGerald, a former OUSD staffer who worked on the prototype tools, "because we recognize that there's a wide variety of programs and multiple valid ways to deliver those programs."

provide more options, we needed to find ways to communicate those options in a way that is hopefully easily understood and easy to share and communicate."

Spurred by acquisition reforms built into the NDAAs passed by Congress from FY16 through FY19—"There is a historic quantity of acquisition reform in those NDAAs," FitzGerald said—the USD(A&S) "wanted to focus on being a data-driven policy and governance organization. And we saw, as we shifted to that, we felt the need to have ways to communicate our policy in more flexible ways and in ways that allowed us to do easier analysis of the policy itself."

More online tools are on the way, beginning with one on middle-tier acquisition, although the timing is uncertain.

The focus from the get-go was collaboration and simplification, FitzGerald said. "When we did the OT guide, we intentionally

brought in representatives from DARPA, from the Defense Innovation Unit, from DASA(P) [Deputy Assistant Secretary of the Army for Procurement] within the Army, equivalent organizations in the Air Force and Navy, from DAU, to make sure that we were writing a product that was optimized for the users … you know, the people who were actually going to be agreements officers, or who were in industry trying to understand how the agreements will get put together, those types of things."

DAU's role as a "central hub for acquisition knowledge" was particularly important, FitzGerald said. "We want to make sure that they are involved in all of that policy development so that they can inform us, as the policy writers, on what they're learning from students, what students are saying, and those types of things. And so that they understand from the outset how we were thinking about developing the policy, so they can communicate that back to their students, almost in real time."

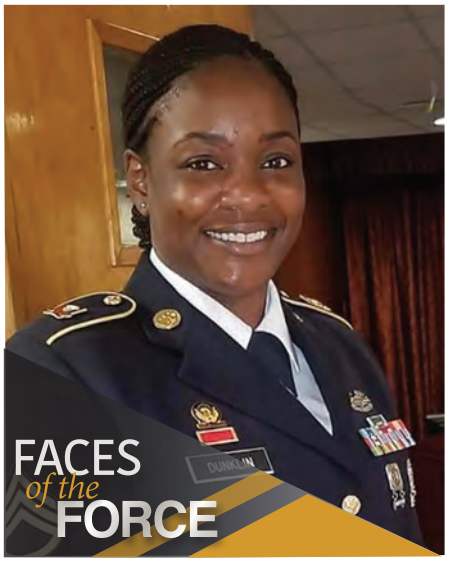
CONCLUSION

In the end, though, it's the acquisition workforce that will decide the future of such prototyping efforts. "So what we're seeking to learn over the course of this year is how much does the acquisition workforce value these types of tools?" FitzGerald said. "Because if we want to do that on an ongoing basis, it's going to require a lot of effort to make sure that everything is up to date and consistent and internally linked and all of that.

"So we're putting it out there as a prototype and if the acquisition workforce really values it, then we'll be able to make an argument for further investment in it. But if the acquisition workforce is fine with PDFs, then we can keep doing that, too."

For more information, go to the DAU website at ***https://www.dau.mil/.***

MICHAEL BOLD provides contract support to the U.S. Army Acquisition Support Center. He is a writer/editor for Network Runners Inc., with more than 30 years of editing experience at newspapers, including the McClatchy Washington Bureau, The Sacramento Bee, the San Jose Mercury News, the Dallas Morning News and the Fort Worth Star-Telegram. He holds a Bachelor of Journalism from the University of Missouri.



STAFF SGT. ADRIANE DUNKLIN

COMMAND/ORGANIZATION:
626th Contracting Team, 902nd Contracting Battalion, U.S. Army Mission and Installation Contracting Command – Joint Base Lewis-McChord

TITLE: Contract specialist

YEARS OF SERVICE IN WORKFORCE: 7

YEARS OF MILITARY SERVICE: 18

DAWIA CERTIFICATIONS:
Level III in contracting

EDUCATION: M.S. in management and Bachelor of Professional Studies in business and management, Excelsior College; certifications in workplace mediation, and arbitration and mediation, Mediators without Borders Institute

AWARDS: Army Commendation Medal, Army Achievement Medal, Meritorious Unit Citation, Army Good Conduct Medal, Army Reserve Component Achievement Medal, National Defense Service Medal, Iraqi Campaign Medal, Global War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, Armed Forces Reserve Medal, Combat Action Badge

AVOIDING THE PERILS OF A POORLY WRITTEN CONTRACT

Based on what Staff Sgt. Adriane Dunklin has learned about contracting, the animated character Gumby would make a great addition to the acquisition workforce. "The most important thing is to be resilient and flexible," she said. "The acquisition field is constantly changing. You have to be able to conform to the changes and continue to support the mission."

Dunklin is a contract specialist for the 626th Contracting Team. Her organization is aligned with I Corps to support the Pacific Pathways missions, and she is the central point for getting requirements into a contract and delivered throughout all phases of the mission. The 626th is part of the 902nd Contracting Battalion within the U.S. Army Mission and Installation Contracting Command at Joint Base Lewis-McChord, Washington, which provides support to Army and Air Force customers on the joint base as well as Army requirements at Yakima Training Center, Washington. "I could be supporting one mission today and it will completely change in a week or so," she said. "As an acquisition professional, you have to be able to deal with the everyday changes without any impact to the warfighter. You never know what is going to happen from one day to the next."

A big part of Dunklin's work is teaching her mission partners about how the acquisition process works and what documents they need to get their requirements submitted on time. She relies in part on certifications in arbitration and mediation to help address that challenge. "Those certifications help me recognize and resolve conflict, and taught me a lot about different personality and leadership types and how to deal with all kinds of people," she said. "All of those skills help me develop relationships, which are an important part of the work I do."

Dunklin has been in acquisition for almost seven years. "Before coming to this field, I was a truck driver. I knew that I did not want to drive 18-wheeler trucks when I got out of the military, so I made the decision to transition to the acquisition career field." For her, the transition was an easy one. "The hardest part was getting the right person to actually write my recommendation letters," she said, adding that Soldiers who are interested in acquisition should research the field first. "Get as much information as possible. It is a very appealing field, and there is great potential for success on active duty and after you've left the service." But, she added, be prepared to work for it. "This field is not your ordinary MOS [military occupational specialty], and getting through the school will not be a cakewalk. There is way more to the acquisition workforce than what is presented online, and talking to someone that is already in the field will be very beneficial to you."

CONTINUOUS LEARNING
Dunklin, second from right in front row, and her classmates at Army Logistics University at Fort Lee, Virginia, gather for a class photo after completing the Senior Leaders Course. Dunklin believes that learning from peers and mentors has helped her to be the best contracting officer she could be, and she encourages others to seek out advice when they need it. (Photo courtesy of Staff Sgt. Adriane Dunklin)

Dunklin knows about that firsthand. "During my first year, I had the chance to get trained by civilian personnel who have been in the acquisition workforce for 15 years or more. Working alongside them and learning the contracting craft was one of the best perks of the job for me," she explained. "I was able to get the one-on-one training that every acquisition professional needs, and I was able to really pick their brains and get way more knowledge than I would get at the schoolhouse."

Her first acquisition assignment was at the U.S. Army Contracting Command (ACC) – Redstone Arsenal, Alabama. It provided a front-row seat to learning how the contracting process worked when it came to acquiring products for the Army as a whole versus just buying for individual units. "I was able to see the complete acquisition process from the beginning to the end," Dunklin said. "Seeing the start of the development of new equipment for the warfighter was a great experience. As contracting professionals, we are always told how our work directly impacts the warfighter; being able to see it from the planning to testing phases is amazing."

She held several roles at ACC – Redstone, including contract specialist and quality assurance specialist. "Those positions taught me so much about how contracting and quality assurance work together to get the best service and products to the warfighter," she said. It also made her a better contract specialist. "As a quality assurance specialist, you are dealing with the contract after it is written and the work is being performed. I learned to really pay attention to how the statement of work or the performance work statement is written, and to make sure that the contractor is performing to the standard of the contract," she explained. "A poorly written contract does more than just waste the government's money—it will directly impact the warfighter. I learned to make sure that everything with the contract and the accompanying documents are exactly what the customer and warfighter need so that there is no delay on the battlefield."

She also learned the importance of asking questions and seeking out help from others, including her mentor, Latanya Jackson, contracting officer at ACC – Redstone. "Always be the person who's not afraid to ask questions," she advised. "If you don't know something or if something is a little confusing to you, ask for more clarification. The best thing that you can do is seek knowledge and lean on your civilian counterparts. They have a wealth of knowledge that is available to you—all you have to do is ask."

—SUSAN L. FOLLETT

TRAIN TO SUSTAIN

An Afghan National Army Special Operations instructor watches recruits as they perform security duties during a training exercise at Camp Commando, Kabul, Afghanistan, in May 2018. A gap between the sustainment requirements for a new system delivered through FMS and a partner nation's ability to sustain the system can lead to the inefficient use of funds and have an adverse impact overall on U.S. security cooperation efforts. (Photo by Master Sgt. Felix Figueroa, NATO Special Operations Component Command – Afghanistan)

RADIO ANASOC

When supplying partner nations through FMS, the best possible equipment may not always be the best possible solution.

by Benjamin Posil

Providing the best (i.e., most capable) equipment is not always the most successful foreign military sales (FMS) solution. In many cases the optimal solution means providing a less capable piece of equipment that better aligns with the recipient's ability to implement, maintain and sustain it with minimal external support. An examination of the Afghan National Army Special Operations Command's (ANASOC) radio network highlights how ineffectual capacity-building efforts can be when they do not reflect a thorough understanding of a partner's capabilities. Ultimately, the U.S. security cooperation program is more powerful in building military capacity when FMS deliverables are synchronized with a partner's organic capabilities.

In few places is the influence of the FMS program more profoundly felt than Afghanistan, where virtually all defense-related procurements are underwritten by the U.S. government. The impact is magnified within ANASOC, the Afghan National Army's most capable combat force. Despite having only 14,000 troops (roughly 5 percent of total ANA forces), ANASOC is credited with conducting nearly 85 percent of ongoing combat operations throughout Afghanistan. As a result, the U.S. government has spent a disproportionate amount of funding to equip ANASOC with kit similar to that used by U.S. special operations units. Unlike with many other partners, the funding made available by the U.S. government to develop ANASOC and the larger Afghan National Army has been momentous in scale.

What is no different for Afghanistan than for other countries with militaries on the lower end of the capability spectrum, however, is that simply buying more capability does not mean the partner will use it the same way that U.S. forces do. As is the case with Harris radios for ANASOC, a partner's capacity will not be enhanced

when the selection of FMS equipment is based on what matches equivalent U.S. units instead of what aligns with the partner's organic capabilities.

LIMITED PARTNERSHIP

The FMS program historically has been predicated on an assumed correlation between delivery of capability and increased military capacity; the more capability the U.S. provides to a partner, the stronger its capacity will become. There are numerous instances, however, where a partner's capability limitations were not considered during FMS case development and ultimately undermined the opportunity for capacity enhancement. Specific examples range from multibillion-dollar equipment fielding programs for Afghanistan and Iraq to the delivery of basic watercraft to the most impoverished African countries.

Any time there is a gap between the sustainment requirements for a new capability delivered through the FMS program and a partner nation's sustainment capacity, there is increased programmatic risk. Left unaddressed, this risk leads to inefficiently utilized funding and an adverse impact on U.S. security cooperation efforts. An example of a dramatic disparity between a capability provided and actual capacity generated is the tactical radio architecture established for ANASOC.

The U.S. government has spent the last 15-plus years equipping, training and mentoring ANASOC soldiers, as it has done for numerous other Afghan institutions. The vehicle for delivering nearly all new equipment for ANASOC (as well as the larger Afghan National Army) is the Building Partnership Capacity (BPC) program. The U.S. government's focus on Afghan security has been so important that the Afghan Security Forces Fund, a specific "pot" of BPC funding, was established for the sole purpose of enabling the Afghan government to enhance its defense capacity. In 2017 alone, Congress appropriated over $4.2 billion for the fund.

Included in the effort to improve ANASOC's ability to "shoot, move and communicate" has been the investment of hundreds of millions of dollars in tactical radios. While several brands of radios have been provided, the most prominent one by far is Harris.

If the ultimate U.S. strategic goal is enabling ANASOC's self-reliance, the dependence on Harris field service representatives is a liability, not an asset.

TOP OF THE LINE

Harris radios are a staple of the U.S. Special Operations Command's (SOCOM) inventory because of their advanced capabilities in propagating voice and data over a broad range of the radio frequency spectrum. Sgt. 1st Class Nicholas Pitz, a former ANASOC mentor, summed up Harris' reputation within the special operations community: "Harris is often considered the gold standard for radios because of the heightened level of capabilities they possess." At least in part because of its prominent role in the special operations community, Harris became the preferred radio solution for outfitting ANASOC.

A long-range high-frequency communication network was established for ANASOC that enables the transmission of encrypted voice and data traffic (including photos and video) over hundreds of miles from radios easily transported in a rucksack or on a vehicle. The U.S. government invested in hardware, training and an army of field service representatives to ensure functionality. While the capability mirrors networks used by special ops units across the globe, there is one conspicuous difference in ANASOC's case: SOCOM units rely heavily on this network at the operational level, while ANASOC units rarely use it at all. A recent survey conducted by the ANASOC – Special Operations Advisory Group staff found that at best, the Harris network has been dramatically underused when compared with its capabilities; at worst, it is universally ignored by ANASOC soldiers.

This is in no way a negative reflection of Harris products. ANASOC's network includes top-of-the-line equipment with tremendous capabilities that rival those used by elite forces worldwide. Instead, the underuse is a byproduct of U.S. strategy that for years provided ANASOC the most capable radio equipment without taking into account the indisputable realities on the ground. Planners failed to realize or acknowledge that because ANASOC does not have the requisite organizational sophistication, the Harris radios would have minimal positive impact on ANASOC's operational capacity.

The reasons for this ineffectiveness are numerous. From a technical standpoint,

SEEING CLEARLY
Afghan Special Security Forces conduct a helicopter raid on Taliban compounds in Kapisa province in August. In providing support to partner nations through FMS, the U.S. needs to consider what capability the partner militaries can use and sustain in a way that will enhance their long-term capacity development. (U.S. Air Force photo by Staff Sgt. Nicholas Byers, Resolute Support Headquarters)

the infrastructure to support a radio that requires regular software updates, proprietary parts and highly skilled radio operators is simply nonexistent in Afghanistan. Access to the internet is limited, even within ANASOC, so the ability to disseminate updates and to independently pursue training does not exist organically; nor do troubleshooting procedures. The resulting inability to update and distribute encryption has a particularly strong impact. Additionally, ANASOC has no practical mechanism to purchase its own spare parts, so its ability to replace broken components depends entirely on the FMS process and the Afghan military's supply system.

CULTURAL CONSIDERATIONS

Harris has filled the gap in part by establishing a network of field service representatives across Afghanistan. The Harris logo is ubiquitous; it can be found at virtually any camp where ANASOC soldiers operate. While this meets the immediate need of on-site subject matter expertise, it does little to build ANASOC's organic capacity. If the ultimate U.S. strategic goal is enabling ANASOC's self-reliance, the dependence on Harris field service representatives to ensure the functionality of ANASOC's tactical radio network is a liability, not an asset.

Even if the previously outlined challenges can be overcome, there are fundamental cultural considerations that simply cannot be ignored when implementing a system like Harris radios. At the most basic level, a large percentage of ANASOC soldiers are functionally illiterate even in their native Dari; English reading comprehension is virtually nonexistent. Harris radios are operated through a series of digital menus in English, and since ANASOC Soldiers' English comprehension is negligible, successful operation becomes an exercise of memorizing an extended sequence of words in a language they are unfamiliar with. Even if some percentage of the Soldiers can gain operational proficiency in a classroom setting through rote memorization, the likelihood of replicating this process in a field environment or in combat drops significantly.

Another consideration is that unlike U.S. special operations teams, for whom universal proficiency and empowerment are trademarks of "team" culture, Afghan military culture is defined by consolidation of power at the command level. What this means for communications is that access to more capable radios is far more restricted than in a comparable U.S. unit, with ANASOC commanders often the only ones allowed access. As a result, basic very-high-frequency "walkie-talkies" or cellphones become the primary methods of communication for much of the front-line forces.

What is especially troubling in the case of Afghanistan is that unlike with most FMS partners, the United States has been working directly with its military, at an operational level on a daily basis, for 15 years. The depth of anecdotal evidence highlighting the realities on the ground in Afghanistan far exceeds the depth

of information available for most other partners. The preponderance of evidence confirms that while the Harris radios are an incredibly capable product, they are so dramatically underused by ANASOC that the radios do little to build actual operational capacity. The time and money dedicated to their inclusion in ANASOC's "Tashkils" (Afghan documents that are similar to the U.S. Army's modified tables of organization and equipment and reflect a unit's assigned manning and equipment levels) could far more effectively be used elsewhere.

CONCLUSION

There are numerous reasons for ANASOC's underuse of tactical communication systems, including the lack of a forcing function, challenges with English comprehension, maintenance issues and equipment complexity. It is highly unlikely that the U.S. will be able to change this paradigm, no matter how much money it spends to do so.

The U.S. procurement system is predicated on the concept of pursuing "best value" for the end user. While this same mandate applies to FMS cases, the "best" solution does not always correspond to the most capable product. The analog option is a far better match for many partner nations' capabilities than the latest digital solutions that the U.S. military uses. The more basic solution is easier and more affordable to learn, operate, maintain and sustain than more complex alternatives. Moreover, the functionality is easier to integrate with the partner's overall military capacity.

The same disconnect that results in hundreds of millions of wasted U.S. taxpayer dollars in Afghanistan can be equally impactful, albeit on a lesser scale, in even the smallest FMS cases. While the scope and scale of the examples vary greatly, the resulting waste of taxpayer money and erosion of U.S. influence with partner nations have the same effect. To most efficiently employ the FMS program—and the BPC program in particular—the U.S. needs to accurately assess what capability partner militaries can support and effectively supplement in a way that will enhance their long-term capacity development. On its face, providing U.S. partners with older, and ostensibly inferior, technology may seem counterintuitive. But the result will be more capable and self-reliant partners and a more effective security cooperation program.

For more information, contact the Maryland National Guard Public Affairs Office at 410-576-6179.

YOU'RE NOT HEARING ME

Recruits refine their tactical radio programming skills at the Afghan National Army Special Operations Command School of Excellence in Kabul, Afghanistan. The radios are a remarkably capable product; however, they're underused as a result of several factors and have done little to build operational capacity. (Photo by Master Sgt. Felix Figueroa, NATO Special Operations Component Command – Afghanistan)

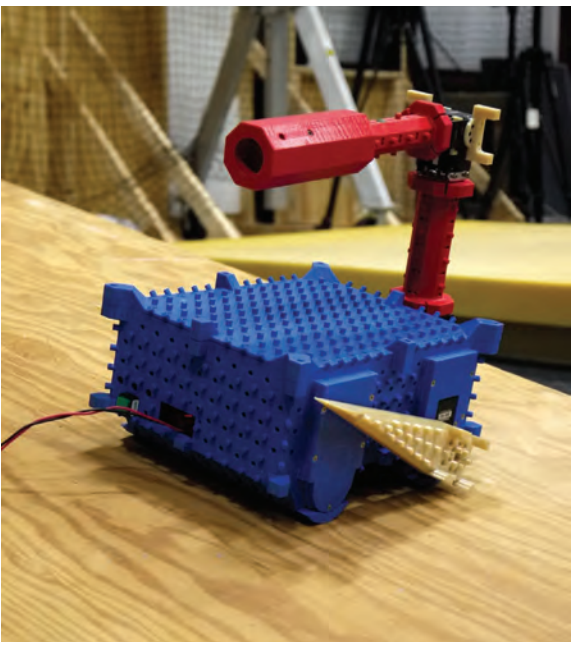
BENJAMIN POSIL is a security cooperation professional with over 10 years' experience in the field. He is a lieutenant colonel in the Maryland Army National Guard, where he recently completed a 10-month deployment to Afghanistan. He has earned MBAs from the University of South Carolina and Wirtschaftuniversität Wien in Vienna, Austria, and an M.S. in international relations from Troy State University. He also has a B.A. in international relations and Latin American studies from the University of Delaware. He is an Acquisition Corps member and a certified program manager through both the Defense Acquisition Workforce Improvement Act (Level II) and the U.S. Department of Homeland Security (Level III).

The author would like to express his appreciation to Lt. Col. Glenn Deetman, Maj. Adam Kavalsky, Sgt. 1st Class Nicholas Pitz and Sgt. 1st Class Sherwein "Joey" Asuncion. Their wisdom, assistance and technical expertise were essential in the development of this article.

I'VE FALLEN AND I CAN'T GET UP

Robots should rescue Soldiers, not the other way around. So the U.S. Army Research Laboratory is developing software to help robots pick themselves up after a fall.

by Jacqueline M. Hames

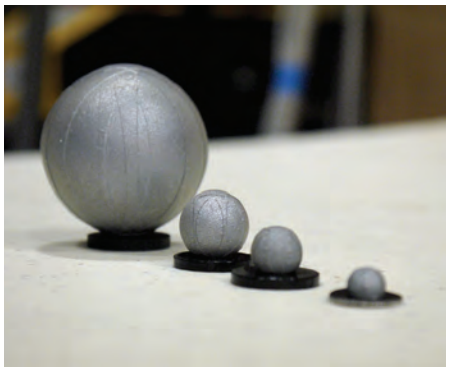


READY FOR DUTY
The test robot resembles an oddly shaped Lego toy, with a blue body, white arms and a red, jointed appendage with a counterweight. The bumps on the robot allow motion capture markers to be fitted to it in hundreds of configurations. (Photos by Jacqueline M. Hames, Army AL&T)

Most real-life robots are a long way from their sentient science-fiction counterparts. You could even categorize them as a little bit helpless, prone to falling over. That may be cute for a robotic toy dog, but it is decidedly undesirable for a robot in the field tasked with clearing improvised explosive devices (IEDs). "We hope that we can prevent that situation from ever being a problem again, where the robot can right itself and return to the vehicle so the Soldier isn't tempted to risk his own life for the sake of a robot," said Dr. Chad Kessens, research scientist at the U.S. Army Research Laboratory (ARL) at Aberdeen Proving Ground, Maryland.

In 2011, Kessens took a training course with Soldiers in which they learned how to use robots for finding and identifying roadside IEDs. "Through my interactions with the trainers who had actually used robots in Iraq and Afghanistan, I found out that one of the major problems they have is the robots they're using for this turn over more often than they would like—even once is a problem," Kessens said. One of the Soldiers that Kessens worked with said that, after 20 minutes of trying and failing to right his robot—which was potentially near an IED—he got out of his vehicle, hustled over to the robot and rescued

MOTION CAPTURE
ARL's Autonomous Systems Division captures robotic movement using cameras like this one mounted on a large steel frame. The test robot is outfitted with motion capture markers that the camera system locates in the near-infrared spectrum to find joints and record dynamics of the robot.



ROBOT MARKERS
ARL research scientists use these reflective globes—motion capture markers—in conjunction with motion capture cameras to find joints and record the dynamics of a robot. The markers come in several sizes and can be attached to the test robot in hundreds of configurations.

it because he valued the robot so much. When Kessens heard about this Soldier's experience, he immediately wanted to solve the problem.

"My role," Kessens said, "is to do robotic manipulation research that will positively impact future Army operations." He and the rest of ARL's Autonomous Systems Division's advanced mobility and manipulation team want to understand how robots can right themselves so that the future Soldier has semi- or fully autonomous robots on the battlefield.

BOT FLIPPING 101

The problem, as Kessens sees it, is that today's robots are unable to reorient themselves after experiencing a disorienting event, like falling into a ditch or being knocked over. The solution, then, is to give robots the ability to self-right. To do that, the robots need to be more aware of the space they are in and how they can move in that space. Kessens has developed a two-part software package, referred to as self-righting software, to give the robots that ability. The first part of the software is for analyzing the robot's structure, while the second part is for planning and executing self-righting maneuvers.

"My job as an Army researcher is to really understand the entire problem," Kessens said. His main goal is to understand the robot's morphology using the analytical part of the self-righting software. Morphology is the study of the forms of things; in this instance, Kessens is studying the robot's shape, where its joints are and how they are oriented in relation to one another, how heavy the limbs are relative to one another, and all the other different parameters that go into the physical makeup of a robot. "How does [the morphology] affect its ability to self-right, and under what circumstances can it not self-right?"

The goal of the software is to encompass as many varieties of robotic systems as possible; therefore, the research has to be relatively generic. However, all research has to start with a set of control parameters: Kessens and the research team assume that the software will be used for robots with rigid bodies, and that have sensors that can determine what configuration the robots are in and in what direction gravity is acting, Kessens said. "So we need something, a sensor like an IMU—inertial measurement unit—or we could use just accelerometers or inclinometers. There are different ways to get that information," he said.

An IMU is the sensor in a smartphone that changes the screen from vertical to horizontal, and vice versa, when the phone is turned sideways—what happens when you flip your phone to look at a photo, for instance. IMUs "are relatively cheap and pretty ubiquitous, so it's not a leap to assume that a robot would have such a sensor," Kessens said. The team is also considering the size of the robot in its analysis. Larger robots tend to have more computing power, but robots that could fit

The self-righting software is relevant to the development of the Next Generation Combat Vehicle—some of these vehicles will be optionally manned or fully autonomous in the future.

GOING THROUGH THE MOTIONS
Jim Dotterweich, research scientist in the Autonomous Systems Division, monitors a test robot as it demonstrates a maneuver using the self-righting software. The software, which comes in two parts, analyzes the robot's structure and plans and executes self-righting maneuvers.

in the palm of your hand are limited in how much memory they have and how much processing they can do in real time, he said.

"When I talk about having these two pieces [of software], the analysis piece can happen before the robot ever hits the field, and it will generate maps for the robot that can be stored fairly compactly, in terms of memory … but [the robot will] still be able to use [the maps] without requiring a great deal of processing," Kessens said. The idea, he continued, is to use the analytical side of the software to thoroughly assess the robot's morphology beforehand and then capture that information in a compact form to run as a separate piece of software on the robot that the robot would then use to navigate and self-right. The assessment determines all of the orientations a robot could stably sit in for a given joint configuration on a given ground angle, Kessens said. The software figures out how those states connect with one another, forming the map—kind of like the way a human remembers how to get up a certain way from a particular starting position, such as lying on your back. "Once you've done it, you know how. You don't have to think about it much because you can access that knowledge," he said.

Of course, not all of the Army's current robotic systems have the same morphology—not all of them are tracked with a single arm, like iRobot's 510 PackBot or Qinetiq's Talon—and future robots will be even harder to predict. "Future robotic systems may be significantly more complex—we may have a humanoid robot, and we're going to want that humanoid robot to be able to pick itself up," Kessens said. This futuristic variety presents an interesting challenge for Kessens: How do you tell a variety of robots, both current and future, how to right themselves? Through painstaking research, careful analysis, a little bit of trial and error and a small Lego-like robot.

ROBOT ON THE GO

The robot used in the team's research is made of a shoebox-sized blue base, two white, tapered arms on each side, and a red, jointed appendage that carries a counterweight. (All the parts were 3D-printed on the team's own printer.) It can sense its own orientation and send a signal back to the researcher asking permission to self-right. However, this robot is just a research platform, said Geoff Slipher, chief of the Autonomous Systems Division. He noted that research is still in the early stages, and emphasized that the test robot's capabilities aren't what the team envisions for final systems. "It's not intended to be anything that the Army would ever intend to field. … It allows us to ask and answer research questions. So, our product is not a robotic system; our product is knowledge about how to make robotic systems perform better," Slipher said.

In a demonstration, Jim Dotterweich, a research scientist working with Kessens, placed the research robot on a wooden ramp on the floor in the center of a room-sized square, steel frame. The frame, or rigging, held motion-capture cameras that in an actual experiment would record the robot's movements. The robot's Lego-like exterior allows researchers to attach reflective globes—motion-capture markers—of varying sizes in hundreds of configurations. The camera system locates the markers in the near-infrared spectrum to find joints and record dynamics of the robot, Dotterweich explained.

FOILED AGAIN

Scientific research is fraught with peril, even when working with software and robots. Researchers like Jim Dotterweich never know when the test subjects will act out or scoot too close to falling off the ramp. However, once properly in position, the test robot is able to perform self-righting maneuvers quite well.

ARL's Autonomous Systems Division's advanced mobility and manipulation team wants to understand how robots can right themselves so that the future Soldier has semi- or fully autonomous robots on the battlefield.

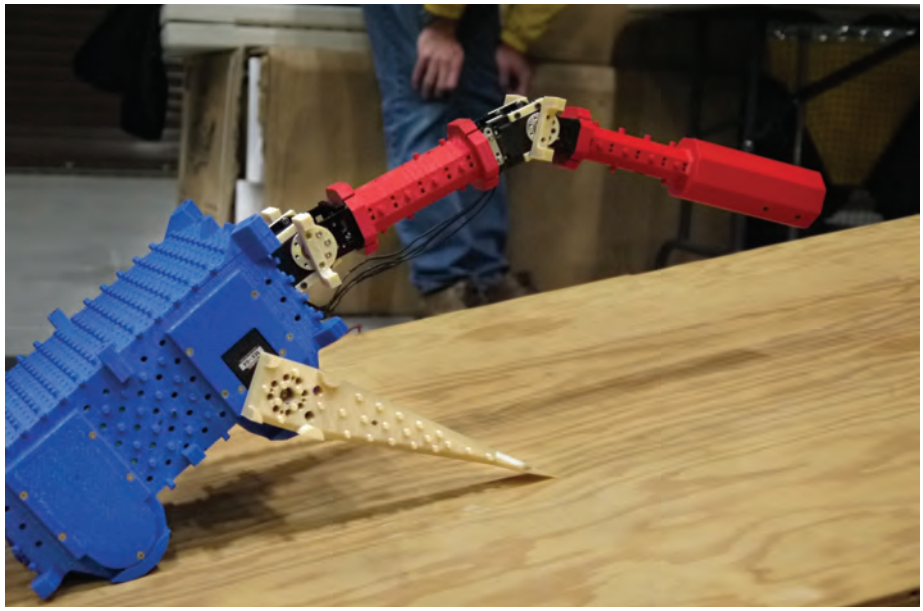
Dotterweich conducted the demonstration hunching over a computer on a fold-out table to send the self-right command to the robot. Slowly, the robot pushed itself halfway upright using its arms. And then, in one quick movement, it twisted and jumped to a fully upright position, drawing a gentle cheer from the other researchers.

For their research, Kessens and his team generated a series of maps for different ground angles—different degrees of inclination, like a steep slope—using their software. They start the robot in varying configurations, such as lying upside down or on its side, before running a path-planning algorithm to move the robot through the map, Kessens said. "We generated experimental data and matched it to the model data and showed that, yeah, our maps are doing a pretty good job of saying what states the robot could actually be in," he said. The team also conducted several experiments wherein the robot would be given a random starting configuration before righting itself.

The self-righting software can be adapted to most rigid-body robots. Anything that has arms, legs, wings or flippers—in

this case, a rigid appendage that is used specifically to flip a robot over, not to be confused with aquatic flippers—can be used. "Things that are soft or curve continuously, like an elephant trunk, would be a lot more difficult for the software to handle," Kessens said.

In August, ARL partnered with the Johns Hopkins University Applied Physics Laboratory to assess the self-righting ability of the U.S. Navy's Advanced Explosive Ordnance Disposal Robotic System—a lightweight, tracked robot similar to the PackBot that can be carried like a backpack. The self-righting software helped to determine the best ways for that system to self-right with the assistance of the Hopkins lab's range adversarial planning tool. The tool, which uses adaptive sampling—a method to efficiently search the space of possible robot configurations—helped the software work faster to generate self-righting maps for the Navy's system, Kessens said. In other words, the planning tool quickly found different ways the robot could be configured, which allowed the self-righting software to plan maneuvers faster.



PICK YOURSELF UP
The self-righting software enables robots with rigid bodies to right themselves without physical assistance from a human counterpart. This software will allow robots that may have tipped over while looking for IEDs to right themselves and continue their mission, reducing the risk to Soldiers.

CONCLUSION

Moving robots around, from a simple nudge to an outright backflip, may seem unimportant in the grand scheme of things. Sure, your bomb-sniffing bot being able to right itself is useful and keeps you safe, but what does robotic mobility really mean for the Army?

The software being developed at ARL can help the Army create its own robotic systems and help the Army purchase commercial systems, Kessens said. Understanding the self-righting abilities of commercial systems gives the Army a reference point for comparing robots, he explained.

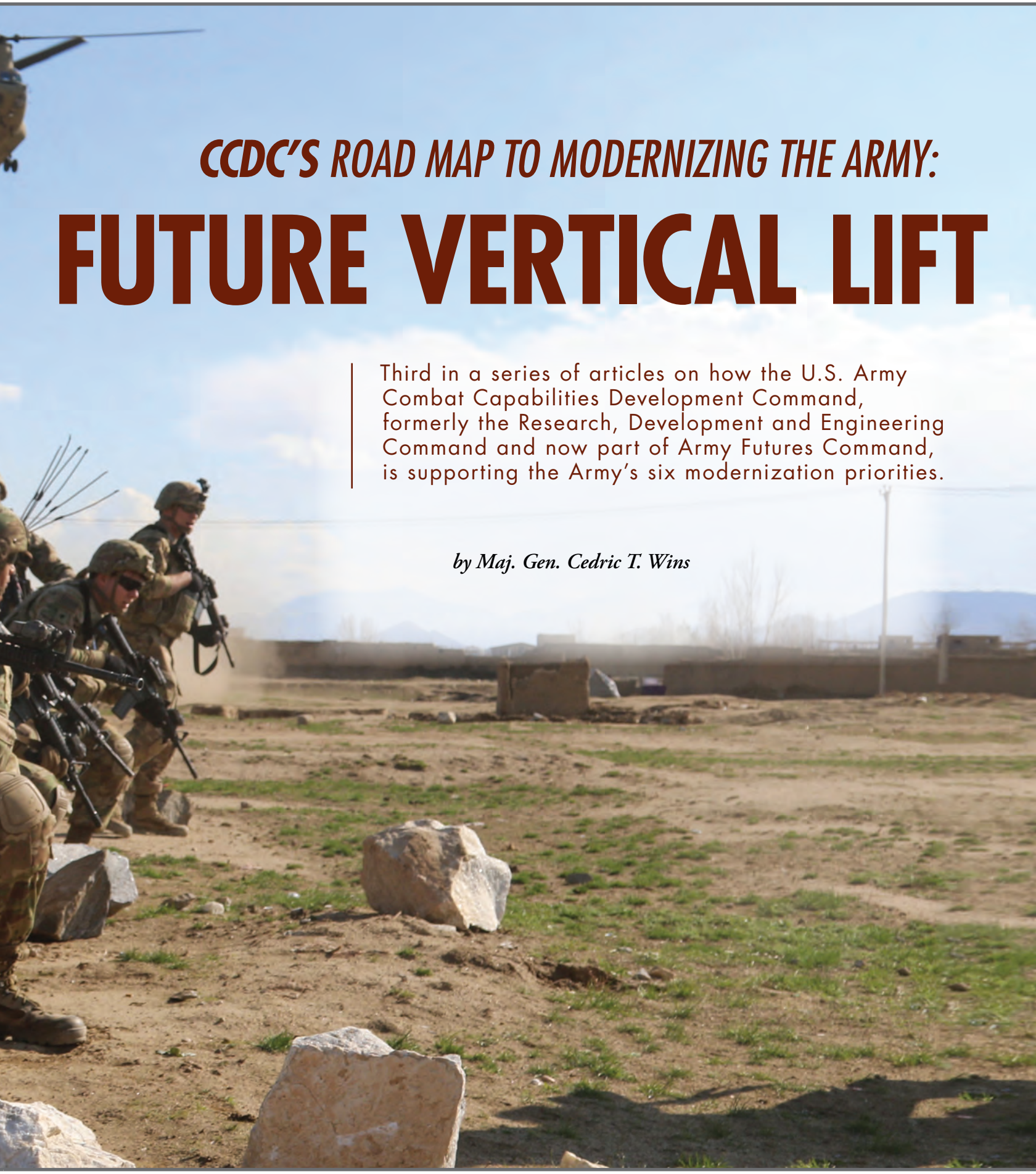
The self-righting software in particular, Slipher said, is relevant to the development of the Next Generation Combat Vehicle—some of these vehicles will be optionally manned or fully autonomous in the future. "We can envision a circumstance where those robots are out in a situation far away from help, either human or other robotic partner help, where they would roll over or need to right themselves," he said. "And so the basic research that Chad [Kessens] is doing is laying the groundwork for a transition path into larger robotic systems so we understand the physics and how the autonomy and the physical substantiation of the robot, how those two things interact, so that when … we actually have a design for a vehicle … then we can understand, OK, here are the requirements that would feed into that in order to build a self-righting capability."

The Army is interested in making robots go fast and making them agile and adaptive, Slipher said, and though technology like the Massachusetts Institute of Technology's cheetah robot is interesting in terms of raw physicality, it's not quite what the Army's after. "What we want is capability, that capability needs to have a purpose, and that purpose … needs to be able to enhance some sort of mission-effectiveness," Slipher said.

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 for the military, with seven of those years spent producing news and feature articles for publication.

SAFE TO LAND

Soldiers from 1st Squadron, 180th Cavalry Regiment secure a helicopter landing zone on the outskirts of Kabul, Afghanistan, in March 2018. Among the capabilities the Future Vertical Lift program is exploring are early warning systems to alert helicopter crews of incoming small-arms fire in time for them to take evasive action. (NATO photo by Erickson Barnes)



CCDC'S ROAD MAP TO MODERNIZING THE ARMY:

FUTURE VERTICAL LIFT

Third in a series of articles on how the U.S. Army Combat Capabilities Development Command, formerly the Research, Development and Engineering Command and now part of Army Futures Command, is supporting the Army's six modernization priorities.

by Maj. Gen. Cedric T. Wins

When Soldiers from the 2nd Battalion, 7th Cavalry dropped from UH-1 Huey helicopters into a small clearing in the Ia Drang Valley in November 1965, they became part of what is considered the first large-scale helicopter assault and the first large-unit engagement of the Vietnam War. Though immediately surrounded by thousands of North Vietnamese soldiers, American forces were able to combine air assault with the more traditional heavy artillery support to keep from being overrun. Hundreds of American Soldiers died during the battle that followed, but the air support was one key reason they were able to inflict a much heavier toll on the North Vietnamese army.

Helicopters were indispensable during the Vietnam War because of their ability to take off and land vertically and to hover in a country covered in dense jungle. They were used to transport Soldiers and supplies to the war zone, conduct reconnaissance missions, strike targets and evacuate injured Soldiers for treatment. Many years later, Army aviation continued to play an important role in Iraq and Afghanistan, where the varied desert and mountainous terrain presented problems including limited maneuverability and brownout conditions.

Emerging requirements for Future Vertical Lift include the ability to fly farther and faster, to carry heavier payloads, be easier and less expensive to sustain, to team with unmanned systems and perform certain optionally piloted missions.

Helicopters remain critical to Army operations, but some of the vertical-lift platforms in current use are more than 50 years old. To achieve the performance that next-generation aircraft will require, we are working on many critical areas, including lethality, survivability, lighter and stronger airframes and rotors, and advanced manned and unmanned teaming.

ONE TEAM, ONE PLAN

Before moving into the U.S. Army Futures Command and becoming Combat Capabilities Development Command (CCDC), the U.S. Army Research, Development and Engineering Command (RDECOM) launched an across-the-board campaign plan to gain greater visibility of our operations and become more effective and efficient. This campaign continues to scrutinize our integrated technology development, how we manage our talent and other resources and how we communicate this to our partners and the American public.

As part of that campaign, we reorganized our portfolio and management structures to mirror the Army's modernization priorities, naming a lead center for each modernization priority. While the CCDC Aviation & Missile Center leads science and technology (S&T) for Future Vertical Lift—the Army's third modernization priority—our eight major and three international centers and laboratories work together to interface with both the requirements community and the cross-functional teams developed as part of the Futures Command. This synergy enables our labs to produce a unified position and focus on the most critical technologies required for future vertical lift.

CCDC supports the Future Vertical Lift team at multiple levels, such as with a dedicated S&T representative who provides aviation expertise, access to our labs to exchange technology, war-gaming exercises for collaboration and problem solving, subject matter experts and program development support.

The command also brings the expertise of and relationships with its extensive network of domestic and international academic and industry partners, the U.S. Army Aviation Center of Excellence and the Program Executive Office (PEO) for Aviation to develop and demonstrate new technologies for future vertical lift that will provide increased range, protection, lethality, agility and mission flexibility.

TECHNOLOGY FOR THE FUTURE FIGHT

We are developing and demonstrating several technologies for future vertical lift to inform concepts of operation and retain air power in multidomain operations, which will require commanders to fight with joint forces across multiple spheres to defeat adversaries.

HEAVY LIFT
The Future Vertical Lift program aims to facilitate the development of a new generation of helicopters to replace Black Hawks and other vertical-lift platforms the Army has relied on for years. (U.S. Army photo)

The Integrated Mission Equipment for Vertical Lift Systems is a digital backbone of open architectures that will enable the Army to update and modernize equipment much faster and more effectively than currently fielded systems. This technology will not only meet evolving vertical-lift requirements, but may be used on other platforms in the future, including combat vehicles. The flexible backbone will enable a plug-and-play capability, which will allow the Army to update systems easily with new technology. An added benefit will be the ability to increase readiness by programming the aircraft with the right capabilities for a mission before the aircraft departs.

In March 2018, the Aviation & Missile Center—formerly known as the Aviation and Missile Research, Development and Engineering Center, or AMRDEC—conducted demonstrations on Modular Missile Technologies, a line of modular open systems architecture test missiles. The missiles were launched from a fixed stand and flew the ballistic path the team had planned. The highly adaptable open architecture hardware and software design of the Modular Missile Technologies will not only reduce life cycle costs for future aviation weapons, but also will provide greater flexibility and the ability to make improvements rapidly.

Another area that we are exploring is air-launched effects, including unmanned aerial vehicles and missiles. These can be launched from current platforms such as an Apache attack helicopter or a Gray Eagle unmanned aircraft system, or from platforms still in development, such as the Future Attack Reconnaissance Aircraft (FARA). These platforms will contain a variety of payloads to degrade or destroy advanced unmanned aerial systems and provide support to troops on the ground.

The Aviation & Missile Center is developing a FARA prototype, which will be a smaller variant than the Future Long-Range Assault Aircraft that is also in development. These future aircraft will have multiple types of unmanned aerial systems with lethal and nonlethal effects that can operate in communications- and GPS-denied environments.

WHAT IT NEEDS TO DO

Based on multidomain operational concepts, emerging requirements for Future Vertical Lift include the ability to fly farther and faster, to carry heavier payloads, be easier and less expensive to sustain, to team with unmanned systems and perform certain optionally piloted missions.

Aviators need to be able to operate day or night in all types of weather, including degraded environments such as sand, smoke, smog, clouds, fog, rain, snow, and brownout or whiteout conditions. Degraded visual environment (DVE) technology will enhance operations, making it possible to see the enemy without being seen, which will greatly increase lethality and survivability. Part of readiness is being able to operate in different environments, so DVE will make a critical impact when it's fielded by increasing combat power as well as preventing mishaps.

To support aviation survivability, we are exploring innovative technologies that will warn aircrews of incoming small-arms or machine-gun fire early enough for them to take evasive action and launch a counterattack. These technologies will outpace evolving threats with coordinated effects that will detect, avoid or defeat threats by reducing platform susceptibility and vulnerability.

A number of our efforts that will enable Future Vertical Lift to perform both manned and unmanned operations link directly to the Army's priorities, including robotics, autonomy and artificial intelligence (AI).

For example, we are leveraging multiple areas of expertise across the command, including engineers who can produce technology that allows platforms to perform complex navigation and a communications system that will operate in anti-access and area denial environments. To support this effort, we started the Advanced Teaming for Tactical Aviation Operations program in FY19. Both industry and DOD have invested in this effort, so our challenge is to rapidly select the best components from industry that will work on military aircraft.

UP AND OVER

UH-60 Black Hawk helicopters assigned to Task Force Shadow fly over mountainous terrain in eastern Afghanistan en route to Kabul in June 2018. Helicopters have been essential to operations in Afghanistan because of the mountainous desert landscape. (Photo by Capt. Kristoffer Sibbaluca, 101st Combat Aviation Brigade)

CLOSING THE GAPS

As we develop critical technology for Future Vertical Lift, we are working on several capability gaps that need to be addressed to maintain overmatch in multidomain operations. These capability gaps include the ability to:

- Conduct aerial reconnaissance and security operations in extreme environmental conditions.
- Conduct aerial sensing in obscured and unobscured conditions.
- Conduct joint and combined-arms air-ground operations.
- Defeat or suppress enemy air defense systems.
- Operate in contested airspace.
- Detect, identify and locate enemy weapon systems to protect aircraft and related systems across all domains during joint and combined-arms air-ground operations.

To achieve the performance that next-generation aircraft will require, we are working on many critical areas including lethality, survivability, lighter and stronger airframes and rotors, and advanced manned and unmanned teaming.

MULTITASKING SENSORS

Existing sensors are used for a single purpose, but it is no longer sufficient to have separate sensors for targeting, survivability and navigation. As a result, we are developing multipurpose sensors that will not overload the size, weight and power of the aircraft and will reduce the cognitive burden on pilots from data overload. These next-generation, multifunction electro-optical and infrared sensor systems will provide situational awareness in anti-access and area denial environments and automate targeting capabilities.

DEMONSTRATORS AND PROTOTYPES

The Aviation & Missile Center is working closely with industry to design and build a Joint Multi-Role Technology Demonstrator for Future Vertical Lift, which will incorporate existing and experimental vertical-lift capabilities for future programs. The Army is using the technology demonstrator to conduct ground and flight demonstrations, which will help inform requirements for next-generation Army aircraft.

Additionally, the Army already has directed competitive prototypes for the FARA to be developed by the Aviation & Missile Center. The FARA will be a light-attack and reconnaissance aircraft that will be able to avoid radar detection and operate in densely populated megacities. Requirements for the FARA ,include enough AI to fly unmanned at least part of the time, a secure communications network to control specialized drones, an open architecture, speed up to 235 miles per hour and the ability to reach targets 155 miles away. The Army plans to conduct flight testing on the prototypes in 2023 and make a procurement decision in 2024, then field this new capability to a combat unit soon afterward.

TEAMING WITH PARTNERS

CCDC has hundreds of cooperative research and development agreements with many industry partners, including Boeing Co., Lockheed Martin Corp., Karem Aircraft Inc. and AVX Aircraft Co. Our academic partners on Future Vertical Lift include Penn State University, the University of Maryland and the Georgia

VERTICAL LIFT IN VIETNAM
An undated photo of a UH-1 Huey helicopter landing with Soldiers of the 101st Airborne Delta Raiders in the A Shau Valley near Hue, Vietnam. (U.S. Army photo)

The flexible backbone will enable a plug-and-play capability, which will allow the Army to update systems easily with new technology.

PROTOTYPES, DELIVERED
In 2015, AMRDEC and its partners—more than 85 from industry, and 150 experts from the Army side—delivered two prototype Multi-Mission Launchers. Mounted on a Medium Tactical Truck, the launcher can rotate 360 degrees and elevate from 0 to 90 degrees. The wide-ranging collaboration is a model for the Future Vertical Lift effort. (U.S. Army photo)

Institute of Technology. Our international partners are the United Kingdom, France, Israel and Germany. These agreements enable both parties to trade access to labs, equipment, data and other resources for technical knowledge.

We also lead the Vertical Lift Research Center of Excellence program, a collaborative effort between government and academia to develop, evaluate, demonstrate and test advanced vertical-lift technologies.

The aviation community is close-knit, fostering critical transition support and sharing knowledge across organizational lines. We have developed a road map to transition critical technologies in the short, medium and long term. This will ensure that future increments of vertical-lift platforms will maintain overmatch well beyond initial and full operational capability. We have transition agreements with both the U.S. Army Aviation Center of Excellence and PEO Aviation on critical efforts to make sure that both the requirements and acquisition communities are ready to transition on time.

VALOR IN ACTION

The Army awarded four contracts to industry to build technology demonstrators that will enable it to try out new capabilities in vertical lift. Bell Helicopter's V-280 Valor demonstrator has logged more than 80 flight hours to date. (Photo by Bell Helicopter)

CONCLUSION

Under the Army Futures Command and as a critical member of the Future Force Modernization Enterprise, we are informing new concepts of operation and expanding what's possible in many critical technologies, including those required for Future Vertical Lift. These technologies will provide commanders with increased reach, protection and lethality where they are most needed—on the battlefield of the future.

MAJ. GEN. CEDRIC T. WINS is the commanding general of CCDC. He graduated from the Virginia Military Institute and was commissioned in the Field Artillery in July 1985. His military education includes Field Artillery Officer Basic and Advanced Courses, U.S. Army Command and General Staff College and the National War College, where he earned an M.S. in national security and strategic studies. He also holds an M.S. in management from the Florida Institute of Technology.

ANTOINETTE J. FREELAND

COMMAND/ORGANIZATION: Product Manager for Installation Information Infrastructure Modernization, Project Manager for Defense Communications and Army Transmission Systems, Program Executive Office for Enterprise Information Systems

TITLE: Product officer

YEARS OF SERVICE IN WORKFORCE: 20

DAWIA CERTIFICATIONS: Level III in program management and in test and evaluation; Level I in information technology; member of the Army Acquisition Corps

EDUCATION:
B.A. in psychology, Marymount University

AWARDS:
Army Superior Civilian Service Award

COMMUNICATORS WANTED

Interested in being a product officer? Here's what it takes: "If I were hiring someone for my job, I'd look for someone with a variety of acquisition experience, good attention to detail and strong communication and problem-solving skills. Communication is a big part of the job, but often a skill that people overlook," said Antoinette "Toni" Freeland, product director for the Program Executive Office for Enterprise Information Systems (PEO EIS). "The biggest challenge I face is bringing together the different organizations from different backgrounds and getting them to understand and work toward a common goal—serving as a mediator to ensure that all of a project's stakeholders, including the product office team, are speaking a common language and working toward the schedule with the same urgency."

Freeland and her team are assigned to the Product Manager for the Installation Information Infrastructure Modernization Program (I3MP) under the Project Manager for Defense Communications and Army Transmission Systems. Their job is to support joint warfighters and mission command centers with emerging information technology (IT) and secure infrastructure systems through life cycle management for Army and joint networks. "A Soldier's ability to shoot, move and communicate depends on a reliable, unified network, and mission success depends on coordinated communications to ensure that the right level of combat power is at the right place, at the right time," she said. "All this communication is transported over the Army's network—nothing works without it."

When she tells people what she does for a living, Freeland noted, "People are often surprised by how driven the Army acquisition staff is to own and get after problems. For some people, it is a change in mindset from top-down, stovepipe-driven directives to creative, outside-the-foxhole thinking that produces results for our Soldiers. I always remind people that it's Soldiers who we're working for."

She has been with PEO EIS for almost five years, starting as chief of the Acquisition Management Division. Her introduction to defense acquisition came 15 years before that, when a contractor hired her as a software test analyst supporting the Joint Interoperability Test Command's work on the Global Command and Control System – Joint. "I was fascinated by the processes that took a military need from the requirements phase through development into testing, and then deployment to the Soldier," she said. "The realization that I could be part of the process that helped Soldiers do their jobs more effectively while also ensuring their safety while they executed their mission was important to me, and it was something I wanted to contribute to."

In looking back over those two decades, she noted that the biggest change she has seen is one of perspective. "More people are recognizing that IT programs are not like traditional acquisition programs and do not progress the same way through conventional acquisition

ON COMMON GROUND

Freeland confers with Andi Fehl, left, Home Station Mission Command Center project team assist, and Mark Reed, an audiovisual expert. Her biggest challenge as a product officer is making sure the different organizations from different backgrounds, including the product office team, work toward a common goal using a common language and with a shared sense of urgency. (Photo by Catherine DeRan, U.S. Army Acquisition Support Center)

processes. As a result, you're also starting to see new processes for addressing that difference."

Freeland served as product officer for the Product Office for Command Centers during the late 2018 installation of the mission command information infrastructure at the 82nd Airborne Division Headquarters at Fort Bragg, North Carolina, the first headquarters in the Army at that level to receive the new system. The 82nd Airborne received a command center that will enable it to conduct expeditionary, uninterrupted mission command during all operational phases.

Freeland led a team that included software and network engineers, program managers, logisticians, IT specialists and cybersecurity experts from I3MP, the U.S. Army Information Systems Engineering Command, Tobyhanna Army Depot and industry integrators. She called the project—her first as a product officer—one of the most important of her career.

"Executing mission command from home station is a new capability that the Army is delivering for a more powerful and reliable capability than those of any opposing force to date. The 82nd is part of the Global Response Force, which means that it must have a battalion ready at all times to deploy anywhere in the world within 18 hours," she explained. "The capability that we were able to give them directly supports that mission, and it was the first time I had been part of providing a program that directly supported readiness and our country's safety."

Her career has also given her the opportunity to mentor and advise junior acquisition professionals. "My advice is to take individual responsibility to develop your technical and acquisition skills in different areas of expertise. You will need a variety of skills to get after the solutions to sustain our networks and our business systems to support Soldiers wherever they operate," she said.

"The Army places the right people in the right places at the right time to execute its mission. Those missions create opportunities for professional and personal growth. If you're given an opportunity to take on a developmental assignment to increase your breadth of experience, embrace it and you will be better for it."

It's also important to know what you don't know, she added. "What I've learned over the past 20 years is that you do not need to know everything there is to know about an acquisition position at the start. What you need to know is how to access and learn the information you need to do the job at hand. No two acquisition programs are the same, so no two sets of experiences will be the same."

—SUSAN L. FOLLETT

THE HACKER'S TOUCH

Hackers can collect personal information and do life-altering damage with it—not just with financial information but also data on family and friends. (Image by Getty Images)

TECHNICALLY SPEAKING

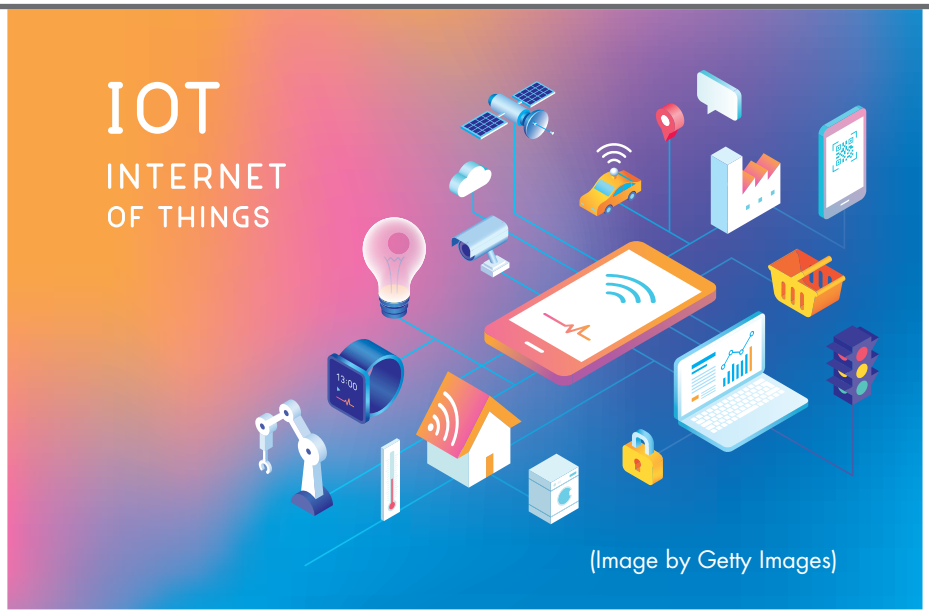
FOOTPRINTS IN THE DATA

Step inside the least understood of the warfighting domains, cyber, where digital detectives analyze data to solve crime, and similar tools and techniques are used to defend against cyberattacks.

by Mary Kate Aylward

In 2015, the U.S. Office of Personnel Management revealed that two major breaches affecting at least 22 million people had occurred the previous year, in which the assailants made off with personnel records and data on SF-86 forms—on which federal employees and contractors applying for security clearances report their addresses and employment history for the last 10 years, overseas travel, contact information for family members and friends, and much more in response to the 127-page questionnaire. One goal of the background investigations the SF-86 collects data for is to determine whether a candidate could be vulnerable to blackmail, and so it asks for the kinds of information that give blackmailers leverage. Candidates report debts, whether they have ever sought psychological counseling or treatment for alcohol abuse, or whether they've been arrested or charged with a crime or used drugs. That information is now in the hands of hackers.

Apart from the damage to individuals—an SF-86 form provides enough information for a criminal to steal someone's identity, empty bank accounts, ruin credit—there's the risk to national security. The data theft could make it possible for hostile foreign governments to unmask spies or track down relatives of U.S.-based emigres.



(Image by Getty Images)

Digital or cyber forensics is the process used to figure out which actors are behind a hack like this, and how they did it. U.S. officials speaking privately said that China had stolen logins and passwords to perpetrate the hack, though the Obama administration did not formally accuse China. Considering that data theft on this scale occurs during peacetime, the ability to protect the cyber space where digital data lives, and to analyze attempts to manipulate or steal it, is probably one of the least understood but most necessary components of any future defense strategy.

"When I started, digital forensics was just about looking at hard drives on computers. Now it's everything you touch," said Special Agent Patrick Eller, lead digital forensics examiner with the Army's Criminal Investigation Command, in an interview with Army AL&T. Digital forensics examiners can piece together the movements of persons of interest, place them in a particular location at a particular time, and gather evidence about feelings, motives and more with the aid of powerful software. "Watches, FitBits, phones, tablets, computers, all the way down to the programs on them: the chat applications, like SnapChat, Facebook, WhatsApp"—the universe of data sources is vast, Eller said.

Special agents from the command (known as CID), like Eller, collect, preserve and analyze data from digital devices to "build digital timelines, which is what supports the whole case." Digital forensics examiners don't usually go to the crime scene. Instead, Eller and several other examiners train the CID agents who work the crime scene. "We teach [agents] to identify and collect digital evidence," such as any phones or other devices present, Eller said.

WHAT THINGS?

The "internet of things" refers to the expanding group of products and appliances that connect to the internet so that, at the most basic level, the product's owner—or someone else—can operate the item wirelessly, directing it to turn on or off with a smartphone app.

The next level up is the idea of a "smart home," where the appliances and products can exchange data and talk to each other. Google's Nest thermostat automatically monitors whether anyone is in the house, for example, and will tell the dryer to keep tumbling your clothes until you return so they don't wrinkle.

THE SCENE OF THE CRIME

A crime scene can be crawling with digital data that's not immediately visible, because of the proliferation of internet-connected devices and how frequently we interact with them. "Think about what's called the 'internet of things,' everything in your house being connected to the internet," Eller said. "I can turn on lights in my house, I can open my garage, I can start appliances, I can lock doors from my phone.

"For us as examiners, it's a challenge because we have to figure out how to get the data out of these devices in a forensically sound manner," he said. After the agents on scene collect all the sources of digital information, they apply for search authorization, and send the device and a specific request for evidence to the digital forensics examiner.

The laws and precedents covering what digital forensics examiners can look for, and what permissions they need to do so, were established before many of the current tools and techniques became available. But the process still begins with an authorization to search, either a warrant issued by a magistrate or a consent to search given by the device's

owner. The authorization generally specifies what can be looked for, as a warrant for a physical search does: It's usually not blanket permission to rifle through a house (or read all the texts on an iPhone) at random, but permission to look for things that might be relevant to a case.

IT'S META, MAN

Detectives in the non-digital realm look for strands of hair, tire tracks or weapons. Digital forensics investigators look for digital data—files, images, video—and metadata. Metadata is information about data, such as when it was created, if it was modified and by whom. The length of a phone call, for instance, is metadata that can be useful even if investigators can't get or can't use the contents of the conversation.

Finding links among the many pieces of data is a key contribution of digital forensics tools. Analyzing those connections can open up new leads to investigate. If an investigator notices that each of the three phones sent to a lab connected to the wireless network at McDonald's on Main Street, that's a new lead: It could place the suspects together in one location, and the agents working the case could try to interview the McDonald's employees working on that day.

IN THE LAB

Army CID now uses upward of 20 forensic tools, each fairly specialized, to investigate and analyze digital devices, according to Eller. Twenty years ago, a case might involve a few hard drives from the suspect's laptop, and one kind of software could do all the necessary analysis. Nowadays investigators might need to search a smartphone, an Amazon Alexa, a tablet and the onboard computers from a suspect's car. The tools available to access and search computing devices for evidence have likewise grown in number and power.

Digital forensics tools on the market include EnCase, the granddaddy of digital forensics. It has been in use since 1998, when it was used primarily to search and analyze hard drives seized during criminal investigations. Now it's a suite of tools that law enforcement can use to search digital devices linked to a possible crime, and that organizations can use to defend against cyberattacks or to collect information about the attacks.

Access Data's Forensic Toolkit can scan a device for "text strings"—groupings of characters—and use those to build a dictionary to decrypt emails or other data that has been encrypted. It can also scan for malware and then analyze what the malicious code could be designed to do, where the infection could have come from, and if the malware is communicating with an outside server or website.

But before forensics examiners can analyze data, they need to be able to see it. Most devices now offer the option of encryption with a passcode, and so there's another set of digital forensics tools that specialize in breaking that encryption.

TOOLS OF THE TRADE

Working in laboratories such as this one, digital forensics examiners have access to tools that help them investigate and analyze digital devices. With the proliferation of devices from which to extract valuable information, the software required to perform that analysis has become highly specialized, and the tools available to access and search computing devices for evidence have grown in number and power. (Image courtesy of Wikimedia Commons user Viktor DFC)

THE CASE OF THE GRAY KEY

In March 2018, an anonymous source alerted the cybersecurity community to the existence of a gray box, four inches square, that could unlock any iPhone and extract every piece of data from it. Plug an iPhone into the "GrayKey," and anywhere from a few hours later (if the phone is protected by a four-digit passcode) to three days (for a six-digit passcode), the passcode surfaces and the device downloads all the phone's data for investigators to analyze.

The device's maker, a small Atlanta-based company called Grayshift, did not say by what means its device evaded the security features on the phone, which usually erase the phone's data after 10 failed attempts to enter the passcode. Outside security experts said it's "almost certainly" the case that Grayshift found a weak spot in the iPhone's software that lets the GrayKey guess hundreds of passcodes per minute.

By October 2018, Apple had apparently found and fixed the weak spot, and GrayKey devices could no longer break into newer iPhones. (They could still do a "partial extraction" on some older iPhones.)

"Mobile forensics is really taking over the majority of the forensic work we're doing, and it's also one of the largest challenges to overcome security-wise," Eller said. "It's a constant challenge for the companies that make the hardware and software we use to search—it's a cat-and-mouse game" between the forensic software companies and Apple and makers of Android devices.

That game focuses on the security measures that prevent anyone other than a phone's owner from unlocking it. Thousands of devices are in law enforcement custody, locked and unsearchable, because tech companies so far have declined to provide software to override the passcode or fingerprint security, or to leave a "back door" in their products through which digital investigators could get access to the phone's data. The tech companies argue that this would weaken security for all users.

Even so, as GrayKey showed, smartphones aren't impervious to the powers of cash and the smarts of computer engineers. There's a market for phone-cracking hardware and software, and U.S. law enforcement and government agencies are among the customers paying forensic firms anywhere from $5,000 to $30,000 to break into passcode-protected devices.

After the 2015 shooting in San Bernardino, California, that killed 14 and left the shooter dead, the FBI wanted access to the shooter's iPhone. It asked Apple to create a version of the iPhone's operating system without the "auto-erase" security function. Apple refused, and the FBI paid an outside vendor reportedly close to $1 million to break into the phone. The vendor was believed to be Cellebrite, an Israeli cybersecurity firm.

CONCLUSION

At a demonstration of the iPhone-unlocking GrayKey, before Apple's security updates partially defeated it, an armed guard stood watch over the company's booth. "It's an arms race," Grayshift CEO David Miles said of the struggle between security features and hackers and purveyors of forensic and decryption technology.

BREAKING IN

The Universal Forensic Extraction Device produced by Cellebrite, an Israeli cybersecurity firm, believed to be the firm the FBI paid to break into an iPhone belonging to the shooter in the 2015 shooting in San Bernardino, California, after Apple declined to give the FBI a way around the phone's encryption. (Image courtesy of Flickr/Weissenbach PR)

The comparison to armed conflict is apt. Digital forensics of the kind Army CID engages in is about building a case to prosecute crimes. But the tools and skills that digital investigators use—not to mention the knowledge required to understand them—overlap with those used in the cyber domain to spot attempts to infiltrate U.S. government computer systems, and to trace and block them. Whether it's a "gray war" or "multidomain battle," or the continuing struggle for information superiority, hacks, malware, cyberattacks and other attempts to compromise an enemy's ability to communicate are part of the picture.

A Soldier needs tools—sensors, binoculars—to see who's firing at him, and with what kind of weapon. Information systems need cyber forensics tools for the same reason: It's hard to defend against an attack you don't understand, and digital forensics tools can help Soldiers and analysts see the cyber battlefield and what weapons are being deployed there. As the degree to which our lives are online increases, so, too, does the amount of conflict and crime that occurs in cyberspace. Digital forensics is likely to grow even more relevant, as is the smart acquisition of forensics tools and the training and hiring of people skilled in their use.

MARY KATE AYLWARD provides contract support to the U.S. Army Acquisition Support Center. She holds a B.A. in international relations from the College of William & Mary and has nine years' experience writing and editing on foreign policy, political and military topics.

PRESERVING EVIDENCE

This write blocker, hooked up to a hard drive, lets a digital forensic investigator copy and read the contents of a hard drive without altering or risking damage to any of the original data—an important feature to preserve digital evidence in its original state. (Image courtesy of Wikimedia Commons user ErrantX)

THE NINE LIVES OF DIGITAL DATA

Files can be deleted, but that usually just means they're removed from one location on a computer; information about them is often still available elsewhere on the device. Hard drives can be "wiped"—your organization probably wiped your work computer (unless it was brand new) before giving it to you, for example—but data is still accessible.

People have set computers on fire, taken a sledgehammer to the hard drive and shot the computer, and digital investigators were still able to extract useful data.

In its guide for lawyers dealing with digital evidence, the American Bar Association notes: "In one case, a perpetrator squirted charcoal lighter fluid into the cooling slots of a PC case and then ignited the fumes. He fried the majority of the PC, but computer forensics experts were still able to recover data from the hard drive for analysis."

Digital forensics: It's powerful science.

SUSTAIN ACCELERATION

Managing change means building on early successes—sustaining acceleration—says Kotter in his book "Leading Change." (Image by metamorworks/Getty Images)

CHANGE AGENT

Dr. John P. Kotter

Change happens because people find that the changes work for them. In its quest for modernization, the Army can learn a great deal from one of the world's leading authorities on organizational development.

by Michael Bold

Few have studied more intensely the way that organizations large and small navigate through times of great change than Dr. John P. Kotter. First as a professor at Harvard Business School, and now as a professor emeritus and as co-founder and chairman of Kotter International, a consulting company he started in the wake of the overwhelming response to his research, he has become the go-to authority on leadership and change. His 20 books have sold millions of copies in over 150 languages.

His goal, as Kotter International's website puts it, is to "help mobilize people around the world to better lead organizations in an era of increasingly rapid change." As the Army stands up the U.S. Army Futures Command, and Army acquisition enters a period of profound change aimed at getting better capabilities to Soldiers faster, Army AL&T talked with Kotter in October about change and leadership. Kotter is not an expert on the military, but Army leadership's sense of urgency and resolve impresses him.

"When it comes down to tactics, what we've learned … is that if you get a group of people who understand the basic argument—in [the Army's] case, how much the world has changed since the traditional system for acquiring new systems, weapon systems and the like, and the time horizon that was acceptable, how much that is out of line with current reality—that's something really … the word 'revolutionary' is not a big overstatement."

Kotter warns, though, that even the best of intentions to face reality can be overwhelmed by today's rapidly evolving technologies. "Everything needs to be accelerated to put up with just the speed with which [technology evolves] and the uncertainties and the less capacity to predict that we have today versus 10 years ago, much less versus 50 years ago or further," he told Army AL&T.

In the interview, Kotter elaborated on the requirements necessary for leading change successfully.

A SENSE OF URGENCY

To lead an organization in a time of change, creating a sense of urgency is vital. Maintaining that sense of urgency is just as important as creating it, Kotter said.

"How often do people get stalled in producing the size of change at the speed they want these days?" he asked. "And the answer continues to be all the time, especially for large and complex and old institutions. And it's just because it's tough. Large and old and complex institutions have structures and policies and systems and culture and all kinds of habits, and a staff that thinks a certain

MOBILIZE FOR CHANGE
Much of Kotter's work is determining the best tactics for leading people to embrace and effect change, and then showing people how to do it. (Image by phototechno/Getty Images)

KOTTER AT A GLANCE

Kotter graduated from the Massachusetts Institute of Technology with a B.S. in electrical engineering in 1968 and an M.S. in management in 1970. He then completed his Doctor of Business Administration in 1972 at Harvard Business School and joined the faculty. In 1981, at age 33, he received tenure and a full professorship, and was later named the Konosuke Matsushita Professor of Leadership. Kotter retired as a full-time faculty member from Harvard in 2001. In 2008, he co-founded Kotter International. (Among Kotter International's early clients was the U.S. Army Aviation Center of Excellence at Fort Rucker, Alabama, in 2009. As the war in Afghanistan intensified, Kotter helped the center create a strategy to successfully process a backlog of pilots through the training program.)

Kotter first received widespread attention in the spring of 1995, when his article, "Leading Change: Why Transformation Efforts Fail," was published in the Harvard Business Review. In very short order, the article jumped to the top of the Review's reprint list.

A book, "Leading Change," followed the next year, becoming an international best-seller. In 2011, Time magazine said "Leading Change" was one of the 25 most influential business management books ever written. In "Leading Change," Kotter devised an eight-step process for change management and leadership (since updated in his 2014 book, "Accelerate"):

- **Create a sense of urgency:** Help others see the need for change through a bold, aspirational opportunity statement that communicates the importance of acting immediately.
- **Build a guiding coalition:** A volunteer army needs a coalition of effective people—born of its own ranks—to guide it, coordinate it and communicate its activities.
- **Form a strategic vision and initiatives:** Clarify how the future will be different from the past and how you can make that future a reality through initiatives linked directly to the vision.
- **Enlist a volunteer army:** Large-scale change can occur only when massive numbers of people rally around a common opportunity. They must be bought-in and urgent to drive change—moving in the same direction.

- **Enable action by removing barriers:** Removing inefficient processes and hierarchies, for example, provides the freedom necessary to work across silos and generate real impact.
- **Generate short-term wins:** Wins are the molecules of results. They must be recognized, collected and communicated—early and often—to track progress and energize volunteers to persist.
- **Sustain acceleration:** Press harder after the first successes. Your increasing credibility can improve systems, structures and policies. Be relentless with initiating change after change until the vision is a reality.
- **Institute change:** Articulate the connections between the new behaviors and organizational success, making sure they continue until they become strong enough to replace old habits.

"A vision is not an operating plan."

BUILDING A TEAM
The best way to communicate a vision for the future of an organization, Kotter says, is through a growing team of people who understand the vision and can talk about it with other members of the organization. (Image by metamorworks/Getty Images)

way. And changing all that in a significant way toward something that makes sense in terms of the current or the anticipated future environment is just tough. And people start making it tougher by getting it wrong, right at the beginning, by creating far too little sense of real urgency around whatever the critical issues are."

Warning your workforce that it's change or die doesn't work without also outlining a vision for the future, Kotter said. Sometimes you have to blow an air horn to wake up a slumbering workforce. "But blowing an air horn in their ear the third time and then the 20th time and then the 600th time doesn't work," he said. "All they'll do is focus on trying to stop you and your air horn. They won't be paying any attention to whatever the real issues are." That creates an anxiety-driven false sense of urgency, he said.

A STRATEGIC VISION

That sense of urgency can't be limited to agreeing that something is wrong with an organization, Kotter said. Leaders also need to point the way to better times ahead. "What our consultants have learned is that they want to get to work with an organization to get masses of people to the point where they think, a) yes, something has to change, and b) there's the real actual opportunity out there. That is to say, if we make the change, that things will be better. … This isn't just a running away from, it's a running to something. If the employee believes that the vision makes sense and is excited about it, they will be willing to step up to the plate and help."

Once an adequate number of people in the organization are buying into the vision, Kotter said, "what we have found is that you've got the conditions started from

which you can do a lot of other stuff. But at least you've got the conditions that aren't going to lead you to take off, to think that indeed you're making great progress, and then to discover that everything kind of slows down on you because in the background people either think this isn't necessary or this is stupid or it's not my job or a million other reasons why they inadvertently don't help, or become blockers."

To help leaders develop a clear, coherent vision for the future, Kotter developed a five-minute rule. "A good vision can be explained, and explained in a way that's clear enough and also emotionally compelling enough, without 53 PowerPoint slides. It can be done verbally in a relatively short period of time, we discovered—hence that so-called five-minute rule." If the leader couldn't explain the vision in five minutes, "it usually meant that it was just not clear in their own heads, which means their capacity to communicate it and make it clear in anybody else's heads, much less get them excited about it, just wasn't there. Because a vision is not an operating plan."

IT TAKES AN army

Enlisting an army of true believers is vital to effecting real change, Kotter said. Develop a group of people who buy into the need for change and who want to be a part of it, and organize them in a way that enables them "to become your first phalanx of folks out there spreading the word." And don't just use them as an echo chamber, he said, but sound them out for ways to get to the desired goal. "They can come up with ideas that you and I would never dream of that are relevant within their context and within the culture that they're in." That, in turn, gets other people's attention and "gets them moving toward that feeling of 'we got to do something,' and this is too important. … And they start infecting or attracting more and more people and it just kind of grows, and more and more people help out, coming up with more ideas to attract more people.

"The whole thing eventually gets to the point where, like I say, you've got huge numbers of people with a real sense of urgency around the relevant issue, and you've got something that you can build off of and has some real chance of a) producing change and, b), producing sustainable change that doesn't just get pushed back by the forces of history."

To lead an organization in a time of change, creating a sense of urgency is vital. Maintaining that sense of urgency is just as important as creating it.

COMMUNICATE, COMMUNICATE, COMMUNICATE

A strong vision for the future of an organization doesn't do any good if you don't let people know what it is, Kotter said. "Number one is forget the fantasy that four people in a communications department is going to do it for you. You want to start with as many people who kind of understand it and can talk about it as your initial team, and you want that to grow. But you want as many people as humanly possible talking about this. There is no such thing as undercommunicating on this stuff."

Every meeting, every encounter, every group email is an opportunity to explain your vision, Kotter said. "You get people to understand, to buy in, when you get enough music played loud and long enough in surround sound. Surround sound is in a sense [that] they hear it from their peers, they hear it from their bosses, and they start to hear it from their subordinates. … You get the music played on a regular basis and in surround sound and growing in terms of how many speakers you got out there that are actually blasting it out, and you've got a chance then of being able to catch people's attention and win over their hearts and minds on this."

CULTURE CHANGE

Organizations, when looking to move in a new direction, often say they want to change their culture. Indeed, culture change is often at the top of the list of organization objectives. But Kotter said the very nature of culture means that it will be the last thing an organization can change.

"Culture is air. It's mist," he said. "Good luck trying to grab it and twist it into some new form." Kotter points to the 30 years following World War II, when anthropologists discovered islands in the South Pacific that had had no contact with modern technology or civilization. Anthropologists studied how these groups made decisions on feeding their families, seeking shelter and solving conflict.

IN IT TO WIN IT

Getting people to buy in to a strategic vision for change, to become true believers, requires instilling a sense of an urgent need for something better, not just a consensus that something is wrong with an organization. (Image by ibigfish/Getty Images)

"Culture is air. It's mist. Good luck trying to grab it and twist it into some new form."

"When they started studying how cultures came about, the pattern was very clear," he said. "You'd have a group of people who would come together, they would start trying to focus on some task, which could be anywhere from living together or building something or holding a social event. If the way they went about doing that task actually worked … they said, yeah, this worked, we're doing fine. They would then either repeat it or repeat it with some small improvements. And this kind of rinse-and-repeat cycle over time would start to create what we call behavioral norms, which

> **"A good vision can be explained, and explained in a way that's clear enough and also emotionally compelling enough, without 53 PowerPoint slides."**

is just the way people did things. I mean, nobody had to keep reinventing this stuff; after a while it became a habit. This is how we fish, this is how we build huts."

Eventually, Kotter said, these ways of performing tasks became the group's culture—norms of behavior and underlying assumptions or beliefs about what is good, what is bad and what is valued or not valued, that are shared by a group of people.

"Culture changes the same way," he said. Groups are either unsatisfied with current practices or think there might be a better way. "That's step one. Step two is if it works and it's pretty unambiguous that indeed this produces a better result. They communicate that, there's a little bit of cheering and high-fiving, and then you do your rinse and repeat." Eventually the new habits replace the old, and the culture has changed.

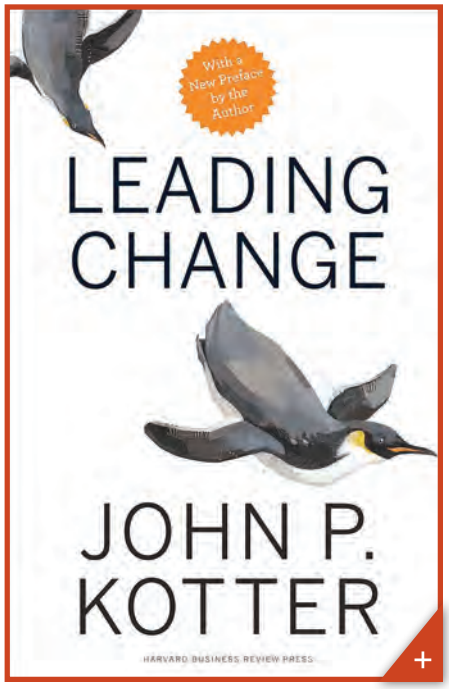
"And, as it turns out, that exact same pattern is what we find when we study businesses or units of the government, or nonprofits or health or education or any organization," Kotter said. "… So culture as a word can come up earlier in the discussion, but it's not changing it. That happens all as a result of all these other actions."

CONCLUSION

Leading change requires not just intellect, but emotion, too, Kotter said. "If there are principles that we have found that seem to cut across all industries, all sizes of organizations, public and private … one is that change happens because it's not just a head exercise, it's a head and a heart exercise. Change happens not just because people have to, because it's their job, but because they want to."

That emotional buy-in allows for the rapid change that today's technologies require. "That's why some of these startups, even when they grow to some size—not hundreds of people, but thousands of people—continue to move at speeds that seem incomprehensible to older organizations. It's because they build, indeed, a solid management structure … but they don't lose that kind of want-to, voluntary, into it for something emotional, network-type organization that helped get them started when they were very young."

On the other end of the spectrum are organizations (such as the Army) that "keep the number of people who are in a sense empowered to help produce change small



and controllable," Kotter said, without recognizing that a strict hierarchical organization is "built much more to produce efficiencies and reliability just to get the job done. It wasn't invented to change itself … or to invent radically new ideas that can do things radically better."

For more information, go to ***https://www.kotterinc.com/****.*

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SPEED ISN'T EVERYTHING

The multibillion-dollar Future Combat Systems program failed to deliver and is often derided as a symbol of everything wrong with acquisition. It started with an OTA designed to speed up the acquisition process—which worked as designed, but speeding up the process isn't always the right way to get good products to Soldiers. (U.S. Army photo by Markus Rauchenberger, Training Support Activity Europe)

BEEN THERE,
DONE THAT

BEWARE the RUSH to FAILURE

Flexibility in contracting and scheduling delivers capability to warfighters in the optimal time—not necessarily the shortest time.

by Robert F. Mortlock, Ph.D., Col., USA (Ret.)

"Schedule-driven programs usually fail," a seasoned acquisition professional and mentor cautioned me as he prepared to retire after a long, successful program management career. I was an inexperienced but highly trained and motivated new acquisition professional working on the program schedule for an urgently needed warfighter capability to detect biological warfare agents.

In the late 1990s and early 2000s, the possible use of biological weapons on the battlefield was a real threat, driving the need for a biological standoff detection system. The warfighters needed the system as soon as possible, and my acquisition team planned a development, testing and procurement strategy that met the warfighter's need on the battlefield. Despite the urgency, the desire for a responsive acquisition approach, and available resources and funding, the underlying laser technologies did not work reliably outside of a controlled laboratory environment. The program proceeded anyway, but languished in the "valley of death" and never led to a fielded, militarily useful product. The valley of death refers to the gap that often occurs between technologies that work in a controlled laboratory environment on a small scale in prototypes, and technologies that work for warfighters in a combat environment on a large scale in manufactured products. Even now, decades later, the technologies that might enable use of lasers to detect and identify biological agents at a distance can't be relied on to alert Soldiers to potential danger.

ON TIME AND EFFECTIVE

Combat eyewear needs to be rugged. Rushing a delivery and risking effectiveness is not a winning strategy. (U.S. Army photo by Sgt. Alon Humphrey, 3rd Armored Brigade Combat Team, 1st Armored Division Public Affairs)

The program was schedule-driven based on the urgency of need—the threat that biological agents would be used on the battlefields in the Middle East against American service members. But in the end, it failed to deliver the capability to the warfighter. No amount of money or demand could whip a not-ready-for-prime-time technology into shape (possibly in defiance of the laws of physics) to meet the need. The capability required more time for research and development, a hard pill to swallow for senior leaders in the past and today as the pressure mounts to fix the slow, unresponsive defense acquisition system.

ACQUISITION REFORM—GO FASTER!

Resources (i.e., funding) can also create pressure for a schedule-driven program. The program's planned research, development, test and evaluation, procurement, and operations and support funding (generally referred to as the colors of money) and the planning, programming, budgeting and execution system force each program, in fact, to be schedule-driven—incorporating an inherent risk for failure.

This is the dilemma facing program managers (PMs) and acquisition professionals: The pressure to close an urgent capability gap and plan the proper color of money continues at the same time that the push for acquisition reform intensifies. Go faster is the message that comes across loud and clear. Well, senior leaders, be careful what you ask for—it may be a rush to failure and unnecessarily increase the risk of not delivering capability to warfighters.

Acquisition programs can go fast, as evidenced by the numerous successful rapid acquisition efforts over the last two decades to support combat operations in Iraq and Afghanistan, like the Mine Resistant Ambush Protected (MRAP) vehicle program. Given unlimited funding, a priority of effort and reliance on mature commercial technologies, the MRAP program is an acquisition success story—delivering capability to the warfighter in record time for an acquisition of this magnitude, over a $30 billion program.

In 2005, during my time in the Army's Rapid Equipping Force, I was a team member in numerous successful rapid (albeit lower

dollar) acquisition efforts that delivered capability to warfighters within six months of identifying a requirement. On a much larger scale (on the order of hundreds of millions of dollars per year), as a colonel-level project manager, my project management office successfully ran the Army's Rapid Fielding Initiative, which provided deploying Soldiers state-of-the-art individual clothing and equipment—first aid kits, ear plugs, flashlights, flame-resistant clothing—based on items available from the commercial marketplace.

TRIPLE CONSTRAINT

However, the pressure to go faster within defense acquisition does not alter the fundamental principles of the PM's triple constraint—cost, schedule and performance—which limits optimal solutions. Wanting a capability fast involves sacrificing performance and possibly accepting increased costs. Senior leaders fool themselves if they believe that things are somehow magically different with each reform initiative. My wife reminds me of this frequently: "Just saying it more emphatically won't make it come true."

Recent acquisition reform initiatives have emphasized the value of prototyping, experimentation, commercial technology, incentives for innovation, partnering with nontraditional defense contractors and faster contracting approaches. These initiatives can and do have a positive impact for acquisition professionals. Although far from original (each of these practices has been around for decades), focusing on them allows PMs to use these tools more routinely and innovatively with less need for justification. Prototyping and experimentation enable the acquisition enterprise to mature technology, as well as refine requirements and concepts of employment. This enables the delivery of limited capability to the warfighter as early as possible and sets up future programs of record for long-term success because the requirements, technology and funding are on firm footing.

FLEXIBILITY + EMPOWERMENT WORK BETTER THAN MANDATES

Unfortunately, new initiatives often come with unintended pressure for PMs and often counterproductively limit flexibility

HIGH-DOLLAR SUCCESS

All the ingredients came together for the MRAP program to deliver good products quickly: The need was urgent, and the technology was mature. (Photo by Capt. Jason Welch, 3rd Cavalry Regiment Public Affairs)

and constrain empowerment. As outlined in "DOD Directive 5000.01, The Defense Acquisition System," PMs need the flexibility to tailor acquisition strategies appropriately depending on urgency of need, technology maturity and availability of resources and funding. An important element of the acquisition strategy is the contracting approach—the selection of the proper contract process and type.

In 2010, the Better Buying Power (BBP) initiatives resulted from the Weapon Systems Acquisition Reform Act of 2009, which attempted to reduce total ownership cost and cycle time, focusing decision-making early in the design phase and encouraging early testing and evaluation. The BBP themes were well thought out, ranging from gaining greater efficiencies to maximizing competition, to reducing non-value-added oversight (red tape), to cutting costs. At the program level, however, these new initiatives turned into mandates. For example, BBP 1.0 emphasized the use of fixed-price contracts over cost-reimbursement contracts for development efforts. At the time, a blanket application of this guidance over all development efforts led to contract types that were inappropriate for the risk in some programs.

For example, after the cancellation of the Army's Future Combat Systems in 2009, the Army began the Ground Combat Vehicle program and awarded firm-fixed-price research and development (R&D) contracts to BAE Systems Inc. and General Dynamics Corp. for designs and prototypes. The new vehicle's requirements called for a heavy reliance on mature technologies. Firm requirements, commercial technologies and BBP pressure all equated to firm-fixed-price R&D contracts.

However, the government underestimated the difficulty of integrating the components to achieve the desired requirements. The result was the program's cancellation in 2014 after spending nearly $1.2 billion for designs, with no prototypes delivered and no capability fielded to warfighters. The inappropriate choice of contract type for the program contributed to higher-than-necessary program risk. In retrospect, a cost-reimbursement contract would have been more appropriate to advance the state of the technology, but the pressure to act in accordance with the BBP initiative was too intense to overcome.

Program managers felt similar pressure to use fixed-price R&D contracts for the Army's Soldier Protection System. The system consisted of five coordinated efforts to update Soldiers' equipment, including helmets, ballistic vests, hard armor plates, combat eyewear and an integrated Soldier sensor system. It was the first time the Army attempted to coordinate the improvements in protective equipment so that the systems would be fully integrated—resulting in a modular, scalable, mission-tailorable

A word about Future Combat Systems

For the past decade, acquisition experts have referred to the Future Combat Systems program as an example of everything wrong with defense acquisition—a canceled program that wasted billions of dollars and resulted in no delivery of capability to warfighters. The Future Combat Systems program tried to integrate too many immature technologies using a system-of-systems approach to transform the way Army brigades would fight.

Few pundits mention that the program started as a Defense Advanced Research Projects Agency effort contracted through an other transaction authority (OTA) with Boeing Co. and its industry teammate, Science Applications International Corp. The OTA incentivized Boeing to get the Army to an approved milestone B, to start the formal program of record and system development and demonstration phase as quickly as possible. The Army had planned funding streams, and funds were at risk (schedule-driven).

Boeing and the Army achieved that milestone B in 2003. The OTA also enabled Boeing to become the lead system integrator for the Army's Future Combat Systems program of record. Despite repeated warnings from the Government Accountability Office of immature technologies and lack of adequate funding, the Army marched forward until 2009, when the secretary of defense canceled the program because of affordability concerns, immature technologies and requirements not reflecting the current threats faced by Soldiers in Iraq and Afghanistan.

The OTA did its job—it sped up a slow, unresponsive, bureaucratic contracting process in a rush to get a program of record and an approved program into engineering and manufacturing development. But it was a rush to failure and resulted in no capability delivered to the warfighter.

—ROBERT F. MORTLOCK

TIGHT FOCUS
Acquisition professionals have contracting options to encourage speed, cut through red tape and maximize value. But there's no contracting tool that can mature an immature technology by an arbitrarily chosen time. (U.S. Army photo by Spc. Adeline Witherspoon, 2nd Infantry Division Sustainment Brigade)

warfighter capability and achieving a 10 percent reduction in weight.

Each of the five components resulted in the award of up to three competing firm-fixed-price contracts for the delivery of prototypes for testing, demonstration and user field trials. What were the results? The helmet, ballistic vest and hard armor plate efforts each failed to produce products that satisfied the capability the warfighter needed—meeting the minimum ballistic protection requirements with the desired weight savings.

The updated combat eyewear, featuring a lens that could transition from light to dark within a second, could not withstand Soldier field trials—they were fragile and broke too easily. The integrated Soldier sensor system also failed user testing—there were too many wires, and it was too complex for Soldiers to operate. For each of these efforts, the contractors delivered prototypes for testing in accordance with the contract requirements. In each case, the individual technologies within each system were mature. However, when these mature technologies were integrated into a military product and operated by Soldiers in a realistic combat environment, the system was deemed operationally unsuitable—not ready for prime time.

Cost-reimbursable contracts might have created incentives for the contractors to make progress in "ruggedizing" a militarily useful product, rather than incentivizing scheduled delivery for payment.

IT'S ALL IN THE EXECUTION

A poor plan executed vigorously is better than a good plan executed poorly: It's a very common theme in operational warfighting units. But does it really apply to defense acquisition? In defense acquisition, a poor plan vigorously executed equates to no capability delivery and wasted resources. Similarly, a poorly executed good plan equates to the same. What we need in defense acquisition is good planning and vigorous execution.

A good plan incorporates lessons learned, has flexible on- and off-ramps and delivers capability to the warfighter using an incremental development and procurement approach. The recent acquisition reform initiatives emphasizing the use of other transaction authority (OTA) are a step in the right direction for streamlining acquisition efforts. Contracts based on the Federal Acquisition Regulation (FAR) remain a barrier to entry into defense contracts for many of today's most innovative and technologically savvy firms. It is critical to leverage OTA to break down that barrier.

GOOD PRODUCT DELIVERED FAST

The Rapid Equipping Force (REF) fields products very quickly, including variants on commercially available detection equipment—a sign that, for some products or capabilities, an approach that values speed can work well, but the old adage about good, fast or cheap still applies. (U.S. Army photo by REF Public Affairs)

However, OTAs are simply vehicles to speed up the contracting process—ways to avoid cost accounting standards, earned value reporting and the mandatory use of small, disadvantaged, minority-owned and veteran-owned businesses. OTAs avoid these national policy objectives that are part of the FAR.

But speed to contract award should not be the goal—the goal is speed to deliver warfighter capability.

CONCLUSION

Acquisition reform initiatives continue to make a difference, with many resulting in delivering capability to the warfighter as quickly as possible. The key to success in acquisition reform is empowering PMs to tailor acquisition strategies based on the urgency of need, technology maturity and available resources.

Just going fast—or increasing the speed of the program—is not the answer. Speed often increases risk in acquisition, resulting in a higher percentage of failed efforts. Speed to contract award, for example through an OTA, has little correlation to fielding militarily useful and suitable products to the warfighter quickly—in fact, it may have the opposite effect. Selecting the proper contracting type and approach results in improved operational warfighter capability in the optimal time, balancing cost, schedule and performance.

A commitment to the education and training of acquisition professionals, as well as the follow-on empowerment of these professionals to do their jobs, promises the best return on investment in helping to speed up defense acquisition. Continued training and education as well as leader development will help solidify the bonds of mutual trust and respect between the acquisition and warfighter communities.

For more information, contact the author at ***rfmortlo@nps.edu****.*

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DRIVING the FUTURE

The Army needs vehicles to be 'robotics ready' for the future force.

by Bryan J. McVeigh and Mark Mazzara

ROBOTICS APPLIED FOR SAFETY
Soldiers can use the RCIS Type I, created by adding a robotics applique kit to an HMEE, to investigate suspected explosive hazards. The system can function either autonomously or with a human operator. (Graphic courtesy of PEO CS&CSS)

Robotic mules that follow Soldiers to carry and charge their gear. Remotely piloted aircraft giving Soldiers real-time intelligence. Standoff systems to let Soldiers investigate and neutralize explosives from the safety of an MRAP. Not too long ago, such capabilities were the stuff of movies, but that future is here today—and shifts in the character of warfare could revolutionize the future for tomorrow's Soldiers in ways we can hardly imagine. Army leaders describe a future environment marked by great-power competition, rapid technological evolution, incredible speed and the advent of autonomy-enabled technologies. In some ways, that era—for ourselves, our allies and our adversaries—has already arrived, and we have to plan now so that our programs are prepared for a highly robotic battlefield.

In fact, over the last 40 years, the prevalence of software and digital controls in commercial cars, trucks, construction and mining vehicles and recreational vehicles has greatly increased. This has improved the functionality and features of those base systems. Along the way, commercial investment drove down the cost of many technologies—making them relatively easy and cost-effective to apply to military vehicles and enable the growth of modern robotic systems.

LEADER-FOLLOWER
Adding robotic components to existing systems is quicker than building an unmanned system from the ground up and can improve Soldier safety. The Leader-Follower capability is a suite of robotic applique sensors and vehicle by-wire and active safety upgrades for the Palletized Load System A1 fleet. It aims to reduce the number of Soldiers required to operate a convoy, thereby decreasing the number exposed to attack. (U.S. Army photo)

While this transformation has taken place largely in the commercial sphere, the Army has not been able to take full advantage of these commercial trends—primarily because of the long life cycles of its systems. It usually takes the Army a lot longer to field a new truck, for example, than consumer-focused companies. By the time the new Army truck hits the field, its onboard electronics may already be out of date, and that makes it hard to add the latest technology—which today means robotics. That reality must change, and it is clear that change is on the way.

APPLIED ROBOTICS

Making our systems "robotics ready" begins by ensuring that the Army acquisition community and stakeholders understand design considerations for manned systems to support subsequent robotics and autonomous applique kits or technologies. An applique kit is a package that can be added to an existing system to provide additional capability. Armor applique kits, for example, provide Army vehicles with a higher level of protection.

Autonomous applique kits provide advanced behavior, such as unmanned navigation and mobility. The possibilities range from managing data to augment a Soldier's cognitive capability, to increasing system safety, to more fully autonomous mission applications in bridging, breaching and other activities. Whatever the system, with the right effort, the Army can tangibly improve its ability to integrate robotic and autonomous capabilities into existing equipment and future systems and save money in the process—if program managers include the appropriate "hooks" early in the design process.

Fortunately, the hooks we need are widely available today on commercial cars and trucks. They include digital backbones, by-wire steering and braking, electronically controlled transmissions, digital controls of key actuators, telematics and active safety systems. ("By-wire" means electronically controlled—by-wire braking is controlled by a vehicle's onboard computers, for example, as opposed to physical brakes pushed by a human.)

Industry has paved the way, and the Army can capitalize with its own investment if it carefully plans for integration now, as opposed to waiting until later and incurring higher costs because of a more complex integration. Including autonomy-enabling technologies up front in either new procurements or service-life extension programs will allow for the integration of unmanned

technologies into a system (whether it's a truck, plane or boat) in a more efficient and cost-effective manner, while also offering immediate advantages to the system's maintenance and sustainment.

Small- and medium-sized teleoperated ground robots, like the PackBot and Talon families of robots, and large teleoperated mine flails are now commonplace in the Army. Robotic mules and semiautonomous trucks are on track to be in formations within a few years. As the Army accelerates the fielding of robotics and autonomous system capabilities across a variety of formations and demonstrates their real value, it is easy to see how they are likely to increase the range of mission applications. Army technologists envision the same types of technology applied to a variety of existing systems—from construction vehicles to material handling equipment; from mine-protected vehicles to tactical trucks; and from armored combat systems to watercraft.

The Army's Route Clearance Interrogation System (RCIS) Type I is a good example of adding robotic capabilities to an existing system—enabling the unmanned operation of the existing High-Mobility Engineering Excavator Type I (HMEE-I). The HMEE-I operates using manual hydraulic controls and some limited drive-by-wire controls. In 2017, the Army prepared to seek bids for a technology applique kit to turn the manned excavator into one that could be robotically operated. First, it converted the hydraulic controls of the HMEE into digital controls. Then it converted the remaining automotive functions to become drive-by-wire rather than manually activated.

This conversion—which took more than five years and cost nearly $8 million—resulted in a new variant of the HMEE-I called the Delta HMEE, or D-HMEE. There are numerous other examples of digitization and drive-by-wire conversions: The U.S. Army Combat Capabilities Development Command's Ground Vehicle Systems Center (part of the U.S. Army Futures Command) worked with Torc Robotics to convert a 120M Motor Grader to autonomous control, while Caterpillar has developed teleoperation conversion kits for its D7R-II bulldozer. While a project manager can develop these kits after the fact, it is far more efficient to integrate applique kits and technologies if the underlying digital controls are already in place on the base platform.

ADDING AUTONOMY

For new programs and service-life extension programs, combat developers and program managers (PMs) should consider designing their systems to be "autonomy ready" from the beginning. By including relatively inexpensive by-wire technologies in the base configuration, PMs will make it vastly easier and cheaper to add autonomous capabilities later. So what do they need to include?

Serial data bus and commercial safety technologies. A serial data bus enables the transfer of a sequence of information one bit at a time. It can enable the implementation of various robotic functions and can be built upon later to provide enhanced capability.

Another quick-win requirement to include in performance specifications is commercially available active-safety technology. Technologies like anti-lock braking systems, electronic stability control, collision mitigation braking, automatic lane detection and warning, blind spot warning, reverse cameras and path displays are widely available—most cars today carry some or all of these. They significantly enhance safety performance and set the foundation for adding active safety, unmanned or autonomous capabilities in the future.

Digitization or drive-by-wire. PMs should include by-wire specific requirements in the development process based on the abilities of the vehicle and expected uses. Selection of by-wire components is heavily dependent on the particular base vehicle, and the use of "bolt-on" kits does not usually make sense if fully unmanned functionality is required. For example, if acquiring a dump truck, the Army should consider not only by-wire control of the system's steering, braking and transmission but also by-wire control of the dumping system actuators.

FOUR EYES

A control unit atop this D7R-II bulldozer allows a Soldier to control the vehicle wirelessly with a remote control and monitor its progress from the vehicle's four cameras. (U.S. Army photo by Sgt. 1st Class Jason Proseus, 416th Theater Engineering Command)

Interoperability compliance. Platforms with a high likelihood of someday needing to provide unmanned or optionally manned functionality should consider requiring that interfaces be compliant with the Robotics and Autonomous Systems Ground Interoperability Profile. The Army developed the profile with its industry partners to provide known interfaces for interoperating with robotic and autonomous systems. Acquiring a system that already complies with the profile will allow for greater interoperability once the autonomous capability is added.

Physical interfaces. Systems engineers should consider using commercial standards such as those of the Society of Automotive Engineers and the Institute of Electrical and Electronics Engineers to define physical interfaces for applique kit integration. They should also leave enough physical space for the later inclusion of applique hardware such as radios, computers and associated electrical wiring and connections.

Onboard diagnostics. PMs should require that onboard diagnostic systems come with the base configuration. This has the direct advantage of improving maintenance, sustainment and safety. The indirect advantage is that the sensors and data needed for diagnostics offer a foundation for providing unmanned capabilities to the system in the future.

Of course, integrating so many new technologies can affect other operations and functions of a system and does require some additional considerations. PMs should ensure that systems are built to the most rigorous standards available. Have the manufacturer run extra fault-injection tests, and make sure the contractor supplies data from those tests, plus safety artifacts such as failure mode diagrams.

COUNTING THE COST

One of the great benefits of leveraging advancements in commercial technology is that market forces and industrial investment have already driven down the cost of many—but not all—technologies. Requirements developers and PMs should conduct market research to determine the cost implications of including robotics-ready technologies in their base configurations. The D-HMEE development effort cost the Army roughly $8 million in research, development, test and evaluation over about five years. In hindsight, that amount could have been reduced based on lessons learned throughout the development. But the level of effort to convert any nondigital systems into unmanned systems is significant and makes funding hard to predict.

The Army has not been able to take full advantage of these commercial trends—primarily because of the long life cycles of its systems.

The product cost of converting a base HMEE Type I to a D-HMEE configuration is approximately $75,000. The government estimates that if the D-HMEEs had been produced as new production systems, the per-system cost would be around $25,000 higher than the HMEE Type I. Which is to say that in this case, the total cost of getting an unmanned system by building a basic system first and then modifying it is considerably lower than building an unmanned system from scratch.

MAN-TRANSPORTABLE ROBOTIC SYSTEM

Small- and medium-sized robots used for route clearance and explosive disposal proved their worth in Iraq and Afghanistan and are now widespread in the Army. Larger robotic "mules" are on the horizon. (Photo courtesy of Endeavor Robotics)

AN EARLY MOVE TO AUTONOMY

Remotely operated mine flails—vehicles that use weights to strike the ground and detonate buried mines—were some of the first robotic systems on the battlefield. Many more are likely to follow, and the Army can lower the cost of the transition by producing manned systems today with enough space and ability to have robotic components added later. (Photo by Maj. Dan Marchik, 416th Theater Engineering Command)

Taking into account safety, some analysts believe that the drive-by-wire and active safety systems would provide a return on investment by themselves by preventing accidents and the associated costs. These analysts believe that safety systems built into the original product by its manufacturer, as opposed to add-on by-wire systems, can be more reliable (directly controlling braking without needing to add hardware), less obtrusive to humans (no protruding hardware in the human compartment), and more capable (some vehicle actions are difficult to control after the fact).

Finally, by-wire systems may also substantially reduce overall operation and sustainment costs. Digitization can position programs better for condition-based maintenance and the integration of multifunctional video displays, not to mention a reduction in total system part counts. Condition-based maintenance (also known as vehicle telematics) provides prognostics that tell users ahead of time if maintenance or replacement will be needed. This is possible only with modern components, i.e., those that are part of by-wire systems.

CONCLUSION

Planning and designing Army systems for future by-wire technologies hold a wide range of potential value in enhanced capability and reduced costs. Opportunities abound to use current technology—in addition to thoughtful design for the future—to capitalize on our ability to accelerate more effective capabilities to the force. Analysts anticipate that industry will offer digitization on a continually higher percentage of systems on the market.

As Army acquisition professionals, we play an important role in informing programs and shaping the future force. While robotic and autonomous capability additions may incur some costs, the long-term advantages may warrant consideration of including the technologies in the near term—even if they are not an explicit operational requirement.

For more information, go to ***www.peocscss.army.mil****.*

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MARK MAZZARA is interoperability lead for robotics within the Project Manager for Force Projection at PEO CS&CSS. He has held systems engineering positions in the U.S. Army Tank Automotive Research, Development and Engineering Center, the PEO for Ground Combat Systems and PEO CS&CSS, and served in 2014 as the Department of the Army systems coordinator for robotics in the Pentagon. He holds an M.S. in systems engineering and a B.S. in mechanical engineering, both from Oakland University, and is Level III certified in systems engineering and in program management.

LINING UP YOUR GOALS

Syncing up DAWDF funding and Human Capital Strategic Plan objectives will lead to an enhanced process and more transparency.

You can throw all the money you want at an acquisition effort, but if the people doing the work don't know how to prioritize it and make sure it's doing what it's supposed to do, achieving your goals is going to be difficult.

All acquisition programs have at least three things in common: the work, the people doing it and the financial resources to support the work. Successful programs tend also to share an alignment of goals and objectives with the people doing the work.

We can't just expect all of that to come together automatically. Successful efforts tend to provide adequate resources to the people doing the work—the education, training and all the other necessary elements that help align our mission with our priorities.

The Army acquisition community must not only determine how best to deploy our resources, but also how we use the Army Acquisition Workforce Human Capital Strategic Plan (HCSP) to ensure that the people who have to obligate that money are prepared to do so in the most effective and efficient manner.

We launched the HCSP in October 2016. It's our "business plan" for developing the best possible acquisition workforce for the Army. To meet that objective, we must make sure that we focus our resources on our most important priorities. But we also need buy-in from the acquisition community on our major goals and objectives. Those will be inextricably linked to the HCSP and the specific goals and objectives that we have there.

FULFILLING THE PLAN

The HCSP has five goals:

- Workforce planning.
- Professional development.
- Leadership development.
- Employee engagement.
- Communications and collaboration.

Let's focus on the first two goals, workforce planning and professional development.

One of the ways we improve workforce planning and professional development is with the Defense Acquisition Workforce Development Fund (DAWDF). Congress enacted DAWDF with the FY08 National Defense Authorization Act (NDAA), then made it permanent in the FY16 NDAA. This fund permits DOD to recruit and hire, develop and train, and retain its acquisition workforce. In FY18, DAWDF provided $86 million in funding to the Army Acquisition Workforce, which led to 322 quality initiatives, 183 new hires and training for 19,364 members of the workforce.

IT'S ABOUT STEWARDSHIP

With adequate resources carefully prioritized and spent, primarily from DAWDF, the people who make up the acquisition workforce can receive the education and training necessary to carry out the Army's priorities. The Army Acquisition Workforce Human Capital Strategic Plan serves to ensure that those who obligate the money have the skills and know-how to do so effectively. (Graphic by U.S. Army Acquisition Support Center)

DAWDF REVIEW

For FY20, we have an enhanced structure that we're putting in place for DAWDF funding for Army organizations to make sure that our prioritization makes sense.

- Every request for DAWDF funding must align with one of the five HSCP goals.
- Every request will be reviewed by a council-of-colonels board.
- Every organization requesting DAWDF funding will brief acquisition leaders on its plan for using the funds.
- Every plan will be documented on a database to ensure transparency.

The U.S. Army Director for Acquisition Career Management Office has always brought in people from the field and incorporated subject matter expertise to review DAWDF proposals. We are modifying this approach slightly— using the existing process and getting a greater degree of input from more of the stakeholders. There has always been a tremendous amount of rigor in DAWDF funding, and this is the next evolution of rigor to ensure that our stakeholders' input is more broadly reflected.

THINK METRICS

All of those activities and efforts, specifically the initiatives, need to have concrete metrics associated with them. It's way too easy, sometimes, for people to find what they believe to be a competency gap and think that there's a way to train it away. Unless you understand the baseline competency and what we think we can accomplish through training before you start that training, then you may spend all sorts of money to develop a program or course that doesn't exactly address the true gap and may never attain the desired result.

Let's say you see a problem with how a product is being developed. You decide we have a gap in understanding a particular part of the process. You train against that part of the process. And yet you don't see a change in the results.

Why? Because either, a) we haven't really defined the requirement and recognized what the core problem is, or b) we haven't used metrics to understand whether what we say we're trying to solve actually gets solved. Metrics are important, and so is understanding the core problem.

When every initiative has very specific metrics associated with its objectives, you can actually know whether or not you've accomplished what you set out to do in the first place.

At the end of the day, it really is about professionalizing the acquisition workforce and ensuring that it has all the skills, tools and competencies needed so that we are world-class stewards of the taxpayers' dollars. Developing acquisition professionals goes hand in hand with developing the best products, which requires special people doing very specialized work. We can't afford in today's environment to be just OK, we have to be exceptional!

EARNING HIS ACQUISITION WINGS

Maj. Daniel Brown just wants to make things a little better for the next guy. "Getting deployed Soldiers the capabilities they need to do their difficult job and then return home is always the goal, and I remind myself of that every day. I have been that deployed warfighter, and I want to make sure our current and future Soldiers have better lethality, capability and survivability than I did."

Brown is an Army experimental test pilot (XP) with the Aviation Flight Test Directorate at U.S. Army Redstone Test Center, Alabama, part of the U.S. Army Test and Evaluation Command. As chief of the Aircraft Survivability Equipment Testing Division, he manages and executes engineering and developmental flight tests of various aircraft components and systems, mainly survivability systems incorporated into rotary-wing and fixed-wing Army aircraft. "These technologies aid the warfighter's threat awareness in flight and greatly increase their chances of avoiding—and even defeating—complex radar, infrared and laser-based threats," said Brown.

Brown was an aviation officer before coming to the Army Acquisition Workforce and completed two tours in Iraq with the 1st Combat Aviation Brigade, 1st Infantry Division. After finishing graduate school in 2014 through the Advanced Civil Schooling program, he spent two years teaching in the Department of Civil and Mechanical Engineering at the United States Military Academy at West Point.

While teaching, he applied to be an Army XP. "I thought it was the best way for me to align my personal passion—aviation—with my professional Army aviation experience and my educational background," he said. Teaching at West Point "was great preparation for test pilot school," he noted. "Three or four times a year, we took cadets up in Cessnas and Lakotas to gather data for the lab portion of our aerospace engineering courses. Addressing engineering topics while in flight, collecting data and flying within tight parameters—those skills are a big part of learning to be a test pilot."

The XP application process included being accepted into the Acquisition Corps as a functional area 51A (program management) officer while also completing the multistage selection process to be an XP candidate. "While fundamentally 51As, XPs are branded 51Ts [test and evaluation officers] as well," Brown explained, "and we must first serve in a 51T position and meet the associated requirements, including Level II certification in T&E [test and evaluation] in two years," he explained. Brown attended the yearlong U.S. Naval Test Pilot School at Naval Air Station Patuxent River in Maryland. Graduating from that school incurred him a T&E officer utilization tour requirement but also counted toward many of his T&E certification requirements. (Utilization tours are extensions of military duty, for a specific period after personnel receive specialized training or education, in which the individual utilizes that training or education.)

"Since 51T isn't currently a primary acquisition career field, we also need to get 51A key developmental experience after serving the 51T utilization tour," Brown said. "Most Army XPs serve 51A time as an assistant product manager after their initial XP

MAJ. DANIEL BROWN

COMMAND/ORGANIZATION: Aircraft Survivability Equipment Testing Division, Aviation Flight Test Directorate, U.S. Army Redstone Test Center, U.S. Army Test and Evaluation Command

TITLE: Experimental test pilot and division chief

YEARS OF SERVICE IN WORKFORCE: 4

YEARS OF MILITARY SERVICE: 12

DAWIA CERTIFICATIONS: Level III in test and evaluation

EDUCATION: M.S. in aerospace engineering, University of Maryland, College Park; B.S. in mechanical engineering, United States Military Academy at West Point

AWARDS: Bronze Star Medal; Army Senior Aviator Badge; U.S. Cavalry Order of the Spur (Gold, Silver); Army Aviation Association of America Honorable Order of St. Michael (Bronze); Military Outstanding Volunteer Service Medal

MIXED BAG

Brown meets with other members of his test team—from left, Craig Block, Steve Kaye, Jeb Woods and Adrian George—alongside a UH-60M Black Hawk. Experimental pilots test all kinds of different aircraft, and even within a single type, aircraft vary. Two Black Hawk helicopters, for example, might have different sets of prototype controls. (Photo by Christy Barnett, unit public affairs representative, U.S. Army Redstone Test Center)

utilization, usually in the Program Executive Office for Aviation or Intelligence, Electronic Warfare and Sensors. Having to complete two separate key developmental positions back to back is challenging in its own right."

Brown, who's currently serving in his 51T key developmental position, noted that his work puts him in contact with multiple programs and reinforces the acquisition fundamentals he learned in his courses. "These programs are all different acquisition categories and types: programs of record, QRCs, JUONs, etc. They're also at different stages in the acquisition life cycle. As a result, I'm getting a very broad look at the acquisition process as a whole—something you might not initially expect from a highly technical XP specialization." (QRCs are quick reaction capabilities; JUONs are joint urgent operational needs. Key developmental positions are jobs that DOD sees as fundamental to an officer's development in a particular field.)

The biggest challenge he faces is managing aircraft schedules. "The average battalion might have 24 aircraft, all of which are the same. So if, for example, one Black Hawk isn't ready, a flight crew can just move to the predesignated identical spare and complete its mission for the day," Brown said. "But in a testing facility, we might have just a fraction of that number of aircraft of a single type, for example, and none is the same. They're all in different stages of testing, outfitted with different prototypes or modifications, and have different test instrumentation equipment installed.

"We also have to operate them within the parameters granted by the organizations we're testing them for. So we use detailed tracking and weekly deconfliction meetings to make sure that if something comes up and one test flight changes, we can minimize the negative effects to any other test programs that are slotted to test using a singular, unique aircraft."

Brown noted that the most valuable training he has received so far in his career came from his assignment at the Naval Test Pilot School. The school incorporates more than 100 hours of flight training in rotary-wing and fixed-wing platforms, covering more than 15 aircraft types. "It starts with first principles on aircraft performance, aircraft handling qualities and aircraft systems, then builds over multiple exercises and test reports toward a monthlong, comprehensive evaluation of an aircraft for a specified mission," he explained.

The final report requires students to combine their aviation expertise with what they've learned in training to assess the suitability of an aircraft for warfighters' needs. "The school teaches us to be a bridge between the tactical and the technical communities, which is right where the Army Acquisition Workforce operates," Brown said.

Now out of training and part of the acquisition workforce, Brown sees firsthand the importance of serving as that bridge. "The more the acquisition community understands the warfighter's mission and exactly what's needed for that mission, the better the product will be. The uniformed acquisition officer is the link to help facilitate that understanding."

He noted a couple of things Soldiers don't often think about when it comes to acquisition. "Most Soldiers don't know that there's a huge workforce behind them that they'll never meet. They should take comfort in knowing that these people go to work every day dedicated to giving them what they need," he said. "And most don't realize how much never gets to them—that the new capabilities they receive are the culmination of a lot of things that didn't work. When the system works the way it should, the warfighter doesn't get something that doesn't work, and we haven't spent a lot of taxpayer dollars unnecessarily. Success shouldn't be measured only by what makes it to the warfighters."

—SUSAN L. FOLLETT

ACQDEMO's CAS2NET 2.0 ALMOST DIDN'T HAPPEN

The CAS2Net 2.0 upgrade took 20 years, but it got a brain transplant for its 20th anniversary.

by Steve Stark

The AcqDemo Program Office's rollout of CAS2Net 2.0 may not exactly be cause to break out a $200-plus bottle of Cristal champagne, but for those in the AcqDemo system, the midyear review season provides reason to celebrate. The long overdue update brings many eagerly awaited changes and a much more robust system.

For those wondering why it took so long, the fact is that it almost didn't happen. How it did is almost a shaggy dog tale. More about that in a moment.

For those familiar with CAS2Net 1.0, the new version will look a great deal like the old one, which is a good thing because it means no one needs to learn a whole new system.

HOW OLD?

CAS2Net 1.0 software is—there's no way around it—old. How old? Older than Windows XP. Older than CD burners standard on personal computers. A kid born when CAS2Net 1.0 debuted could be a sophomore in college today.

For many, the old CAS2Net could be frustrating, non-intuitive and time-consuming. Forget to hit the save button and everything you entered could

BACK IN THE DAY
Founded in 1959 as the Ordnance Industrial Data Agency and housed in Radford, Virginia, ALTESS is now in its 60th year of providing IT solutions, support and services—across a system's entire life cycle—to customers in secure environments. (Photo courtesy of ALTESS)

disappear. It also could require a lot of cutting and pasting but if, for example, you put in a bulleted list, pasting didn't bring formatting along with it.

The old version is a bit like a forgetful, disheveled colleague who, one day, is replaced by his brother. The brother is sharper, never forgets anything, and gets the job done with efficiency and a dash of style. He may look like his predecessor in superficial ways, but no one is going to miss the original. That's CAS2Net 2.0.

On the surface, the site appears to have had a top-notch facelift, but it's much more like a brain transplant. The Program Executive Office for Enterprise Information Systems' Acquisition Logistics and Technology Enterprise Systems and Services (ALTESS) modernized the software behind the site for the Office of the Secretary of Defense's Human Capital Initiatives (HCI) program.

A SERIOUS IMPROVEMENT

From a user perspective, the new version looks similar to the original but feels better, said Chad Vance, who has managed the sustainment of CAS2Net 1.0 since 2015, as part of his portfolio as Application Services Division chief at ALTESS. But what's really important is that "some of the stuff that's going on in the back end [of CAS2Net 2.0] is a lot more robust. The database was optimized. It's more efficient, it can handle more users, and it's definitely more reliable. There was a lot of work—probably a lot more work—that went in on the back end of it," Vance said.

"We also wanted to make it more user-intuitive, and easier to manage so that you didn't need subject matter experts on site for the rest of its life" to manage issues with the software, he said. With the new version, an administrator can take care of the system. "The goal was just to make it a little more current and make it so it can scale for a growing user base."

Its ability to scale as its user base expands is a major concern for AcqDemo, which now has more than 40,000 participants.

According to Vance, one of the most frequently requested improvements to CAS2Net was, " 'Can't you make it more like Word?' So we found an interface that looked more like [Microsoft] Word." The new version also autosaves, another much-requested improvement. But all of the new improvements came close to never happening.

A NEAR-DEATH EXPERIENCE

CAS2Net 1.0 launched alongside AcqDemo (the DOD Civilian Acquisition Workforce Demonstration Project) in 1999. (See related articles, "Contribution!" Army AL&T, July-September 2017, Page 112, and "Celebrating 20 Years of AcqDemo" in Defense Acquisition magazine, March-April 2019.) Unlike the General Schedule (GS) system, with its salary steps, AcqDemo is a performance- or contribution-based management system, with "broad band" salary levels that are much wider than the GS steps but correspond to GS pay levels. The AcqDemo system, which was developed in an effort to further professionalize the acquisition workforce, offers more flexibility for movement from level to level within pay bands, and the potential for annual awards or bonuses, among many other things.

COLLECTIVE OWNERSHIP
ALTESS has evolved into an application modernization shop as well as the Army's commercial cloud broker, helping application owners migrate to the commercial cloud and providing sustainment and cybersecurity services afterward. (Photo courtesy of ALTESS)

Always in search of ways to make the defense acquisition system better, Congress created the National Security Personnel System (NSPS), which DOD implemented in 2006.

Among the intended consequences of NSPS was that AcqDemo would go away. And it might have, had it not been for collective bargaining agreements between DOD and about 3,500 unionized employees. To make AcqDemo go away, DOD would have had to renegotiate those labor agreements to move those employees onto NSPS, said Sandy Brock, Army AcqDemo program director. DOD didn't do that, but all other employees migrated to NSPS. That period saw the lowest enrollment of employees in AcqDemo—and improvements to CAS2Net were hardly a priority.

Then, in October 2009, following criticism that NSPS was unfair, the National Defense Authorization Act for Fiscal Year 2010 included a provision to unwind NSPS by 2012, returning participants to their previous pay systems. So, while many former NSPS employees returned to AcqDemo, its survival still was not a foregone conclusion. Meanwhile, CAS2Net just kept getting older.

Today, even with NSPS gone, AcqDemo is not the only demonstration contribution-based system. "There are 15 others that we track," Brock said.

PROGRESS BEGINS BY COINCIDENCE

Regardless of whether you identify AcqDemo's birth year as 1996, when it was conceived, or 1999, when it was implemented, 20 or 24 years is an almost inconceivably long time for software to go without a significant upgrade. ALTESS may be an unlikely savior and software developer for CAS2Net, but that's essentially the case.

A couple of coincidences cemented that mutually beneficial relationship.

The first coincidence was that ALTESS took over the sustainment of CAS2Net in 2015. The second was the designation in December 2016 by then-Secretary of the Army Eric K. Fanning—who was impatient with the pace at which the Army was consolidating legacy data centers—of ALTESS as a "modernization hub" in a directive. And while that directive says, "The ALTESS Data Center (RFAA_VA_ALT_01) is designated as a modernization hub for Army commands and is available to facilitate Army application modernization support," it doesn't define what it means for ALTESS to be a modernization hub or what modernization support means.

ALTESS Product Director Tim Hale said that ALTESS as a modernization hub has evolved into both an application modernization shop and "the Army's commercial cloud broker, assisting application owners in the migration to the commercial cloud and providing sustainment and cybersecurity services to those applications once they do migrate."

SPEED AND AGILITY
ALTESS was able to roll out CAS2Net 2.0 after working on the modernization project for only about a year, a relatively short timeline that it attributes to Agile development and the flexibility afforded by working with a government agency instead of an outside contractor. (Image by U.S. Army Acquisition Support Center (USAASC))

"It's almost like the software engineer needs to do mindreading in order to understand exactly what the user wants."

For Vance's shop specifically working on application modernization, that means two different avenues of work. The first is what Vance described as "the minimum support needed to bring software up to Army cybersecurity and regulatory standards." The second is what he called "strategic modernization," of which CAS2Net is the most recent example. For Vance and his team, that means working with DOD customers to develop software upgrades quickly, with more flexibility than a traditional contractor would be able to bring to the table.

TIMING IS EVERYTHING

The final, and perhaps most interesting, coincidence was the pivotal role of Tony Parton in shepherding CAS2Net to its renaissance.

Parton is the deputy program manager for AcqDemo in the Human Capital Initiatives (HCI) program at Defense Acquisition University at Fort Belvoir, Virginia. HCI owns CAS2Net and AcqDemo, and Parton's office at AcqDemo is a few doors down from Army AL&T.

Before that, however, he worked at ALTESS on Vance's team. During his 15 years of Army service, Parton found that he was good at fixing things, especially electronics. He leveraged that ability and earned a degree in software development from the College of Brockport, within the State University of New York system, in 2002. That eventually led to his job at ALTESS, managing the Army Budget Office's P&R [Procurement and RDT&E, or research, development, test and evaluation] Forms software. Along with CAS2Net, P&R Forms is the best-known of the software packages that ALTESS has modernized.

ANOTHER COINCIDENCE

It was almost a coincidence that the CAS2Net project came to ALTESS, Vance said. It happened that one of the people at the HCI office had served with Parton in the Army. (Parton exited the Army as a staff sergeant in 2002.). A fellow service member, Steve Edsall, worked at AcqDemo and the two got to talking. When Parton heard that AcqDemo was looking to upgrade CAS2Net, he saw an opportunity. He knew that ALTESS could do the work.

With improvements desperately needed and a substantial number of new employees coming into the AcqDemo system, HCI was on the verge of hiring the original contractor to improve the system, Vance and Parton said. However, Parton came to Fort Belvoir in about June 2017 to brief the HCI team on ALTESS's capabilities and its ability to replace "CAS2Net 1.0 with a new, modernized system that would be more appropriate for the growing user population, and that would be able to support that growth over the next five to 10 years," Parton said.

HCI "called a timeout" on bidding out the work, Vance said. From their sustainment work, it was clear to Vance and Parton "that the code base was limited and not very scalable" and would need to be rebuilt.

According to Brock, the old system was so slow it could take all night for the Army AcqDemo office to run a report. As a result, she said, the office could never get real-time data.

That mirrors something that Vance said about the P&R system. The Army Budget Office has reports that it must get to Congress. With the old version of P&R that ALTESS upgraded, Vance said, generating that report could take six to eight hours. The system that ALTESS upgraded enabled the Defense Technical Information Center to run the reports in seconds.

Parton's pitch to HCI was a hit. And because the relationship between ALTESS and HCI was government-to-government, ALTESS could be more flexible than an outside contractor could. If HCI wanted to update requirements after reaching an agreement with a contractor, it could mean more money and a contract modification, which could slow work. With ALTESS, that wouldn't be necessary.

AGILE IS THE TICKET

"We had our initial requirements-gathering session around August 2017" with HCI, Parton said. The development of the revamped CAS2Net took approximately a year, speed that Vance and Parton attributed to ALTESS's Agile development approach.

"I worked for Chad [Vance] and his division managing software projects," Parton said. "Really, what it boils down to with [developing a] user interface is that a lot of times a user has a very hard time expressing their requirements in such a way that the software engineer knows exactly what they want. It's almost like the software engineer needs to do mindreading in order to understand exactly what the user wants." Going to work with the HCI team, Parton said, "I was able to help some in that role to communicate between the business side and the technical side. But, really, what enables the user interface to be better is that we went through an Agile process."

Vance said that his team would take each requirement and code it in one- or two-week sprints, and then deliver that code for testing when the sprint was done. If new requirements came up, he said, they could work the code into the sprint schedule depending on its urgency.

"Basically," Parton said, "Chad and his team worked with the program office to define what would go into each sprint. That was completed, finalized and delivered by the end of each two-week sprint, and then it went into testing mode. The user population, mostly component-level users across the Army, Air Force, Marines and Navy, went in and looked at the system and said, 'Yeah, that's not exactly what I meant,' and so we were able to improve the user interface through that constant feedback loop."

CONCLUSION

According to Vance, Parton and others that Army AL&T spoke to, the HCI office saved a good deal of money and gained considerable flexibility by working with ALTESS on the CAS2Net project. For Vance, the project was part of ALTESS's dual role as both a data facilitator and a software development shop, within its larger role as a modernization hub. In addition, Hale said, ALTESS has positioned itself as an information technology (IT) managed-service provider for applications required to

UNEXPECTED PAIRING

A series of coincidences brought ALTESS and AcqDemo together on the project to upgrade CAS2Net, which now has a more user-friendly interface and speedier report generation capabilities as well as improved scalability and simpler sustainment. (Image by Getty Images/USAASC)

ALTESS may be an unlikely savior and software developer for CAS2Net, but that's essentially the case.

migrate to the cloud, which means that ALTESS can assist Army and DOD application owners not only with modernizing applications, but also with cybersecurity services, system engineering support and a host of managed services necessary to make them cloud-ready.

On the one hand, ALTESS can lead government customers through the process of getting their data into compliance with DOD standards, which involves more than 290 different application compliance standards. On the other, it has a stable of software engineers that are fully capable of quickly modernizing software for government customers.

"We were very fortunate that we built a whole application sustainment program that just happened to partner with a data center," Vance said.

For more information on ALTESS's cloud or software modernization and sustainment capabilities, contact Chad Vance at ***william.c.vance1.civ@mail.mil****. For more information on CAS2Net2, version 2.0, contact Tony Parton at* ***Anthony.Parton@dau.mil****.*

STEVE STARK is senior editor of Army AL&T magazine. 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 and S&T, he is the best-selling ghostwriter of several consumer-health oriented books and an award-winning novelist. He is Level II certified in program management.

'STOP THE BLEED': THE SIMPLE ART OF SAVING LIVES

It has only been since the early 1990s that CPR training has been available to the general public, and this simple training has saved countless lives. MRMC's 'Stop the Bleed' campaign aims to save even more lives with training to treat traumatic hemorrhage.

by Ramin A. Khalili

For Col. Michael Davis, the problem isn't the blood—as a reconstructive surgeon by trade, it's never been about the blood—rather it's the way Hollywood always make the blood look so … bloody.

"It's not like a horror movie," said Davis, director of the U.S. Army Medical Research and Materiel Command's Combat Casualty Care Research Program (CCCRP), talking about the mechanics of traumatic bleeding and perception versus reality. "You're never going to see projectile bleeding from a patient like you do on the screen, but people always think they will."

Said Davis, "And that's a barrier, I think … a problem."

It's a problem for the military, certainly—as hemorrhage remains the No. 1 killer on the battlefield, and thus a chief concern for Davis and his team—but it's also a growing problem for American citizens on the home front. According to the Centers for Disease Control and Prevention, trauma is the No. 1 cause of death in the United States for people under 46, accounting for nearly 50 percent of those fatalities. But dive deeper into those numbers and you find the remnants of a slew of recent mass trauma events, like the 2012 school shooting in Newtown, Connecticut; the 2013 Boston Marathon bombing; and the 2015 Amtrak train derailment in Philadelphia. The message, then, has become overwhelmingly and tragically clear: Preparedness and vigilance are now requirements as injuries formerly confined to faraway combat zones now occur randomly and unpredictably on American street corners.

Enter the "Stop the Bleed" campaign.

A HOMEGROWN EFFORT

Launched at the White House in late 2015 via presidential proclamation, "Stop the Bleed" is a federal outreach program designed to save lives by teaching American citizens the simple basics of military-tested bleeding control: steps like using tourniquets to stanch blood flow and packing open wounds with clean gauze. These same steps have contributed to a 67 percent decrease in fatalities caused by extremity bleeding during recent U.S. conflicts in Iraq and Afghanistan, as compared with previous U.S. involvement in Vietnam.

Based on that success rate and CCCRP's overall expertise, the National Security Council asked the program to develop the campaign in direct reaction to the aforementioned domestic incidents, with the goal of fostering a new brand of national resilience at the grassroots level.

Indeed, "Stop the Bleed" is the reason Davis now straddles foreign combat zones and the U.S. home front as part of his daily duties. For him, the connection—and cooperation—between

GEORGIA STOPS THE BLEED
Georgia state legislators attend "Stop the Bleed" training in October 2017. The Georgia General Assembly is a big supporter of the campaign, allocating hundreds of thousands of dollars to install a dozen bleeding control kits in each of 2,300-plus schools across the state. Efforts are also underway to teach bleeding control techniques to at least 10 administrators in each school. (Photo courtesy of the Georgia Trauma Commission)

the two worlds has never been more clear. The campaign, which operates as an unfunded mandate and thus without any spending authority, has grown dramatically via a grassroots marketing effort grounded primarily in simple, word-of-mouth outreach. For extra heft, CCCRP has begun working with a variety of stakeholders to develop a codified set of bleeding control training techniques and education guidelines.

The goal: Combine resources across the federal and private sectors to bring the campaign to the general public, where individuals can learn lifesaving skills from registered trainers across the country. "Saving a life is something everybody can do," said Davis. "We just have to find a way to teach that, to translate those basics of military medicine to a larger audience."

That larger audience has certainly materialized—and quickly—as the analog-style outreach effort has led to successful licensing of the "Stop the Bleed" logo to more than 300 corporations, universities, government agencies and nonprofit entities worldwide as of early 2019. The licensing process, which is free to those using the logo for educational purposes, gives CCCRP, as the copyright owner, oversight as to who exactly is promoting the campaign and how that promotion is taking place.

Notable U.S. licensees include The Walt Disney Co., the American Red Cross and the Boy Scouts of America, along with hundreds of police and fire departments across the country, all of whom pledge to promote the proper tenets and techniques of the campaign. As a testament to the desire for such simple yet valuable information, the "Stop the Bleed" campaign so far has processed licensing requests from Italy, Canada, the United Kingdom and Belgium.

"When we go out to schools and teach these bleeding control courses, we don't even have to ask kids to put down their phones," said Dena Abston, executive director of the Georgia Trauma Commission in Rossville, Georgia. "That's how engaged they are—that's how much they want to learn these skills."

Georgia state lawmakers are equally enamored, pouring hundreds of thousands of dollars in grant money into a new effort that would install one dozen bleeding control kits inside each of the state's more than 2,300 schools—more than 27,000 kits in all. In addition, efforts are underway to train at least 10 administrators in each of those schools in bleeding control techniques.

Said Abston of the campaign's popularity, "I've never seen anything like it."

THE IMPACT OF LIFESAVING ACTION

But when it comes to saving a life, to physically inserting oneself into a mass trauma scene and becoming an active bystander, there are still barriers to overcome, that "gore factor" being chief among them.

"Hollywood movies always show blood squirting everywhere," said Gregory Tony, newly installed sheriff of Broward County, Florida, and owner of the active shooter response training company Blue Spear Solutions LLC. "But the reality can be much less dramatic from a visual standpoint."

Said Tony, "I can recall arriving at a shooting scene one time where the victim—a female shot in the upper neck and

back—was lucid and providing detailed information about the shootings."

It's that kind of firsthand experience that has driven Tony, an early "Stop the Bleed" licensee and adopter, to push the campaign into his immediate community and beyond. By speaking directly and specifically to key local stakeholders as part of a coordinated action plan, he said, he's been able to allay those fears, break down the barriers and convey the importance of immediate action and its overall impact.

"Most people have a fear of working with or touching blood, but we figured out how to get more supporters and participants," said Tony. "Our greatest success comes when we talk with people like school officials, local legislators, church pastors and business owners about the severity of excessive bleeding, and paint a full picture of the community impact of learning bleeding control techniques."

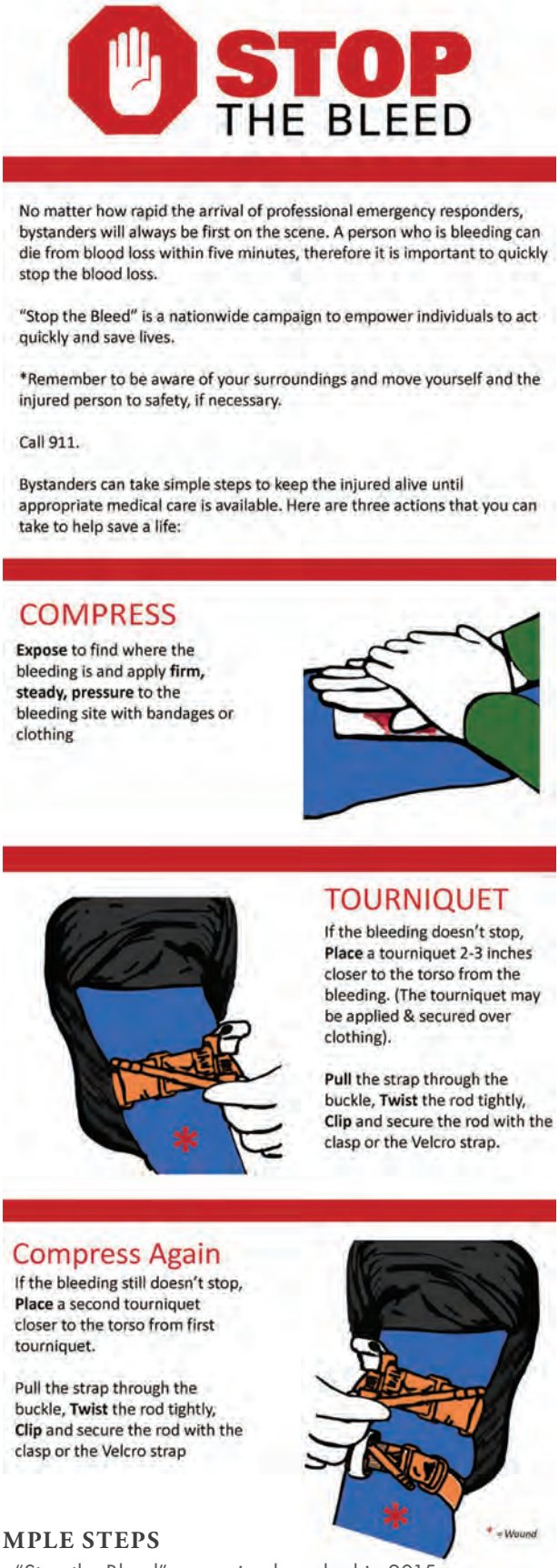
To that end, Tony has teamed with those same types of entities in Florida and North Carolina to teach bleeding control fundamentals to both children and adults, including work with the students and families at Marjory Stoneman Douglas High School in Parkland, Florida, the site of a horrific school shooting in February 2018 that left 17 people dead and another 17 people injured.

"Unfortunately our first responders are now the everyday civilians," said Max Schachter, whose 14-year-old son, Alex, was one of the victims in that shooting. "We know this is going to happen again, and so we need to solicit all Americans to learn how to 'Stop the Bleed.' "

Lori Alhadeff, whose 14-year-old daughter, Alyssa, also died in the Parkland shooting, talks about the campaign in the same manner; to her, it's a clear imperative. "Bleeding control training and equipment should now be mandatory for every school, teacher [and] student," she said.

As a result of Tony's work in the wake of the Parkland shooting, Florida state senators are drafting legislation mandating implementation of the "Stop the Bleed" campaign in every school in the state, a clear nod to the importance of young children and teens in this equation.

"Youth is the key ingredient to success here," said Tony. "Kids have the greatest opportunity for impact, for immediate response and for the long-term continuity of this national campaign."



SIMPLE STEPS
The "Stop the Bleed" campaign launched in 2015 with this instructional graphic, among others. (SOURCE: U.S. Department of Homeland Security)

CONFIDENCE, COMPETENCE, RESULTS

Back in his office at Fort Detrick, Maryland, Davis pulls a bright orange tourniquet from his desk drawer and spins the plastic windlass around with his fingers, tightening the cordage for a brief second before releasing the tension. He does this once, twice, three times. He understands the apprehension in the face of traumatic bleeding, he said, but he also knows that empowerment is the best tool to fight those fears.

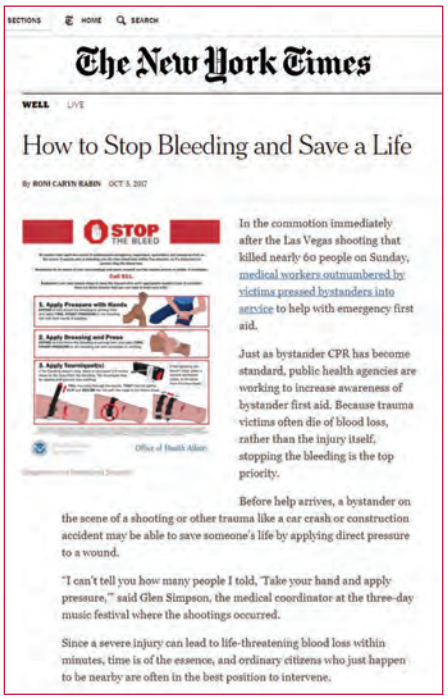
"Nobody's mentally prepared for a trauma scene," he said. "Everybody always thinks, 'this is overwhelming,' and 'this is above my capacity' … but I can assure you it is not."

Granted, while the steps for aiding a trauma victim are (ideally, at least) relatively basic, there's a clear and dramatic difference between dealing with massive bleeding cases in a clinical versus a real-world environment. Even Davis admits, "Trauma is just a totally different animal in the field."

Still, the tenets of the "Stop the Bleed" campaign are designed to simplify the process and mitigate the knowledge gap between medical professionals and those active bystanders willing to save a life. That process begins with locating the site of bleeding on the victim, then applying immediate and firm pressure before applying a tourniquet about two to three inches above the wound to help stop the bleeding—making sure to then twist the tourniquet rod tightly before securing it with both the built-in clip and the Velcro safety strap (depending on your tourniquet model). Finally, if the wound is still bleeding, pack it with gauze. "Use more than you think you need," said Davis. This last part is of special importance; emergency room doctors note that while it's best to use clean gauze to pack a wound, anything absorbent will work, even if it's dirty. As the saying goes in the ER, "We can treat a live patient with an infection, but we can't treat a dead one."

Indeed, it's the simplicity of that message that has resonated so deeply. Stories of real people using those techniques to save lives are submitted to CCCRP weekly from across the country. The campaign even took center stage recently through a series of public service announcements featuring the cast of the CBS television network's medical drama "Code Black." Campaign partner the American College of Surgeons engineered appearances from actors Rob Lowe and Marcia Gay Harden as a part of that effort. Abston, with offices based out of tiny Rossville, Georgia, was interviewed by NBC "Nightly News" late last year about her work with the campaign.

"They sent a camera crew all the way up here from Atlanta because they were so interested," she said.



SECTIONS HOME SEARCH

The New York Times

WELL LIVE

How to Stop Bleeding and Save a Life

By RONI CARYN RABIN OCT. 5, 2017

STOP THE BLEED

In the commotion immediately after the Las Vegas shooting that killed nearly 60 people on Sunday, medical workers outnumbered by victims pressed bystanders into service to help with emergency first aid.

Just as bystander CPR has become standard, public health agencies are working to increase awareness of bystander first aid. Because trauma victims often die of blood loss, rather than the injury itself, stopping the bleeding is the top priority.

Before help arrives, a bystander on the scene of a shooting or other trauma like a car crash or construction accident may be able to save someone's life by applying direct pressure to a wound.

"I can't tell you how many people I told, 'Take your hand and apply pressure,'" said Glen Simpson, the medical coordinator at the three-day music festival where the shootings occurred.

Since a severe injury can lead to life-threatening blood loss within minutes, time is of the essence, and ordinary citizens who just happen to be nearby are often in the best position to intervene.

THE WORD IS OUT

This Oct. 5, 2017, article in The New York Times, published four days after the Las Vegas shooting that killed 58 people and left more than 850 wounded, is an example of the reach that "Stop the Bleed" has attained, from the United States to Canada to Europe. (SOURCE: The New York Times)

CREATING FIRST RESPONDERS

An instructor with "Stop the Bleed" licensee Blue Spear Solutions LLC teaches bleeding control techniques in July to students from Marjorie Stoneman Douglas High School in Parkland, Florida. In February 2018, a mass shooting at the school killed 17 people and injured another 17. An effort is underway in the Florida state legislature to mandate the "Stop the Bleed" campaign in every school in the state. (Photo courtesy of Gregory Tony, Blue Spear Solutions LLC)

TAKING FIRST AID FURTHER
Members of the Boy Scouts attend a "Stop the Bleed" training seminar in July 2017 at the annual National Scout Jamboree in West Virginia. CCCRP has licensed the "Stop the Bleed" logo to more than 300 entities worldwide—corporations, universities, government agencies and nonprofit organizations. (Photo courtesy of Paul Brooks)

CONCLUSION

For Davis, this is the way it was always supposed to go: a simple, lifesaving message backed by science, results and military might—a message easy enough to teach quickly yet powerful enough to save lives. It recognizes that, whatever the statistical likelihood of mass violence may be, bleeding control skills increasingly are used in daily, around-the-house types of situations and—as the campaign likes to note—in more rural areas of the country, with the states of Iowa and Montana becoming "Stop the Bleed" license holders expressly to combat farming injuries.

As someone who previously served as chief of reconstructive surgery at Bagram Air Base, Afghanistan, during deployment in Operation Enduring Freedom and then as deputy commander of the U.S. Army Institute of Surgical Research in San Antonio, Texas, Davis can attest to the power of "Stop the Bleed" because he's seen it in action.

"This is the tool that's going to save lives," said Davis, still fiddling with the tourniquet in his hand, still watching it tighten and release. "Mass trauma is easily the biggest health crisis of this generation, and so we've got to be prepared … we've got to spread the word."

For more information, go to ***https://www.nytimes.com/2017/10/05/well/live/bleeding-first-aid.html****.*

RAMIN A. KHALILI is a communications manager with PotomacWave Consulting, providing contract support as the knowledge manager for CCCRP, a position that includes an administrative role for the "Stop the Bleed" campaign. Before assuming his current role, he spent more than a decade as a broadcast journalist, working in a number of cities in the U.S. During that time, he earned an Associated Press Award for his work in Phoenix, before securing a position as chief NASA correspondent for CBS in Orlando, Florida. He holds a B.A. in communications from Penn State University.

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As a DOD employee, you're eligible for TSA Precheck—have you opted in?

OUTSIDE THE LINES

The TSA Precheck program allows DOD employees to avoid long security lines for flights on participating airlines at U.S. airports. To opt in, register your DOD identification number on milConnect and in the Defense Travel System. (Photo by izusek/Getty Images)

From having to book the cheapest flight to departing at odd hours and enduring multiple, long layovers—plus all the "regular" travel snags—government air travel can be a real pain in the neck. Security lines in particular are time-consuming and uncomfortable. The long waits in crowded lines, the removal of shoes and jackets, ensuring that liquids are not only in an appropriate clear bag but also placed in the X-ray bin for scanning—it's stressful. However, the Transportation Security Administration (TSA) makes it easier for DOD employees, reducing the security hassles with the TSA Precheck program.

ON THE FAST TRACK

The program—an absolutely free perk of being a DOD employee—was launched in 2011 for frequent flyers; it opened to eligible members of the general public in December 2013. The public must pay a fee and undergo a basic background check to earn the Precheck qualification. But DOD employees need not pay, as they have already completed the requisite background check. More than 200 U.S. airports and 54 airlines currently participate in the program. Most participating travelers wait less than 5 minutes in the security line, though TSA notes that passengers can still be selected for random searches or be redirected to normal security lines at any time.

... AND YOUNGER KIDS FLY (HASSLE) FREE

In addition to these benefits available to TSA Precheck travelers, once DOD employees join the TSA Precheck program, they can bring children under 12 with them through the expedited screening lines. (SOURCE: Transportation Security Administration)

Oh, and did you know? You can use the program for personal travel. Just enter your DOD identification number when making airline reservations.

"I have found the Precheck provisions for TSA screening procedures to be absolutely essential for government travel," said Michael K. Beans, chief of the Human Resources Division at the U.S. Army Acquisition Support Center at Fort Belvoir, Virginia.

Opting-in is easy—you just register your DOD identification number on milConnect and in the Defense Travel System. Once registered, travelers can enjoy the program's central benefit: expedited security screenings. You won't have to remove shoes, belts or lightweight jackets, and you won't have to take your laptop, tablet or liquids out of your carry-on. (That's as long as your liquids comply with the 3-1-1 rule: you can carry 3.4-ounce or smaller bottles, in one quart-sized clear, zip-top bag, with one bag per passenger.)

Beans, who often carries official electronic devices and printed documents that require special attention for their security, said that the program allows him to focus on the accountability of those items and the official nature of his trip.

That's certainly a blessing for travelers juggling official documents and equipment—but imagine the possibilities for vacations! Once becoming a Precheck member, DOD employees can bring children under 12 with them through the expedited screening lines. Travelers ages 13 and older must use the regular security lines if they aren't a Precheck member.

OPTING IN

But wait—how do you register a DOD identification number? First, log in to milConnect and click on the My Profile tab. Then, click Update and View My Profile from the drop-down selections. You'll see your personal information displayed; scroll down until you come to the TSA Precheck Program line—now, click the box and save your work.

The next step is to register your DOD identification number in the Defense Travel System. Save the number to the "known traveler number" field in your personal profile—this will ensure that all future official travel lists you as Precheck-qualified. For detailed instructions on how to enter the number into your profile, go to **https://www.defensetravel.dod.mil/Docs/How_to_Enter_Your_DoD_ID.pdf**. Don't forget to click save when you're finished.

Fantastic! Now you'll speed through security lines at the airport—with your shoes on.

For more information on the Precheck program, go to ***https://travelprecheck.org/index.html****.*

—JACQUELINE M. HAMES

MASTER SGT. KEITA N. LYLES

COMMAND/ORGANIZATION: 902nd Contracting Battalion, 418th Contracting Support Brigade

TITLE: Battalion sergeant major and senior enlisted adviser

YEARS OF SERVICE IN WORKFORCE: 8

YEARS OF MILITARY SERVICE: 20

DAWIA CERTIFICATIONS: Level III in contracting

EDUCATION: B.S. in business administration, Columbia Southern University; associate degree in general studies, Colorado Technical University

AWARDS: Joint Service Commendation Medal, Meritorious Service Medal, Army Commendation Medal (four oak leaf clusters (OLCs)), Army Achievement Medal (four OLCs), Meritorious Unit Citation, Army Superior Unit Award, Army Good Conduct Medal (fifth clasp), National Defense Service Medal, Afghanistan Campaign Medal (one campaign star), Iraqi Campaign Medal (two campaign stars), Global War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, Korea Defense Service Medal, Noncommissioned Officer Professional Development Ribbon (Numeral 3), Army Service Ribbon, Overseas Service Ribbon (Numeral 7), NATO Medal, Military Outstanding Volunteer Service Medal, Driver's Badge, Sharpshooter Qualification Badge, German Armed Forces Badge for Military Proficiency (Gold), Transportation Corps Distinguished Order of St. Christopher Award, Sergeant Audie Murphy Award

SMALL GROUP LEAVES BIG FOOTPRINT

When Master Sgt. Keita Lyles joined Army acquisition in 2010, the noncommissioned officer (NCO) acquisition community was relatively small. But being part of a small community has paid big dividends, easing the transition to a new military occupational specialty—51C, acquisition—and helping her find mentors and advisers she continues to rely on. "I've been very fortunate to find several leaders across my career path—51Cs as well as non-acquisition personnel—and I've pulled on their jacket tails and consistently sought their advice."

Lyles, battalion sergeant major and senior enlisted adviser for the 902nd Contracting Battalion at Joint Base Lewis – McChord, Washington, came to acquisition from the Transportation Corps. "A friend of mine at the time who was part of the original group of NCOs who transferred to the 51C career field mentioned to me that switching over was a good career choice to look into," she said. At the time, Lyles was in Germany, preparing for a 15-month deployment as a squad leader and mission commander. "After experiencing as many leadership roles as I could, there were only a few remaining growth opportunities in transportation, and I knew it was time for a change. I thought that [switching to the Acquisition Corps] would not only benefit my career and my family—it was also the best option for when I make the transition to the private sector after retirement."

The transition from transportation to acquisition "was a little scary at first," she conceded. "After being somewhat of an expert in my old career field

and holding several leadership positions, having to start over from scratch and learning new skills—some of which were very demanding and detailed—was a major adjustment." She advises other NCOs making the transition to stay focused and motivated throughout the process. "Get everything out of each experience, from networking to taking notes on how to complete a contract you don't have experience with or a briefing or report needed after a mission. Everything we do and the relationships we build make us that much more valuable and user-friendly."

One thing that eased the transition was the camaraderie of the people she worked with. "Our career field was and is very small, and there was always a sense of family in everything we did and at every opportunity we met," she said. "Whether it was coming together during our annual training exercises or preparing for the NCO of the Year competition, everyone … had a 'one team, one fight' mindset and we took care of one another. We all knew each other, which was really nice when we heard each other's names across the world."She noted that her key developmental assignment—serving as brigade staff NCO for the 411th Contracting Support Brigade in Korea—was the most valuable one of her career so far, a good thing because that's exactly the intent of such assignments. "That assignment challenged me to push myself outside of my comfort zone of always being that worker bee behind the scenes. I'm one of those dedicated hard workers who doesn't like being in the limelight, but that's not possible in this role. I did so many different things—setting up teleconferences or putting together a retirement ceremony, for example—and was the face of the organization within the community. I was the first female president of the area's Sergeant Audie Murphy Club, was photographed at all kinds of events, and took part in 5Ks and half-marathons. The most challenging aspect was figuring out how to do everything and be everywhere, as often as I could."

"The most challenging aspect was figuring out how to do everything and be everywhere, as often as I could."

Fortunately, she had lots of support from leadership and her co-workers. "I came across so much knowledge and genuine care for Soldiers from so many leaders," she said, including brigade commanders Col. Americus Gill, Col. David Ware and Col. Johnny Broughton; staff officers Lt. Col. Marty Plys, Lt. Col. Paul Tomcik and Lt. Col. Michael Harris; and her direct leadership, Lt. Col. Jeffrey Redecker, Maj. Maurice Hudson and Master Sgt. Stephanie Bennett.

Lyles also found a lot of value in the Defense Acquisition University courses she took, particularly those in Federal Acquisition Regulation (FAR) fundamentals, advanced contracting, joint contingency contracting and emergency acquisition. "They taught me a lot: a plethora of FAR information, preparing for deployment and confirming my leadership style as well as that of the leaders I worked with."

Lyles' background and accomplishments were factors in her acceptance into the Training With Industry program in 2016, when she was one of two NCOs selected for that year's cohort. She spent 12 months in the Contracts Management Division of Microsoft's Cloud Infrastructure and Operations in 2016 and 2017. "I really enjoyed the bonding and transparency of the work environment there," she said. "I learned a lot about industry contracting, and how Microsoft became one of the leaders in the cloud industry."

The most important lesson Lyles has learned on and off the job is the importance of networking. It takes many forms, she said: "Keeping boots on ground, interacting with the warfighters' organizations, learning how we can best help them with their needs and ensure that they know who we are, keeping a good line of communication and educating them as often as needed to get exactly what they need to be sustainable. Get out of your cubicle—meet your customers, build relationships within the base and surrounding communities, and have a good line of communication with leaders and customers."

Mindset is important, too, she said. "I always remind everyone, junior or senior, new or seasoned acquisition personnel, to look at the glass as being half full. Contracting experiences differ … stateside, outside the U.S. and in deployment areas, so have patience and an open mind."

—SUSAN L. FOLLETT

MINDING THE GAP

What kinds of skills does the acquisition workforce need? A new assessment and leadership concept aims to find out.

by Jacqueline M. Hames

Training and development are critical to the health of the Army Acquisition Workforce's 13 career fields. But finding out where the workforce is lacking in competencies—skills and knowledge—can be somewhat difficult, as workforce members from two program executive offices and the U.S. Army Acquisition Support Center (USAASC) discovered during a November town hall meeting with Dr. Bruce D. Jette, the Army acquisition executive, at Fort Belvoir, Virginia.

An acquisition professional asked, "Is there a database or something of the sort where we can understand the skills gaps in the Army?"

The short answer is no, but there is something in the works.

MANAGING DATA AND PEOPLE

The town hall with Jette, assistant secretary of the Army for acquisition, logistics and technology, covered a wide range of topics on the state of Army acquisition. One of the themes of Jette's talk was the Army's need to manage data better, which this particular question emphasized. Jette deferred to Craig A. Spisak, Army director for acquisition career management (DACM), for an answer on the workforce's skill gaps.

"The problem," Spisak said, "is that while we do have a fairly robust database of sorts, a source database for the majority of personnel information, it doesn't allow us to drill down into a lot of things you want to know, like the competencies that are second- and third-order below. So, I know where contracting people are, I know whether or not they're certified in contracting, but … the individual competencies a certain person has, we don't collect that data today in a meaningful way, so that's where the challenge lies."

POINT TAKEN

Dr. Bruce D. Jette, assistant secretary of the Army for acquisition, logistics and technology and the Army acquisition executive, addressed a wide variety of topics regarding the state of Army acquisition during a town hall in November at Fort Belvoir. One of the topics was the Army's need to manage data better, specifically data on the Army Acquisition Workforce. (Photo by Cecilia Tueros, Program Executive Office for Enterprise Information Systems)

Once the assessment analysis is complete and the functional leaders know where the skill gaps are, they can help the DACM Office develop ways to provide education, training or experiential assignments to fill those gaps.

To be sure, developing a data system that could capture all of the dimensions of tens of thousands of acquisition workforce members—to say nothing of the other data that the Army would like to capture—would be exceedingly difficult. The acquisition career field categories are broad. For example, how many types of engineering are there? Within each engineering discipline—electrical, chemical, energetic materials, civil and so on—how many variations? How many years of experience does a particular engineer have? How much training under the Defense Acquisition Workforce Improvement Act (DAWIA)? What other skills or knowledge might add to that employee's abilities? So, in addition to developing a system to catalog and store such data, it first has to be gathered.

INFO QUEST

The Army DACM Office is already hot on the trail of that second- and third-order information, an effort that began when it launched round one of the Competency and Career Development Assessment in 2017 to address gaps in the workforce's skills and knowledge.

Joan Sable has been with USAASC for almost 20 years and took her current

TRACKING WHO DOES WHAT
The Army DACM Office continues to gather second- and third-order information on the skills and knowledge of the AAW, following up on the Competency and Career Development Assessment in 2017. (Image by USAASC)

post, chief of the Strategy and Communications Division, just recently. She is passionate about the Army Acquisition Workforce Human Capital Strategic Plan, created in FY17, which she manages.

"In that plan, we talk about professional development. We didn't have any way to assess the professional development of the Army Acquisition Workforce," she said, so it made sense to launch a competency assessment that would evaluate the workforce in accordance with the Office of the Secretary of Defense's Acquisition Workforce Qualification Initiative. That initiative is an employee development tool used to identify specific gaps in job experience along with on-the-job developmental opportunities and to capture demonstrated acquisition experience.

Assessment results told the DACM Office how employees in each of the acquisition career fields fared in terms of understanding a skill, the amount of time an employee spent on that skill and the importance of that skill in the employee's position. "So we learned, per acquisition career field, how they matched up to those Workforce Qualification Initiative competencies" from the Office of the Secretary of Defense (OSD), Sable said.

The DACM Office provided the assessment data to Army acquisition functional leaders and acquisition functional advisers during quarterly Human Capital Strategic Plan council and functional integrated team meetings.

The Army has functional integrated product teams that represent each acquisition career field. Meetings of those teams enable functional leaders, functional advisers, Defense Acquisition University (DAU) and the DACM Office to address DAWIA certification tenets and career development for each acquisition career field.

Army acquisition functional leaders are civilians at the Senior Executive Service level who are responsible for the health and management of a specific acquisition career field, while advisers are experts on a specific acquisition career field who represent the functional leader for that field, as partners with the Army DACM Office, Sable explained.

The assessment data will help leaders and advisers better understand the gaps in their designated acquisition career fields, she added. The functional leaders and advisers are a new leadership concept that ensures Senior Executive Service-level leadership, along with subject matter and DACM Office career development expertise, focused as a team on the health of the workforce within a specific career field. In addition, there is now specific emphasis on the eight life cycle focuses of human capital, from the beginning to the end of an acquisition career and everything that impacts that career along the way.

The eight focus areas are:

- Structure (workforce shaping and planning, Military Acquisition Position List).

"While we do have a fairly robust database of sorts, a source database for the majority of personnel information, it doesn't allow us to drill down into a lot of things you want to know."

- Acquisition (recruitment and hiring for civilians, accessing and reclassifying for officers and noncommissioned officers).
- Distribution (placement in an acquisition position).
- Deployment (in the military sense, this means exactly what it says; in the civilian sense, it could be the same, or it could be a broadening assignment or the like).
- Development (training, leader development, education programs).
- Sustainment (retention incentives).
- Compensation (recognition incentives and pay, etc.).
- Transition (attrition).

IDENTIFY THE GAPS

The second round of the assessment—which workforce members can expect to be launched this spring, with full results in the fall—will be targeted at supervisors in order to corroborate the responses on the previous baseline assessment, said Jason Pitts, chief of the Acquisition Workforce Proponency Branch. Pitts' branch is responsible for coordinating with OSD, other services and DAU to advocate on education, training and experience standards for certification. If supervisors acknowledge the same skill gaps that the overall workforce did in the first round of the assessment, then Pitts can confirm an identified gap.

Pitts and his team worked closely with the functional leaders to focus the second round of the assessment, soliciting feedback from those leaders on what they needed to know about the workforce. Because there can be numerous competencies in a career field, Pitts asked them to select the top 18 skill gaps from each acquisition career field that they wanted to focus on.

"I think that will give us a really good picture of what the gaps are, by acquisition career field, by grade, which is the key part," he said. The DACM Office will again share the results with the functional leaders and functional advisers, and with various commands, at the Human Capital Strategic Plan council meetings and at functional integrated product team meetings. "They get to see what the gaps are so they can recommend training to their own people, but at the same time we can use [the results] to shape our centrally run programs and how we use DAWDF [the Defense Acquisition Workforce Development Fund]," Pitts said.

The data that the assessment provides will help to inform any decisions functional leaders make regarding their designated acquisition career field, and help them understand its current state of health, Sable said. "And if we can understand the health of each acquisition career field … then we can improve the state of health of the overall acquisition workforce," she said.

Once the assessment analysis is complete and the functional leaders know where the skill gaps are, they can help the DACM Office develop ways to provide education, training or experiential assignments to fill those gaps.

Pitts hopes that, in the future, competencies can be added to individual development plans and the Career Acquisition Management Portal, so that supervisors and employees can not only assess an employee's skills but also generate reports, though that goal is a few years away. Meanwhile, the DACM Office is working toward improving the health of the acquisition workforce, learning from best practices in other services and industry to help focus its efforts, Sable said.

"So when questions are asked at town halls that were specific like that, we are working toward getting to that point where we have an answer for any kind of question that has to do with acquisition career development," she said. "We are set up for success and ensuring a trusted team of acquisition professionals."

For more information, see the "Army Acquisition Functional Leader and Army Acquisition Functional Advisor Policy" at ***https://asc.army.mil/web/wp-content/uploads/2018/10/AAFL-and-AAFA-Policy-4-Sep-2018.pdf.***

JACQUELINE M. HAMES is a writer and 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 for the military, with seven of those years spent producing news and feature articles for publication.

SARAH MULLINS

COMMAND/ORGANIZATION: Product Office for Command Centers, Installation Information Infrastructure Modernization Program, Project Manager for Defense Communications and Army Transmission Systems, Program Executive Office for Enterprise Information Systems

TITLE: Deputy product officer

YEARS OF SERVICE IN WORKFORCE: 7

YEARS OF MILITARY SERVICE: 11

DAWIA CERTIFICATIONS: Level III in program management and Level I in information technology; Army Acquisition Corps member

EDUCATION: Master of public administration in homeland security, Clemson University (expected August 2019); B.S. in criminology, Florida State University

AWARDS: Bronze Star Medal, Meritorious Service Medal, four Army Commendation Medals, three Army Achievement Medals, Valorous Unit Award, National Defense Service Medal, Afghanistan Campaign Medal, two Iraq Campaign Medals, Global War on Terrorism Expeditionary Medal, Global War on Terrorism Service Medal, Army Service Medal, three Overseas Ribbons, NATO Medal

THE IMPORTANCE OF PERSPECTIVE

Sarah Mullins has seen acquisition from a lot of different perspectives: During more than 11 years on active duty, she spent nearly eight years in the Signal Corps and then four years in the Acquisition Corps. She left active duty as a captain and returned to acquisition as an Army civilian. She now serves as deputy product officer for the Installation Information Infrastructure Modernization Program's Product Office for Command Centers, within the Program Executive Office for Enterprise Information Systems (PEO EIS). Her husband, Maj. Jason Mullins, is also part of the acquisition workforce, and began his acquisition career as assistant product manager for Nett Warrior at PEO Soldier.

From those experiences, she has learned two things. First, it's important to remain open to change, to rapidly adapt to new information and conditions. Second, Soldiers and civilians could stand to learn a little bit more about each other. "Soldiers don't understand why it takes so long to get what they need. They don't realize that everything they see is the product of the acquisition process, and they're not familiar with the checks and balances of the system," said Mullins.

"I've encountered many civilians in acquisition who don't understand how the Army functions at lower echelons," she added. "The Civilian Education System is a good start, but not enough. Acquisition civilians need to leave their desks and see how their work directly impacts the Soldier. I know that not everyone can travel internationally, but you don't need to go overseas to see that—in many cases, you can visit an Army base in the U.S. and learn how the Army operates at the division and below."

Now in her fourth year as an acquisition civilian, Mullins leads global supply chain and materials acquisition operations and spearheads development and implementation of acquisition strategies, spending plans and process engineering strategies. On the surface, her work is about using technology to connect the Army. "In truth, much of my time is spent on developing networks between diverse groups of subject matter experts to build coalitions," she said. "By encouraging collaboration and building strategic relationships, we are able to accomplish the Army's mission."

Most people don't know the scale of the work that goes into building the Army a modernized network infrastructure for global connectivity and critical cybersecurity, Mullins said. "They're surprised at the number of teams of software and network engineers, program managers, logisticians, IT [information technology] specialists and cybersecurity experts working behind the scenes for the Soldier to connect the Army."

DOUBLE DUTY
Mullins and her husband, Jason, in Kandahar, Afghanistan, in 2010. Mullins' experiences as a Soldier and now an Army civilian have taught her that working in a military unit requires a different style of communication than working in a group of civilians. (Photo courtesy of Sarah Mullins)

Among the biggest projects in Mullins' career is a tech refresh for the Strategic Command Center at the U.S. Southern Command (SOUTHCOM) headquarters in Miami, which was completed in August. She managed the design, engineering, installation, test and delivery of an information infrastructure system tailored specifically for SOUTHCOM. The new system provides IT solutions to support DOD's Global Command and Control System – Joint, which provides the communications, computing and data infrastructure that integrates and presents combat support information to the warfighter on a single computer using the Common Operational Picture – Combat Support Environment. "We were able to see combatant commanders use the system in an exercise with deployed forces—that kind of firsthand experience is invaluable for our team," she said.

Mullins noted that her outgoing personality facilitates cooperation and motivates team members. But it wasn't always the case, she said. "When I first joined PEO EIS as a Soldier, I asked people a lot of questions about what they were doing, and some people were a little defensive. They thought I was trying to take their job, when in reality I was trying to understand how all the pieces fit together."

PEO EIS's structure helped with that, she said, noting that the organization has G-1, personnel, G-2, intelligence and security, and G-3, operations, sections similar to an Army unit. She also learned that working with civilians necessitates a different style of communication. "In an Army line unit, you might have disagreements with your fellow Soldiers but we all understand that we have each other's backs. In an acquisition organization that's mostly civilians, it takes longer to build trust. I've learned how to be a better communicator and the importance of developing relationships."

Her work requires her to identify the factors impacting the project and to act quickly to gain cooperation and build consensus, she explained, as well as creative tension and the free expression of different opinions. "But as a leader, I need to anticipate when to take steps to prevent counterproductive confrontations in order to manage and resolve conflicts constructively." A little humor helps, she found. "I use humor to help others to remain resilient, so they can recover quickly from setbacks and remain optimistic and persistent, even under the adversity of continuously changing environments."

For Mullins, being part of the Army Acquisition Workforce "requires an entrepreneurial spirit. The Army's combat readiness depends on us to identify new opportunities to develop or improve products or services. We need to rapidly identify and analyze problems, weigh the relevancy and accuracy of all available information, and then take the necessary calculated risks to accomplish the Army's mission."

Accomplishing that mission requires the ability to understand and apply Army acquisition principles, procedures, requirements and policies, she said, "to develop new insights into unique situations. You will need to question conventional approaches and encourage your teams to seek out innovative solutions to implement."

—SUSAN L. FOLLETT

ON THE MOVE

JOINT MUNITIONS COMMAND

SENIOR JMC LEADER NAMED TO SES

JoEtta I. Fisher, executive director for Ammunition and deputy to the commander of the Joint Munitions Command (JMC), was promoted to the Senior Executive Service (SES) Jan. 22 at Rock Island Arsenal, Illinois. **Brig. Gen. Michelle M.T. Letcher**, JMC commander, awarded Fisher her SES pin.

Fisher previously served as deputy to the executive director for Ammunition and director of supply planning for the Munitions and Logistics Readiness Center. She also has held inventory and logistics management positions within JMC. (Photo by Tony Lopez, JMC Public and Congressional Affairs)

U.S. ARMY AVIATION AND MISSILE COMMAND

NEW LEADERSHIP AT AMCOM

Maj. Gen. Douglas M. Gabram relinquished command of the U.S. Army Aviation and Missile Command (AMCOM) at Redstone Arsenal, Alabama, Feb. 14. He now serves as director for Test at the Missile Defense Agency, also at Redstone Arsenal. **William P. Marriott**, deputy commander of AMCOM, will serve as executive director until the new commander, **Brig. Gen. Kenneth T. Royar**, arrives.

SES APPOINTMENT AT LOGISTICS CENTER

Donald R. Nitti, executive director of the AMCOM Logistics Center, was appointed to the Senior Executive Service on Jan. 20. **Maj. Gen. Douglas M. Gabram**, then-AMCOM commander, marked Nitti's appointment during a ceremony Feb. 7 at Redstone Arsenal.

Nitti has more than 30 years of leadership and logistical experience supporting the Army at the tactical, operational and strategic levels. The center comprises approximately 4,200 government civilians and contractors who provide life cycle logistics support for Army aviation and missile systems, including supply chain management, acquisition logistics and equipment maintenance.


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U.S. ARMY MEDICAL RESEARCH AND MATERIEL COMMAND

1: SES APPOINTMENT AT USAMRMC

Maj. Gen. Barbara R. Holcomb, commanding general of the U.S. Army Medical Research and Materiel Command (USAMRMC) and Fort Detrick, Maryland, presented **Dawn L. Rosarius** with a certificate in recognition of her selection to the Senior Executive Service (SES) at a service Feb. 8. Rosarius, the principal assistant for acquisition, is the third SES and the first woman assigned to the role. (Photo by Leticia G. Hopkins, USAMRMC Public Affairs)

U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND

2: RDECOM RECEIVES NEW NAME, NEW HOME

The U.S. Army Research, Development and Engineering Command transitioned from the U.S. Army Materiel Command (AMC) to the U.S. Army Futures Command (AFC) and was renamed the U.S. Army Combat Capabilities Development Command (CCDC) at a Jan. 31 ceremony at Aberdeen Proving Ground, Maryland. **Gen. Gustave F. Perna**, left, AMC commander, transferred authority to **Gen. John M. Murray**, center, AFC commander, and **Maj. Gen. Cedric T. Wins**, CCDC commander.

CCDC comprises eight major competency areas and three regionally aligned international elements. Part of the Army's combat development element, the command will focus on fundamental scientific research, technology development, and engineering and analysis to support the Army's six modernization priorities. (U.S. Army photo by Conrad Johnson)

JOINT PROGRAM EXECUTIVE OFFICE FOR ARMAMENTS AND AMMUNITION

3: DEPUTY JPEO APPOINTED TO SES

Andrew DiMarco, right, deputy joint program executive officer for Armaments and Ammunition (A&A), was appointed to the Senior Executive Service at a ceremony Jan. 14 at Picatinny Arsenal, New Jersey. **Ross Guckert**, center, deputy program executive officer for Soldier and a longtime friend, administered the oath of office at the ceremony, which was hosted by **Brig. Gen. Alfred F. Abramson III**, left, joint program executive officer for A&A. (U.S. Army photo by Todd Mozes, JPEO A&A)

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

4: PRODUCT MANAGER PROMOTED TO COLONEL

Col. Sean A. McMurry, joint product manager for Chemical, Biological, Radiological, Nuclear and Explosives (CBRNE) Analytics and Response Systems, was promoted from lieutenant colonel March 5 at a ceremony led by **Douglas Bryce**, right, joint program executive officer for Chemical, Biological, Radiological and Nuclear Defense. **James B. Burton**, left, Brig. Gen., USA (Ret.), former commander of the Army's 20th CBRNE Command, administered the reaffirmation oath. (Photo by Patrick Murray, Joint Project Manager for Guardian)

PROGRAM EXECUTIVE OFFICE FOR ENTERPRISE INFORMATION SYSTEMS

1: LOGISTICS CHARTER CHANGES HANDS

Col. Michael Parent, center, relinquished the charter of the Product Manager for the Logistics Modernization Program at a Jan. 28 ceremony at Picatinny Arsenal, New Jersey. **Col. Robert J. Mikesh**, project manager for the Army Enterprise Systems Integration Program, and Parent's wife, **Desery**, were on hand for the ceremony, during which Parent was promoted from lieutenant colonel. **Gabriel Saliba** is serving as acting product manager. (U.S. Army photo by Jesse Glass)

2: NEW ORGANIZATION FOR PM DCO

Col. Chad Harris, project manager for Defensive Cyber Operations (PM DCO) at the Program Executive Office for Enterprise Information Systems (PEO EIS), passed the PEO EIS flag to **Lt. Col. Leilani Tydingco-Amarante**, product manager for Cyber Analytics and Detection, during an assumption of charter ceremony Nov. 14 at Fort Belvoir, Virginia, that marked the establishment of the product office. **Dr. Jackie Farmer**, center, information systems security officer for PM DCO, served as proffer. PM DCO previously operated as Installation Information Infrastructure Communications and Capabilities before realigning its mission to focus on delivering defensive cyber capabilities. (U.S. Army photo by Racquel Lockett-Finch, PEO EIS)

3: PEO EIS MARKS SES SELECTION

Chérie A. Smith, program executive officer (PEO) for EIS, welcomed **Brendan Burke**, acting deputy PEO, to the Senior Executive Service (SES) during a ceremony March 1 at Fort Belvoir. Appointed to the SES in October, Burke formerly served as product manager for the Installation Information Infrastructure Modernization Program (I3MP) and General Fund Enterprise Business System Increment II, and as project director for Computer Hardware, Enterprise Software and Solutions. (Photo by Racquel Lockett-Finch, PEO EIS)

4: I3MP WELCOMES NEW PRODUCT MANAGER

Col. Enrique Costas, project manager for Defense Communications and Army Transmission Systems (DCATS), presented the charter of the Product Manager for I3MP to **Victor Hernandez** during an assumption of charter ceremony March 8 at Fort Belvoir. (Photo by Racquel Lockett-Finch, PEO EIS)

5: ASSUMPTION OF CHARTER AT EC2M

Sarah Bearden accepted the charter of the Product Lead for Enterprise Content Collaboration and Messaging (EC2M) from **Thomas Neff**, project director for Enterprise Services, during a ceremony Nov. 5 at Fort Belvoir. EC2M aligns resources to deliver and sustain enterprise-level information technology capabilities that enable collaboration, messaging and content management across the Army workforce. (U.S. Army photo by Cavia Mead, PEO EIS)

6: NEW PRODUCT LEAD FOR ENTERPRISE COMPUTING

Palmer Mitchell accepted the charter of the Product Lead for Enterprise Computing from **Thomas Neff**, project director for Enterprise Services, at a ceremony Nov. 5 at Fort Belvoir. The organization's portfolio comprises four initiatives—Army Data Center Consolidation Plan, Army Enterprise Service Desk, Army Software Marketplace and Common Operating Environment—and is the home of the Army Application Migration Business Office. (U.S. Army photo by Cavia Mead, PEO EIS)

PROGRAM EXECUTIVE OFFICE FOR INTELLIGENCE, ELECTRONIC WARFARE AND SENSORS

EMARSS PRODUCT MANAGER DEPARTS

Maj. Gen. Kirk F. Vollmecke, program executive officer for Intelligence, Electronic Warfare and Sensors (PEO IEW&S), thanked **Lt. Col. Sean Smith**, outgoing product manager for the Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS), at a change of charter ceremony Jan. 14 at Aberdeen Proving Ground, Maryland. During Smith's tenure, three EMARSS variants completed operational testing, the final step needed to ensure that the system is certifiable for material release. (U.S. Army photo by Heather Harris, PEO IEW&S)

PROGRAM EXECUTIVE OFFICE FOR MISSILES AND SPACE

JAVELIN CHARTER CHANGES HANDS

Dean Barten, project director for Close Combat Weapon Systems (CCWS), passed the charter of the Javelin Product Office to **Robyn Litle** at a ceremony Aug. 20 at Redstone Arsenal, Alabama. Litle assumed the charter from **Orlando "Fritz" Gordon**, who had served as acting product director. (Photo by Vena King, CCWS Project Office)

OFFICE OF THE CHIEF OF STAFF, ARMY ANNOUNCEMENTS

Army Chief of Staff Gen. Mark A. Milley announced the following officer assignments:

Maj. Gen. Patrick W. Burden, deputy commander, Combined Security Transition Command – Afghanistan, U.S. Forces – Afghanistan, to deputy commanding general, acquisition and systems management, U.S. Army Futures Command, Austin, Texas.

Maj. Gen. Douglas M. Gabram, commanding general (CG), U.S. Army Aviation and Missile Command, Redstone Arsenal, Alabama, to director for test, Missile Defense Agency, Redstone Arsenal.

Brig. Gen. William M. Boruff, CG, U.S. Army Mission and Installation Contracting Command, Joint Base San Antonio, Texas, to deputy CG, U.S. Army Contracting Command (ACC), Redstone Arsenal.

Brig. Gen. Brian W. Gibson, commandant, U.S. Army Air Defense Artillery School, U.S. Army Fires Center of Excellence, Fort Sill, Oklahoma, to director, Air and Missile Defense Cross Functional Team, Fort Sill.

Brig. Gen. Kenneth T. Royar, deputy CG (Support), 101st Airborne Division (Air Assault), Fort Campbell, Kentucky, to commanding general, U.S. Army Aviation and Missile Command, Redstone Arsenal.

Col.(P) Christine A. Beeler, deputy commander, ACC, Redstone Arsenal, to CG, U.S. Army Mission and Installation Contracting Command, Joint Base San Antonio.

Col.(P) Robert M. Collins, assistant program executive officer for Intelligence, Electronic Warfare and Sensors (PEO IEW&S), Aberdeen Proving Ground, Maryland, to PEO IEW&S, Aberdeen Proving Ground.

ARMY AL&T MAGAZINE AWARDS

The ALTies are our way of thanking our contributors for continuing Army AL&T's legacy as the go-to source for lessons learned, analysis and commentary on the issues and people shaping acquisition. Since it's your magazine, it's fitting that these should also be your awards: Each year, readers select the best commentary, article, photo and graphic from the hundreds submitted by acquisition experts and posted online or printed in the hard-copy magazine.

The Readers' Choice Award is given by the readers of Army AL&T's magazine to mark the year's most-read article. "Aggressive. Innovative. Fast." was far and away the most popular article of 2018, reaching more than 5,200 readers on our news outlets alone. Congratulations to all the winners. Once again, you've set the editorial bar pretty high, and we're looking forward to another year of award-winning material.

READERS' CHOICE

Winner: "Aggressive. Innovative. Fast.," **Col. Joe Capobianco** and **Col. David Phillips**, Army Rapid Capabilities and Critical Technologies Office and Special Operations Forces Acquisition, Technology and Logistics, July – September 2018

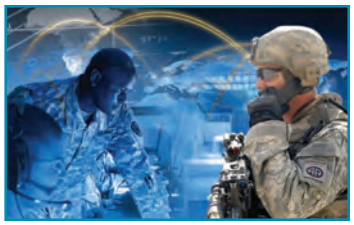
BEST COMMENTARY

Winner: "From Idea to Front Line in Record Time," **Lt. Col. Mark P. Henderson**, PEO C3T, April – June 2018
Runner-up: "PM Perspective: Want Faster Acquisition?" **Bridget Lynch**, PEO C3T, July – September 2018

BEST ARTICLE

Winner: "Analytical Framework: A Space for Trading," **Gail Cayce-Adams** and **Michael Kierzewski**, JPEO-CBRND, July – September 2018
Runner-up: "The 'Armyzon' Equation," **Lt. Col. Rachael Hoagland**, Training With Industry Fellow, April – June 2018
Runner-up: "World-Class Tech, According to Plan," **Argie Sarantinos-Perrin**, U.S. Army Combat Capabilities Development Command, January – March 2018

BEST GRAPHIC



Winner: "All Hands," in "Lessons Learned in Modernization," **Scott Sundsvold**, PEO EIS, April – June 2018
Runner-up: "A one-stop shop for all of your acquisition career needs," Contributing organization: **U.S. Army Director, Acquisition Career Management Office**, October – December 2018

BEST PHOTO

Winner: "Thank you for your input," in "Fortified by Feedback," Photographer: **Amy Walker**, PEO C3T, April – June 2018
Runner-up: "Fog of War," in "Radical Futures," Photographer: **Robert DeMarco**, U.S. Army Armament Research, Development and Engineering Center, July – September 2018

THEN & NOW
1981 & 2018

NEXT GENERATION ON TRACK

Bradley replacement promises to take a technological leap into the future fight.

The Bradley Fighting Vehicle of the past nearly 40 years, which, with the M1 Abrams tank, spearheaded the coalition victory over Iraq in Operation Desert Storm, is destined to be a part of history before long. In its place will be a member of the Next Generation Combat Vehicle (NGCV) family, a work in progress at the top of the list for the Army's high-priority, multipart combat vehicle modernization initiative.

The Bradley has undergone four major upgrades since its introduction in 1981, said Brig. Gen. Ross Coffman, "and what we've seen to date is that the Bradley has been upgraded really to its limit." Coffman, director of the Next Generation Combat Vehicle Cross-Functional Team for the U.S. Army Futures Command, spoke with Army AL&T on Feb. 7. "Those were extremely effective and really have served the Army in a great, great way in every battlefield I've been on," he said. "But we can't look backward, we've got to look forward."

The armored personnel carrier of the future, officially being developed as the Optionally Manned Fighting Vehicle, will be stealthy, adaptable and able to defeat enemy fire, as Coffman described it. Perhaps most important, it will be easy to upgrade. " 'Upgradability' is king," he said.

Upgradability will be important for the other four elements of the new ground combat vehicle, as well: the Armored Multipurpose Vehicle, replacing the M113 Armored Personnel Carrier, which also cannot accommodate any more upgrades; the Mobile Protected Firepower light tank; the Robotic Combat Vehicle; and the Optionally Manned Tank.

GETTING AHEAD OF THE FUTURE

The Bradley M2 and M3 Infantry and Cavalry Fighting Vehicles, respectively, were not quite in production when the Army began laying the groundwork for the generation to follow. An article in the May-June 1981 edition of Army RD&A, the predecessor to Army AL&T, described efforts by the U.S. Army Tank-Automotive Command (TACOM) to explore with Soldiers and industry the technological capabilities that Army combat vehicles would need on the future battlefield … of the mid-1990s.

In "Fighting Vehicles: The Next Generation," Clifford D. Bradley, then-chief of the Exploratory Development Division of TACOM's Tank-Automotive Concepts Laboratory, described a May 21, 1980, all-day presolicitation conference that his laboratory hosted to discuss future close-combat vehicles with some 220 representatives from industry and government. "The objective of the conference was to bring the best 'brains' of industry together for the specific purpose of inviting them to look at the challenge of the follow-on vehicles," the aptly named Bradley wrote.

BATTLE LINES BEING DRAWN

The Next Generation Combat Vehicle Cross-Functional Team is preparing to develop five new vehicles to replace the current generation in the field, which include the Bradley Fighting Vehicle and the Armored Personnel Carrier. (U.S. Army photo)

The conference kicked off a competition to identify and develop "the best concept or concepts to fill the future role of the follow-on Ml, M2 and M3." The Army chose four industry teams to evaluate technologies and trade-offs and produce detailed designs of the selected concepts. Also taking on the challenge was an in-house team.

A year later and after several in-progress reviews, the industry and in-house teams would present their final concepts of next-generation combat vehicles to TACOM for review. A team of experts from the U.S. Army Training and Doctrine Command and the Army Materiel Development and Readiness Command, the predecessor to U.S. Army Materiel Command, would then evaluate and rate the concepts.

The most promising of them would provide the framework for technology test beds with the objective of resolving "critical issues in components, subsystems and total system concepts," Bradley wrote. "Results of these test-bed evaluations and other supporting technologies will then form the technical basis for the specifications for the next family of future close-combat vehicles."

If the process has a familiar ring to it, there's a reason. Nearly 40 years later, the Army is emphasizing collaboration with industry and across the doctrinal, combat development, test and evaluation and Soldier-user communities as it modernizes at unprecedented speed.

ON TO THE NEXT GENERATION

Back to the present: The Bradley's 2026 replacement will not only have to dominate against enemy anti-access and area denial strategies, likely in an urban setting, but also defend itself against enemy attack. Gone are the days when the United States could count on neutralizing enemy forces with airstrikes to clear the way for ground troops to enter a relatively uncontested battlespace on open ground.

Weapon systems on the next generation of combat vehicles will have to aim higher and lower than present combat vehicle-mounted guns—a characteristic known as elevate and depress—"so that you can fight the enemy in tall buildings or in basements," said Coffman, whose first operational assignment was as an armored cavalry platoon leader in Operations Desert Shield and Desert Storm; one of his most recent was as a heavy infantry battalion commander in Operation Iraqi Freedom. "Our legacy fleet was designed to fight in Eastern Europe against a known enemy in known terrain. The elevation and depression was not as important," he said.

Enemy capabilities will have matured, Coffman noted. "While we've been fighting wars over the last decade and a half, our potential adversaries have begun to modernize their equipment. And we must again not settle for parity, but seek overmatch. That's why this modernization effort is so important."

The Bradley replacement will be capable of "an increased degree of engagement, as well as increasing effectiveness of munitions that [can] not just glance on buildings, but actually can engage and destroy the enemy … in these tall buildings," Coffman said. "So if the enemy fires something at a vehicle, the vehicle has a response that destroys that before it strikes the vehicle."

Combat vehicles also must protect the Soldiers riding in them, as the U.S. military's experiences in Iraq and Afghanistan have shown. The rampant threat of improvised explosive devices and mines, for example, drove key innovations, including the double-V hull introduced in 2011 for the Stryker fleet. The double-V hull deflects blasts away from the vehicle and the Soldiers inside. Rocket-propelled grenades and Russian RKG3 parachute-equipped hand grenades are just a couple

of the enemy weapons that the Army's future combat vehicles will need to defend Soldiers against.

ESSENTIAL CAPABILITIES

The Army is not starting from scratch in developing the Next Generation Combat Vehicle family. It will feature a number of combat-tested capabilities introduced to the current fleet through incremental upgrades, including the double-V hull, Coffman said.

Another technology that holds promise for future combat vehicles is the Stryker urban kit, basically a large cage on the vehicle designed to keep rocket-propelled grenades and thrown explosive devices from hitting the vehicle itself. Additional battle-tested technologies include see-through armor; jamming technologies to defeat enemy radio capabilities used to detonate bombs; and bomb-removal systems.

Size, weight and power are perennial concerns for combat vehicles. Current issues include:

- The engine must not only generate enough power for what the first model will do, but have sufficient excess capacity to allow the Army to add requirements as technology advances. Ditto for space in the vehicle. The reason the present-day Bradley cannot accommodate any more upgrades is that there is no reserve space, weight and power capacity left.

A LIFESAVING UPGRADE

The double-V hull added to Stryker combat vehicles starting in 2011 deflects the force of explosive blasts away from the Soldiers inside. (U.S. Army photo)

- The vehicles cannot run continuously on the battlefield, for reasons of stealth and fuel efficiency. The Bradley replacement, as well as other combat vehicles, will need to have a silent capability in its power source, a battery backup allowing the crew to operate without running the engine.
- The vehicle's power supply must fit the Army's logistical needs. The Army is looking at a variety of power sources, including hybrids, pure hydrogen and pure electric. "What we really have to decide as an Army is which technology provides the logistics at range and the ready-now capability for our Soldiers that we want on the next battlefield," Coffman said. "For instance, if you went totally electric, it takes time to recharge a battery. It takes about seven minutes to refuel a tank. So if you can't recharge the battery in under seven minutes, I'm not sure that's a technology that is going to make us better on the battlefield."

PLAN NOW TO UPGRADE LATER

Incremental upgrades are an established concept in combat vehicle development. The Next Generation Combat Vehicle initiative is just taking it to a new level of planning.

"Now we're going into it with a set plan, with both schedule and monies allocated," Coffman said. "Rather than seeking everything that we desire on the first increment that is fielded to the force, through prototypes and incremental upgrades we're able to identify those technologies that aren't quite mature yet. We now have a plan to upgrade the systems through time to maintain pace with technology and outpace our adversaries. And that is a new thing for the Army."

Through the five-year program objective memorandum, Army Futures Command can estimate spending for future upgrades. "So we understand what the costs are, and if that funding remains as predicted, we absolutely have a plan to spend it. We also understand that things change … and we lay that out over time."

The Army is working with industry to plan ahead for upgrades in the design and development of the next generation of combat vehicles, Coffman said. "We need not only our [vehicles] capable of handling increased weights, but we need electrical upgradability. As technologies advance and we want to put additional systems onto an existing vehicle, we have to have the reserve power onboard to be able to handle multiple electrical requirements from these systems."

Also necessary is "sufficient space to handle increased technologies, because while we expect that as technology advances it

FORTY YEARS AT WORK

The Bradley Fighting Vehicle has been on front lines since 1983, at top; played an integral role in the 2003 invasion of Iraq, center; and has been upgraded repeatedly to stay in the fight, supporting training exercises in 2018, for example. (Photos by Spc. 5 Bobby Mathis; Shane A. Cuomo, U.S. Air Force; and Spc. Hubert D. Delany III, 22nd Mobile Public Affairs Detachment)

becomes smaller, you still only have so much room in a vehicle. And so you have to have a certain percentage of space available, so you're not having to over-engineer something to make it fit into a very, very tight space."

This degree of planning would not be possible without what Coffman sees as "an unprecedented level of communication with industry."

"We are sending out draft products, letters to industry; we're meeting with them for up to three hours at a time," he said. "It's really an attempt to overcome the pitfalls that the Army experienced in the previous [combat vehicle] programs"—Future Combat Systems, canceled in 2009, including the Manned Ground Vehicle; and the Ground Combat Vehicle, canceled in 2014—"where a requirement was not informed by the realm of the possible."

Army senior leaders, including Gen. John M. Murray, commanding general of Army Futures Command, and the command's cross-functional teams charged with the individual modernization priorities "have gone to school on the past, and we're applying those lessons … to make sure that we don't fall into the same mistakes that have occurred."

CONCLUSION

The five vehicles in the Next Generation Combat Vehicle initiative are moving forward at varying paces. The Optionally Manned Fighting Vehicle initiative to replace the Bradley began about a year ago, with 2026 the anticipated date for the first unit to be equipped.

Army Futures Command published the draft request for proposal in January to get industry feedback, followed by the final request for proposal in March. Next March, the command expects to award contracts to two vendors for the engineering and manufacturing development phase. FY23 is the target for a milestone C decision.

Its combat vehicle family is something that the Army has attempted to modernize for years. Now Army Futures Command and the cross-functional teams "have dedicated themselves and ourselves to doing things differently," Coffman said. "We are, through conversations with industry and academia, able to identify what is possible on a schedule that we have set for ourselves to get this in the hands of Soldiers."

—MARGARET C. ROTH and JACQUELINE M. HAMES

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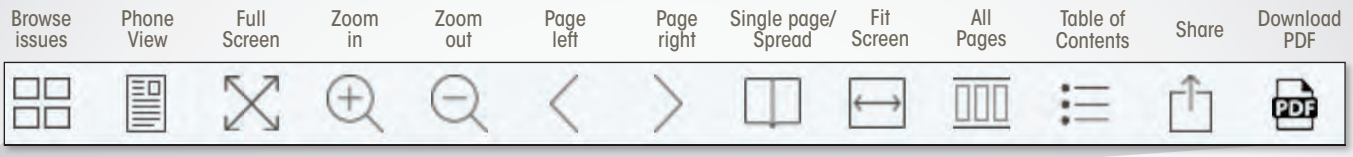

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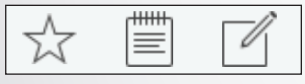

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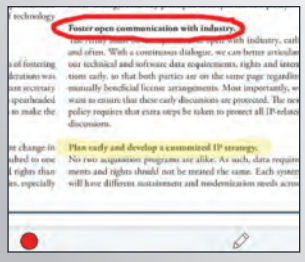

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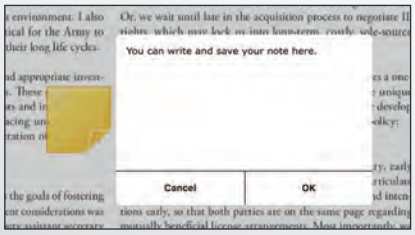

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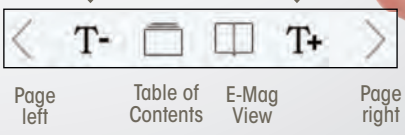

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