DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

ASC.ARMY.MIL

WINTER 2020

UNDERSTANDING ACQUISITION

A NEW ERA OF ACQUISITION
Defense acquisition experts laud Army for focusing on products and priorities over process

THE ACQUISITION TOOLKIT
An interview with Dr. Bruce D. Jette, the AAE and ASA(ALT)

MORE THAN A COMPETITION
XTechSearch grows into an incubator for promising new technologies

READ ARMY AL&T MAGAZINE ONLINE

For the current and past issues of Army AL&T magazine, go to **https://asc.army.mil/web/publications/army-alt-magazine/**.

For writers guidelines and to submit articles, go to: **http://asc.army.mil/web/publications/army-alt-submissions/**

To contact the Editorial Office: Call 703-644-5636/5633

Email: **armyalt@gmail.com**

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

Army AL&T magazine (ISSN 0892-8657) is published quarterly by the ASA(ALT). Articles reflect the views of the authors and not necessarily official opinion of the Department of the Army. Articles of the Army may be reprinted if credit is given to Army AL&T magazine and the author.

Private subscriptions and rates are available from:
Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402
202-512-1800

Periodicals official postage paid at
Fort Belvoir, VA, and additional post offices.

POSTMASTER:
Send address changes to:
DEPARTMENT OF THE ARMY
ARMY AL&T
9900 BELVOIR RD
FORT BELVOIR, VA 22060-5567

This medium is approved for official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

By Order of the Secretary of the Army:

JAMES C. McCONVILLE
General, United States Army
Chief of Staff

Official:

KATHLEEN S. MILLER
Administrative Assistant
to the Secretary of the Army
1934617

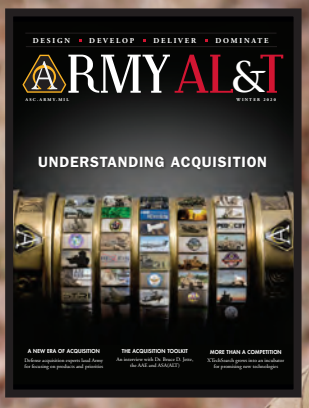
DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

WINTER 2020

FROM THE AAE

UNDERSTANDING ARMY ACQUISITION



ON THE COVER

Army acquisition—from defining a need, to writing a requirement to fill that need, to a program finding a materiel solution to fulfill that requirement, to testing the solution and finally fielding a product, then sustaining and ultimately replacing that product—is more difficult to explain than do.

DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

WINTER 2020

FEATURE ARTICLES

COMMENTARY

WORKFORCE

From the Editor-in-Chief

Language is a funny thing. While serving a tour in Italy, I picked up a little Italian, at least enough to order food and find my way around. Sometimes hearing a word from another language described in your own drives home a stark difference that you often blur in your native language. Two of the words whose subtle yet distinct difference stuck with me were "conoscere" and "capire." Here's the slight but significant difference between the two: Conoscere is to know something, while capire is to understand. Capisce?

In English, we tend to use the two words interchangeably. Lots of us know things, such as how to drive a car, use computers, cellphones, microwave ovens, etc. We know how to use these products to perform functions like driving every day to and from work, or video chatting on your phone with family. But do we really understand how these daily processes work? Basically, no, we don't. I can use a microwave, but exactly what those microwaves are doing or how they are generated, well, that's beyond me. All I know is that my meal is hot and ready to eat!

To a large degree, the same is true of understanding Army acquisition, the theme of this issue. That's especially true since the Army stood up the U.S. Army Futures Command (AFC). Sure, lots of people know, fundamentally, how acquisition works: AFC generates requirements for current and future capabilities needed to win on the battlefields; the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) takes that requirement and turns it into a new weapon, improved armor or an updated tactical radio system. Then, it's off for life cycle maintenance with U.S. Army Materiel Command (AMC). Like driving a car, we basically know how this process works, but very few understand just how complicated a job it is to make it work—much more complicated than driving a car, of course.

The lack of understanding about exactly how Army acquisition works, the players involved, and the impact of research, budgets, testing and ever-changing requirements makes it easy for the layman to ridicule cost overruns or extended timelines. However, for an acquisition professional to not understand the intricacies, well, that leads to the very problems we are paid to prevent.

@ **Email Nelson McCouch III**
ArmyALT@gmail.com

In this issue, we explore how the acquisition enterprise works by reviewing the interdependencies among AFC, ASA(ALT) and AMC. How does AFC fit with ASA(ALT), and ASA(ALT) with AMC? Where does one begin and another end?

To begin explaining acquisition, we have a Q&A with Dr. Bruce D. Jette (Page 18), the Army acquisition executive, along with a "map" of the Army acquisition enterprise. We also take an in-depth look at how the enterprise is doing with modernization of its processes, in "A New Era of Acquisition," on Page 8 and the conclusions are surprising. Then we have several articles, such as "The Need for Interoperability Standards" on Page 28 and "The Contracting Pendulum" on Page 34, that showcase projects and programs the Army Acquisition Workforce is working on and how they interact with others to deliver world-class products to our warfighters.

After reading this issue, I hope you'll better understand the acquisition process and the cutting-edge capabilities it produces, and that you appreciate the dedicated professionals that make it possible. As always, if you have a comment or story idea or want to submit an article, please contact us at **ArmyAL&T@gmail.com**. We look forward to hearing from you.

Nelson McCouch III
Editor-in-Chief

TREADING LIGHTLY
An M1150 Assault Breacher vehicle, an ACAT III program, moves into position during a live-fire training exercise at the National Training Center, Fort Irwin, California, in June. Moving decision-making for ACAT II, III and IV programs to program executive officers, who may further delegate it, speeds the acquisition process and gets new gear to Soldiers faster. (Photo by Cpl. Alisha Grezlik, 115th Mobile Public Affairs Detachment)

EMPOWERING ACQUISITION

By giving the Army acquisition team authority and the necessary training, we can better deliver overmatch capabilities to Soldiers.

Having served in the military for nearly 30 years, I know firsthand the value of empowering and trusting subordinates to do what is best for the Army and our Soldiers. In May 2002, I was "afforded" the opportunity to take robots into combat by forming a small team that integrated Defense Advanced Research Projects Agency robots with government and commercial off-the-shelf items. In only 28 days, we took them into caves in Afghanistan rather than sending in Soldiers with grappling hooks and grenades. Robots are now broadly used in combat operations. Perhaps more importantly, this instigated the Army and DOD's rapid acquisition model.

The point of this illustration is that Army leadership empowered and trusted my team and me to deliver a badly needed capability to protect our Soldiers and enable them to return home safely. There was risk, but also reward. It is still a source of pride, and a lesson in leadership that I intended to pay forward. Sixteen years later, as the Army acquisition executive, I was given that opportunity. With authority from Congress, the secretary of the Army and the chief of staff directed improvements in the acquisition process to field capability fast, and I was again in a position of authority to make a difference.

While Acquisition Category (ACAT) I programs remain, by law, at my level, I have delegated all other milestone decision authority—on ACAT II, III and IV programs—to my program executive officers, who, at their discretion, may delegate decision-making to their program or product managers. Powering down decision-making to the appropriate level of the acquisition process improves the Army's ability to provide timely capabilities to Soldiers while remaining fiscally responsible.

READY DOWN THE LINE

2nd Lt. Michael Preston, an armor officer assigned to the 3rd Armored Brigade Combat Team, 1st Armored Division (1AD), fires the newly adopted M17 pistol in October at McGregor Range, New Mexico. Getting more new capabilities fielded faster requires an acquisition workforce that's empowered to make decisions and take appropriate risks. (U.S. Army photo by Pvt. Matthew Marcellus, 1AD)

It is my strong belief that senior leaders must set an example by allowing their team to do their jobs, to make decisions, to manage risk, and to execute at the appropriate decision-making level. As the Army acquisition executive, I oversee a portfolio that includes the total life cycle management of more than 700 programs. This delegation of authority allows our entire organization and thereby Army senior leaders to reach key decision points and field capabilities to the Soldier faster because there are fewer levels of review involved in each decision.

There are a few important guidelines, however, that I ask my program executive officers, program and product managers and other professionals throughout the acquisition workforce to follow:

- Examine all ways to effectively use the funding allocated by Congress to achieve the desired program outcome in the most timely and efficient manner. We must remain fiscally responsible at all times.
- Design the most appropriate schedule for your program. Let me know the schedule as agreed upon and why—and be as aggressive as possible in getting capability to Soldiers.
- Keep me up to date on program performance. It is important for me to know where the challenges are likely to appear.
- Let me know the risk and how it is being managed. If well-managed risk does not turn out as planned, I will ensure that there are no adverse effects to the team. Likewise, if things turn out well, I will ensure that the team gets the credit.

Consistent with my initiative to "power down" authority, I have placed a high priority on talent management, which is critically important to the acquisition process because it ensures that the best and brightest team members are in the right positions to better support our Soldiers. Training, which includes an appropriate level of education, is key to our efforts in this area.

Experience is also an important factor. I was an armor officer. I've had four company commands, two overseas tours and about 12 years as a tanker that gave me an in-depth understanding of the operational environment. When I retired from the Army, I started my own small business, and it was one of the best things I could have done—it taught me a great deal about managing budgets on a larger scale and spending money efficiently and effectively. My operational and small business experience allows me to understand the challenges at different levels of the acquisition enterprise, much in the same way our leaders, with in-depth training and experience, can see the nuances of those challenges at the production level.

Perhaps the most crucial part of enabling decision-making at the appropriate level is the dialogue it opens between headquarters and the team members throughout the organization. As I told my son when he was at West Point, there's no organization with perfect leadership, but that doesn't mean you should avoid being a leader or entering a position where you can affect an issue. Take note of how your predecessors dealt with challenges so you can envision how to address an issue ahead of time—reflect, talk to other people and get various opinions.

Once in that decision-making position—I'm talking to my current leaders—don't be afraid to push back. We become too isolated and insular; no one feels comfortable disagreeing with one another. A healthy, constructive debate among leaders over a challenge a program faces helps to streamline the acquisition process and perhaps avoid costly mistakes.

In closing, let me take this opportunity to wish our readers a happy and healthy new year. Let it be our goal this year to pursue what's right at all times.

VISION ENHANCED

Soldiers from the 2nd Armored Brigade Combat Team, 1st Infantry Division, are the first to receive the Enhanced Night Vision Goggle – Binocular and the Family of Weapon Sights – Individual, in September at Fort Riley, Kansas. The Army acquisition executive has put in place new policies that field capabilities faster by removing layers of review throughout the acquisition process. (U.S. Army photo by Maj. Bryce Gatrell, 2nd Brigade Combat Team, 1st Infantry Division Public Affairs)

SOME ASSEMBLY REQUIRED

Army combat engineers assigned to the 173rd Airborne Brigade test Qinetiq North America's Dragon Runner 10 at Grafenwoehr Training Area, Germany, in September. Now widespread, the use of robots in combat stems from rapid acquisition efforts undertaken by Jette and others who first brought the technology to Afghanistan in 2002. (U.S. Army photo by Sgt. Henry Villarama, 173rd Airborne Brigade)

SHIFTING GEARS

It has been a long time coming, but over the last few years, the wheels of the acquisition machine have begun to turn faster. (Image by GettyImages)

A NEW ERA OF ACQUISITION

After high-publicity failures, defense acquisition experts laud the Army for focusing on products and priorities over process, but bureaucracy remains a threat.

by Michael Bold and Margaret C. Roth

The query to General Micro Systems Inc. (GMS) came in a roundabout way, from a prime defense contractor that had worked with the Rancho Cucamonga, California, company before. The Army had an urgent need for a rugged, rack-mounted server. The prime contractor knew about the TITAN server that GMS planned to unveil at the annual Association of the United States Army (AUSA) meeting in Washington in October.

GMS and the contractor (which for proprietary reasons GMS would not identify) discussed what the Army was looking for, and GMS seemed to have what the Army needed. But they didn't hear back. "We thought, huh, that's interesting, wonder how that went," said Chris Ciufo, chief technical officer at GMS. Then the Army "came roaring back to us," he said, asking for a proposal within two days. The Army specified exactly what it needed in the system, and GMS provided a formal bid. The Army awarded the contract to GMS and said it needed the servers fast—within six months.

The time from first contact to the award of the contract? Two weeks, said Ciufo.

Welcome to the new era of Army acquisition.

In a remarkably short time, the defense acquisition system and especially the Army, long criticized as slow-moving and bogged down in red tape, are getting new capabilities on contract faster than most would have thought possible five years ago. And other-transaction authorities (OTAs) are the main weapon—although not the only one—in the Army's push to modernize. OTAs make it possible for the services to acquire new capabilities faster and attract more vendors

who traditionally have not engaged with DOD because of the bureaucracy involved, driven by the Federal Acquisition Regulation (FAR) and the Defense Federal Acquisition Regulation Supplement.

The National Defense Authorization Act for Fiscal Year 2016 provided a major boost to OTAs, highlighting and encouraging their use. "OTAs give us a greater flexibility in our contracting methodology than a pure FAR-based contract," Dr. Bruce D. Jette, the Army acquisition executive and assistant secretary of the Army for acquisition, logistics and technology, said in an interview for Army AL&T. "That is a significant value that Congress gave us."

Organizationally, the creation of the U.S. Army Futures Command (AFC), which became fully operational in July, is the single largest development in the effort to speed acquisition, bringing requirements writers, combat developers, scientists and engineers, contracting experts and the testing community together in cross-functional teams early in the process to demonstrably speed the delivery of capabilities to Soldiers.

ON THE AVIATION SIDE OF THE HOUSE
Maj. Mark Cleary, U.S. Army Combat Capabilities Development Command Aviation Development Directorate, briefs Dr. Bruce D. Jette on the Rotorcraft and Aircrew Systems and Concepts Airborne Laboratory in April at Joint Base Langley-Eustis, Virginia. During his visit, Col. Steven Braddom, right, also gave Jette an overview of major ongoing efforts. (U.S. Army photo)

"Institutional knowledge comes at a cost—it often feels like handcuffs to the folks trying to get things done."

Together, the increased use of OTAs and the advent of AFC have given rise to a cautious optimism that is more optimism than caution, compared with previous attempts at acquisition reform. Those who have been through, participated in or led earlier efforts see a distinctly brighter future for Army acquisition.

"For probably a decade, I've felt like we're right on the cusp of really significant changes, in the pace of change, and in the way the DOD is going to do work," said Dan Ward, a former Air Force acquisition officer who specialized in leading high-speed, low-cost technology development programs, wrote two books on innovation and is now a senior principle systems engineer at MITRE Corp. "And I feel like we've crested that hill."

OTAS ON THE RISE

Other-transaction agreements let DOD streamline the bureaucracy of traditional procurement by awarding contracts faster for prototyping and production. From 2012 to 2014, DOD averaged a little over $500 million in obligations on OTAs. That number jumped to over $1.5 billion in 2016 and to over $3.5 billion in 2018,

LOOK TO THE FUTURE
Gen. John M. Murray talks with Soldiers while being briefed on equipment tested during Joint Warfighting Assessment 19 in May at Yakima Training Center, Washington. Murray is the first commander of the Army Futures Command, which many experts agree is a major development in the effort to speed acquisition. (U.S. Army photo by Spc. Audrey Ward, 982nd Combat Camera Company (Airborne))

according to Govini, a data and analytics firm. An analysis by Bloomberg Government says the number will top $7 billion in 2019.

The Army has driven the growth in OTA use. In 2012, the Army had approximately 40 OTAs worth less than $500 million. In 2018, it had more than 220 worth more than $2.5 billion. "When we look at the data … the Army has definitely made a calculated decision to use OTA and other middle-tier-of-acquisition approaches for its modernization today," said Andrew Hunter, a senior fellow at the Center for Strategic and International Studies (CSIS), a Washington think tank.

"The most important thing about the numbers is it's an indicator that people are getting more comfortable with the application of the OTAs, that they're finding good applications in those OTAs, and they're justified in those OTAs," Jette said in the interview.

While improved, OTAs are not new. Congress first authorized their use in 1958, with the legislation that created NASA. Congress allowed the Defense Advanced Research Projects Agency to use "other transactions" in 1989, and their use was extended to the military services in 1996.

"This extension of the authority didn't come out of nowhere," said Stan Soloway, president and CEO of Celero Strategies LLC, a business-growth strategy company working with technology and other firms in the government market. Soloway has also served in government, as deputy undersecretary of defense for acquisition reform and director of the Defense Reform Initiative during the Clinton administration. Efforts to get what is known as production authority began about 20 years ago, Soloway said, as it became clear that limiting OTAs to just the prototype phase of acquisition limited their effectiveness.

Soloway sees the growth in OTAs as a reflection of DOD becoming more customer-focused in a customer-centric world, responding to the frustration of its customers—be they industry, academia or Soldiers—about "an acquisition system that they do not believe has been meeting their needs, in terms of either time or capability."

HOW WE GOT HERE

The impetus for the current wave of change in DOD acquisition started in a big way in 2015, when congressional leaders in military affairs—namely Sen. John McCain, R-Ariz., and Rep.

Mac Thornberry, R-Texas, chairmen of the Senate and House Armed Services Committees—began to "really start pushing on the system by not only pushing the new [expedited acquisition] authorities, but also pushing at organizational changes," said Jon Etherton, president of Etherton and Associates Inc., a defense policy and business strategy consulting firm. Etherton is a veteran of the defense legislative process, having served nearly two decades as a senior Senate staffer.

The result was an unprecedented volume of legislation in Title 8, the acquisition policy portion of the National Defense Authorization Act.

Milestone decision-making on major programs shifted unequivocally from DOD back to the services with the elimination of the undersecretary for acquisition, technology and logistics. "You had the creation of all these new authorities like Section 804 and the expansion of the other transaction agreements," to which DOD has responded with enthusiasm, said Etherton.

"What I've really seen is, with the new administration in particular, they really want to grab onto some of these things," Etherton said. "… And I think the Army has been right in the middle of this, especially at the front end of the decision-making," to start much more rapidly getting on contract and getting the actual work started, with Army Futures Command putting the major players together at the beginning of the process rather than waiting for each to do its part sequentially.

As a result, "we can really start to figure out what works, what doesn't work—reduce risk and get a much more accelerated process going for some of these efforts," Etherton said.

ADDITION BY SUBTRACTION

As Naval Postgraduate School senior lecturer John T. Dillard sees it, the most significant change in acquisition to emerge from the past few years of legislation was the elimination of the defense undersecretary position. "Whatever drove that decision, it has certainly reduced the amount of preparation and documentation that program managers must go through for milestone decisions to proceed, halt or alter the course of their programs," Dillard said.

Defense Acquisition Board reviews were mandated, highly costly and work-intensive "off-core activities" for any Acquisition Category ID project, said Dillard, who managed major weapons development efforts for most of his 26-year career in the Army and now teaches in the Naval Postgraduate School's Systems Engineering Department of the Graduate School of Engineering and Applied Sciences. "They were only the tip of the iceberg with regard to preparatory reviews en route, and were a significant distraction to the [program manager] that pulled them away from their primary functions."

SECRETARIAT ON THE ROAD

Hon. Ellen M. Lord, undersecretary of defense for acquisition and sustainment, meets with key staff members of the Combined Joint Task Force – Operation Inherent Resolve in Iraq in November. Joint Task Force Iraq Commander Brig. Gen. William Seely briefed current and future plans in regard to joint operations. (U.S. Army photo by Staff Sgt. Desmond Cassell/Maj. Charles Dietz)

Thus, the decision for investment milestones now rests with the component acquisition executive.

"The operational side still drives requirements and resources, while the secretariat side executes the acquisition of capabilities needed," Dillard noted, but "emphasis on prototyping and rapid production has increased. … Real-world threats are driving a palpable sense of urgency in the Pentagon to acquire capabilities faster."

ARMY FUTURES COMMAND'S MISSION

Just as OTAs embrace innovation, the Army Futures Command aims to do the same—culturally, procedurally and institutionally. "We are trying very hard to describe what problems we want to solve, and then let industry innovate in terms of how they can possibly solve that problem," Gen. John M. "Mike" Murray, AFC commanding general, told an AUSA panel in October.

"This is about winning, and this is about looking and doing things differently in moving the Army into the information age," he said. "Because we will not be successful if we just continue to do the same things we've always done in the past."

As always, requirements are key.

From the Army acquisition executive's point of view, "AFC fundamentally has changed the front end of the process, which is requirements generation," Jette said in the interview. "And based upon the guidance of the senior leaders, particularly the secretary, the idea is to find a more intimate way to connect the requirements to the development of the acquisition strategy."

The results are telling, observers agree.

"IPTs (integrated product or process teams) were among the first acquisition reforms we pressed for in the '90s, because we knew they could really facilitate program efficiency and effectiveness," Soloway said. "AFC is really an IPT on steroids, and that's truly intriguing."

"What I have seen AFC accomplish thus far is to redirect some existing programs of record to make them oriented nearer-term, the focus being upon early-as-possible capabilities," Dillard said. "Hopefully, this is not so shortsighted as to throw off the investments in longer-term advancements. All in all, it is safe to say that AFC has inserted itself into the process of both combat and materiel developments, and with the power to 'move the needle' that comes with four-star power."

BEWARE OF BACKSLIDING

Bureaucracy remains an ever-present threat to the Army's newfound agility, however.

The increased use of OTAs and the standup of AFC have given rise to a cautious optimism that is more optimism than caution.

"The folks on the ground tell me that there are several layers between them and our most senior leaders telling us to do things faster," Dillard said. "Those layers of bureaucrats and processes are still well-entrenched, and I'm not sure we can remove those layers or if things will go any better without them. Institutional knowledge comes at a cost—it often feels like handcuffs to the folks trying to get things done."

It is noteworthy that there's a guidebook of only 53 pages on other-transaction authority, whereas the FAR is over 2,000 pages, and the defense supplement almost as large, Dillard said.

In fact, Stuart A. Hazlett, deputy assistant secretary of the Army for procurement, told a panel at AUSA that he feared writing an official policy on OTAs could produce another FAR. "I've been reluctant to write policy dealing with OTs in the Army. … What we don't want to happen is for us to start writing policy and allow this thing to start slipping out of control and, before I know it, I've got a FAR-based kind of approach again."

An acquisition system that in the past has not had much tolerance for cost increases or schedule delays, and which has responded to ambiguities with more time-eating rules and capability requirements, is now being asked to tolerate mistakes and even failures in the interest of trying harder and faster to get state-of-the-art technologies to the warfighter, Etherton said. Right now, the

HOW FAST CAN WE GET THIS?
This TITAN-2U server produced by GMS fulfilled an urgent Army need for a rugged, rack-mounted server. But acquiring it via the traditional contracting process would have taken far longer than the Army had. Using an OTA enabled GMS, a smaller company, to bid and sign a contract for the servers within two weeks. (Photo courtesy of GMS)

focus is on schedule, but it is inevitable that cost and performance concerns will surface as well at some point, he said.

"I really hope we don't say, well, now we have to add all these things and make the system the way it used to be," Etherton said. "We just can't go back to that. We have to stay the course and really accept the higher risk, accept that there are going to be problems that we will have to address, but that we have to get into some kind of a new model process. … There needs to be a dialogue on how much of this formal certification reporting kind of things do we really need in this process, to satisfy Congress's oversight concerns but yet not trigger a creation of more bureaucracy."

IN SEARCH OF THE NEW NORM

DOD is in the process of addressing such concerns with a rewrite of its "DOD Instruction 5000.02, Operation of the Defense Acquisition System," which provides the governing policies and principles. "What they're trying to do is basically take the new authorities, clarify what that process looks like for OTAs and rapid prototyping, rapid fielding kinds of things, and figure out how to integrate that into a process that effectively captures the result and major capabilities," Etherton said. "I'm not sure that the new 5000 process that the OSD is currently working on is going to do that right at the get-go.

"What I'm concerned about is that handoff process. What does it look like when we get through this initial, quick, first three, four, five years, and then it gets handed off into a more traditional process where you're basically acquiring a major capability? … I think that's where the real work is going to have to happen," Etherton said.

The fundamental principles of sound acquisition, however it may speed up, still need to include "requirements analysis, a proper amount of testing and having an ironclad contract as the basis for dealing with industry," Dillard said. "Few shortcuts can be taken in these three areas. Unfortunately, all three of these areas had become over-bureaucratized with their voluminous policies, regulations and instructions. Now the pendulum swings the other way."

Dillard cautioned that "though we have rapidly leaped aboard the OTA bandwagon, … OTAs are still contracts, and they must be put into place by warranted contracting officers. They serve to free us up from lots of unnecessary statutes and regulations, but are no substitute for our doing what is inherently governmental: defining what we expect as deliverables from rigorous requirements analysis and systems engineering."

"Fundamentally the engineering process does not change," warned Hunter of CSIS. "Programs that are new-build, complex platforms still have significant engineering challenges."

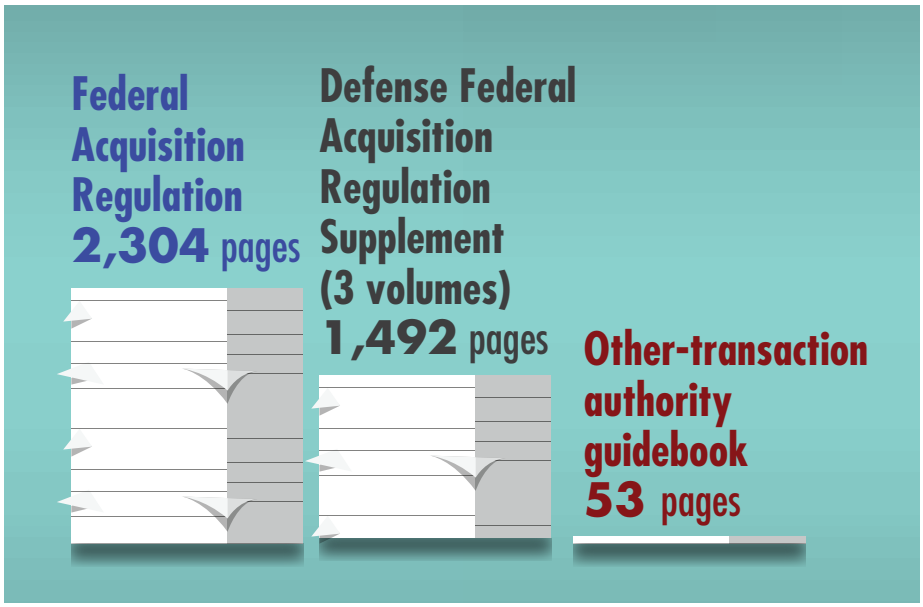
Sustainability is another definite concern, Dillard said. "Sustainment is certainly the area that presents risk when doing things on the quick." It is well-established that long-term sustainment can be the most costly piece of a system life cycle. "Logistic support must be designed in, and that takes a deliberate, iterative effort for suitability and supportability analysis alongside the development, early on and throughout 'the invention process,' " he said.

"Going from prototypes to production-ready systems is a leap that I think is makeable, but the proof's in the pudding," said Hunter. "… Before we get too excited about our success, we have to deliver some systems to the warfighter."

JCIDS PROCESS ON WAY OUT?

It is by now a given that people really want to move away from the 5000 defense acquisition machinery and start moving much more quickly. "They want to get out from underneath the JCIDS [Joint Capabilities Integration and Development System] process," Etherton said. The attractiveness of OTAs and other Section 804 authorities, which to some extent were designed deliberately "to get you out from underneath the JCIDS process, to me, that calls the whole JCIDS process into question," he said.

"Now we have enough information and enough experience [to conclude] that maybe we don't need a JCIDS process at all, or we need something that is a different approach for what JCIDS tries to



REGULATIONS SHRINKING

OTAs require much less from businesses and from the government, making them a more flexible instrument than contracts based on the FAR. (Image courtesy of the authors)

"OTAs serve to free us up from lots of unnecessary statutes and regulations, but are no substitute for our doing what is inherently governmental: defining what we expect as deliverables from rigorous requirements analysis and systems engineering."

accomplish, in a much more agile form," Etherton said. "And honestly, I think that was the intent by Congress in creating some of these authorities."

"I don't think [JCIDS is] going away, I think it is shifting the default," said Ward, the former Air Force procurement officer. "One of the guiding principles with a lot of this is there's more than one way to generate a requirement."

AFC has a leading role to play in the new balancing act of rigor and agility, Dillard said. While the command's mission extends well beyond experimentation with acquisition approaches other than traditional JCIDS capability-based assessments, Dillard sees AFC—particularly the cross-functional teams of representatives from all the organizations with a stake in the acquisition—as a major influence in speeding up the process. "AFC now is in the mix for coordination all the way up [the chain of command], and hopefully for integration across combat domains and functional areas," Dillard said. "If it sounds nebulous and ambiguous, I believe it still very much is."

Bureaucracy remains an ever-present threat to the Army's newfound agility, however.

CONCLUSION

As attractive as OTAs have become, there is concern that they might become an overused, knee-jerk "easy solution," like new developments in contracting that have preceded them. OTAs are by no means a perfect solution, but they have proved their value as a way to expedite.

"The good part about the OTA is that you essentially get to write nearly a commercial contract, whatever you want," Jette said in the interview. "The problem in that is it assumes you know how to write a commercial contract."

"I think there's always a danger of overcorrecting," said Ward. "But I think the danger of overcorrecting is a lower risk than of maintaining the status quo. … This is not a zero-risk proposition. But it is a risk improvement strategy. It's a risk mitigation strategy."

And so the learning curve continues to take shape. "Are we going to make mistakes? Are we going to misuse [expedited authorities] or use them in areas where we probably shouldn't? There's no question in my mind that that will happen," said Etherton. "But the real issue is, OK, how do we take that information and move forward?"

OTAs currently focus on smaller-scale acquisitions. But in four or five years, with the OTA language that allows for production as part of the agreement, an OTA could very well give rise to an ACAT I program—once the expedited authority has made it past the learning curve, Etherton said.

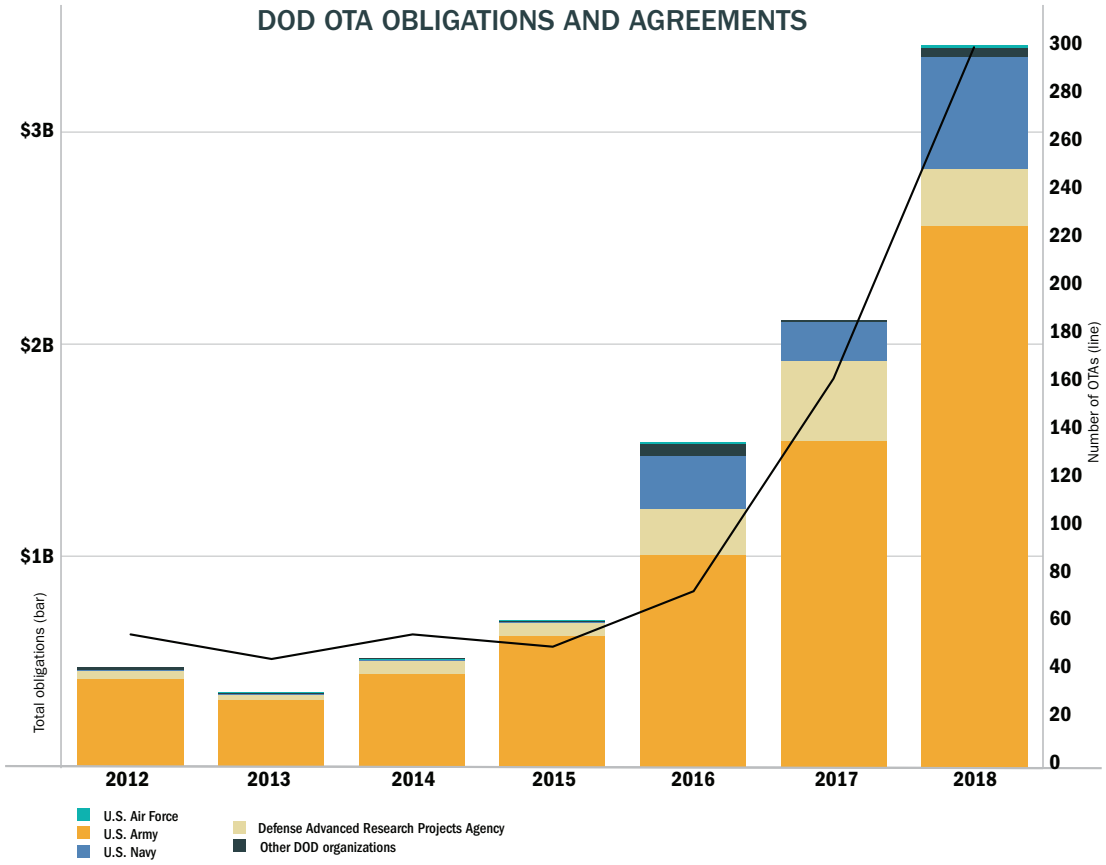
The learning curve did not start in just the past few years, Dillard noted. For all the seeming novelty of OTAs, he said, "this agreement authority has actually been around since 1958 and is no panacea in itself. OTAs are not always faster and must still include the needed protections for the DOD that FAR-based contracts provide. Let's not forget that the infamous Future Combat Systems program began with a $240 million OTA way back in 2002."

Nonetheless, it is clear, Dillard said, that "this time, acquisition reform is working, at least in terms of realizing results sooner. Now, those results may not be the 100 percent solution that was initially required or budgeted for. But the user has a bigger vote than ever these days, and it is doing much to steer a very difficult vessel through the ocean of complexity that is acquisition."

As Soloway sees it, the jury's still out on whether the Army and the Pentagon are capable of substantive acquisition reform in the next two years. "This is a question that we have been asking for decades. And the answer remains the same: I don't know."

"If we can truly modernize the way we develop and train acquisition professionals to align with the historically fast-paced nature of the marketplace and technology," Soloway said, "what is now considered 'expedited' or 'alternative' can become part of the normal course of business."

"If we don't try some of these things, we're never going to find out what works and what doesn't work," Etherton said. "I want to see people embrace the agility, embrace the speed, and just not have to pay a price for it later on in the process.



THINGS ARE DEFINITELY LOOKING UP

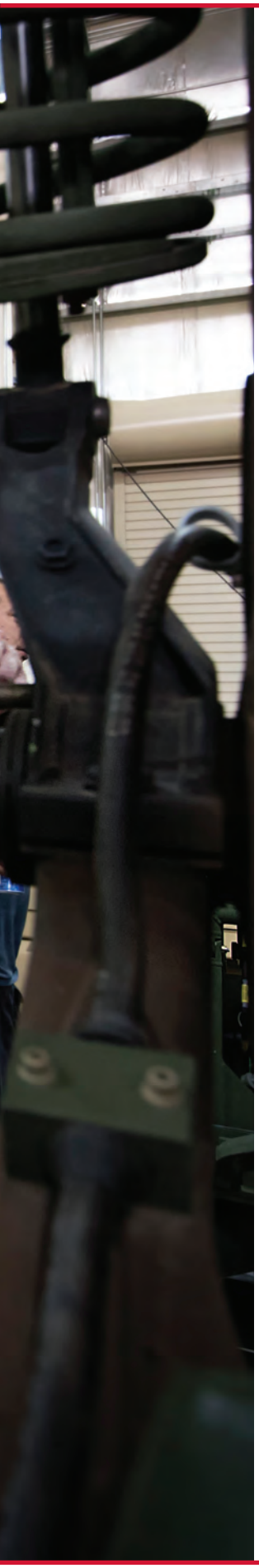
DOD's use of OTAs skyrocketed from 2012 through 2018. That increase, coupled with the standup of AFC, has given rise to a cautious optimism about efforts to streamline acquisition, and those who have been part of earlier reform efforts see a distinctly brighter future. (Graphic courtesy of Govini)

"We don't have a choice," he said. "We can't rely on the old system anymore."

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 degree from the University of Missouri.

MARGARET C. ROTH is an editor of Army AL&T magazine. She has more than a decade of experience in writing about the Army and more than three decades' experience in journalism and public relations. Roth is a Maj. Gen. Keith L. Ware Public Affairs Award winner and a co-author of the book "Operation Just Cause: The Storming of Panama." She holds a B.A. in Russian language and linguistics from the University of Virginia.

QUALITY ADVICE
Lou Carr, center, lead project quality manager for the U.S. Army Combat Capabilities Development Command's Armaments Center at Picatinny Arsenal, New Jersey, advises Sgt. 1st Class Theresa Moore, left, 401st Army Field Support Battalion – Kuwait, and Sgt. Alexander Wensink, 776 Support Maintenance Company of the Tennessee National Guard, during an inventory of M119 howitzers at Camp Arifjan, Kuwait, in August. "The acquisition workforce brings a very interesting set of capabilities to the table," says Jette. (Photo by Kevin Fleming, 401st Army Field Support Brigade)



THE ACQUISITION TOOLKIT

An interview with the Army acquisition executive.

More than two years ago, Dr. Bruce D. Jette was confirmed by the U.S. Senate and sworn into office as the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)). He brought with him extensive experience in the Army acquisition process and lessons learned from owning an entrepreneurial business, along with a clear perspective on leadership and the benefits of a streamlined and agile organization.

His leadership philosophy is focused on cultural change, accelerated fielding, accelerated technology and accountability. Army AL&T spoke recently with Jette to ask his thoughts on modernization of the acquisition process and other changes impacting the acquisition workforce.

Army AL&T: The theme of this issue of Army AL&T is "Understanding Acquisition." Briefly, what are some key points about acquisition that you want people to know?

Jette: I think it's useful for people to understand how the basic acquisition process works. The process starts with a requirement. Someone has to say, "I have a need," and be able to describe that need. If a materiel solution is required, a program is generated to fulfill that need.

A review is required, however, to confirm that a materiel solution is actually required. The Army follows the procedures laid out in the DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel and facilities) system to determine whether the need can be fulfilled with an organizational change. For example, the DOTMLPF review may reveal that we don't need a new rifle, we need to add another rifleman to the squad—that would be an organizational solution versus a materiel one.

If the analysis concludes the need for a materiel solution, the Army acquisition team works through integrating and developing new technologies, putting them together into a system, and trying to fulfill the requirement as it is written.

It's important to note "the requirement as it is written," because testing is at the far end of the acquisition process—and what the Army tests against is exactly what the requirement describes. (See related article, "Enemies List," Page 146). For example, if we're asked to build a vehicle with square wheels, we test against vehicles with square wheels, not vehicles with round wheels. While the requirements as written may seem questionable at times, it is our job as acquisition professionals to meet those requirements, not second-guess them.

OPERATIONAL NEED

Loads are dropped from a U.S. Air Force C-17 aircraft using the G-16 cargo parachute, which will allow units to drop at a lower altitude and reduce the number of parachutes required. "Someone has to say, 'I have a need,' and be able to describe that need," says Jette. (Photo by Jim Finney, Airborne and Special Operations Test Directorate, U.S. Army Operational Test Command)

Once the item is produced by the acquisition community, the Army fields it in accordance with what Army G-3/5/7 (operations, plans and training) has determined the fielding sequence will be, and what Army senior leaders have determined the fielding strategy will be.

When the item is fielded, the Army has to sustain it. Sustainment covers the parts, spares and stockages—as determined by the logistics side of the house, which is the U.S. Army Materiel Command (AMC) in most cases, but might also be the Defense Logistics Agency.

At the end of the life cycle, when the product is being replaced, the Army has to divest it, and that may require demilitarization. As an example, the Army doesn't just put gun tubes out onto the open market; we have to make sure they are not capable of ever being used again.

Army AL&T: It sounds like a complex process that involves a lot of different people.

Jette: It's a lot more complex than people think, especially that front-end piece, the operational requirement. The requirement is what we want to accomplish; it is what drives the acquisition system to give the Army the materiel it needs.

Prior to the establishment of the U.S. Army Futures Command (AFC), under the old system, there was a point-to-point interface. Someone from the U.S. Army Training and Doctrine Command (TRADOC) and the various Army capability development integration directorates wrote the requirement. The acquisition community would then go about acquiring the technology or equipment. These were two independent activities.

I use what I call the "interlaced fingers" analogy to illustrate how we work together now. We have fingers from both hands that are interlaced; the left hand—AFC—has responsibility for the requirements, and the right hand—ASA(ALT)—has responsibility for producing the product. With both hands interlocked, the teams can interact more effectively. This interlocking of requirements and production allows Soldiers to provide critical feedback early into the development of the materiel.

Army AL&T: That leads me to the next question, and that is, how has the acquisition process changed since the creation of Army Futures Command?

Jette: Well, the technical acquisition process is unchanged by the existence of AFC. Deeply buried in law, we're required in certain cases to do certain things. The laws surrounding the acquisition process, DOD 5000 and the DOD 5000 rewrite, and some of the policies that govern it, all of those things remain unchanged.

The creation of AFC, fundamentally though, has changed the front end of the process, which is the requirements—describing the need. The secretary of the Army issued guidance to senior leaders to find a more effective way to connect the requirements to the development of the acquisition strategy. Before, requirements were done by an austere group. Now, we've got a general officer, Gen. John M. Murray, leading the effort. That's a pretty big difference in commitment to requirements on the part of the Army.

Army AL&T: So are we getting better products for the Soldiers now?

All of the flexibilities that Congress has given us—middle-tier acquisition, other-transaction authority and others—are great tools in our kit, but we must approach reform in a process-based way.

Jette: There are products that we're working on that clearly benefit from this new approach. Since AFC was established more than a year ago, we can see a much more capable performance on our part. We've got a much more intimate relationship between the requirements and acquisition communities—the interlocked hands I referred to earlier.

Army AL&T: So does this give Soldiers a better opportunity to have input into the development of equipment that they'll eventually get?

Jette: It depends on the program. Some programs are well-suited to having a lot more Soldier touch points. The Integrated Visual Augmentation System (IVAS) is a great example. Soldiers are involved with IVAS on a weekly basis. While the acquisition program manager is working on development of the materiel solution, the AFC cross-functional team lead is working on providing Soldiers who can answer the next set of questions. So the two organizations work tremendously well toward generating a much better product much faster, because of that close, cooperative and intimate relationship.

Army AL&T: Are there any other examples, besides IVAS, of how that's coming?

Jette: Having Soldiers involved in systems early has been easiest with those systems that are very familiar to the Soldier. The next-generation squad weapon rifle and automatic rifle are two examples. The development of those weapons involved a lot of Soldier touch points at the front end, when we looked at the prototypes. That brought us to a contract that gives us four systems to test. Those systems were based on requirements that came from a very mature assessment of some of the previous prototypes, which then led to the new prototypes, all with a cleaner set of requirements. So we expect that the Soldiers, once we "down-select" to the weapon desired, will be very happy with that weapon produced.

Army AL&T: Shifting gears just a bit, what role does talent management have in the acquisition process?

READY FOR DELIVERY

Personnel from Tobyhanna Army Depot, Pennsylvania, prepare 2-Channel Leader Radios for shipment to the 3rd Security Force Assistance Brigade at Fort Hood, Texas. Once the acquisition community produces an item, the Army fields it according to the fielding sequence determined by Army G-3/5/7 and the fielding strategy determined by Army senior leaders. (Photo by Thomas Robbins, U.S. Army Test and Evaluation Command)

Jette: Talent management is one of the most critical things we need to do for our military and civilian workforce, including our noncommissioned officers. Certainly, there's training. We have to make sure everyone is properly trained. There are legal requirements with respect to acquisition workforce training before they're allowed to expend government funds. In the area of our government contracting personnel, for example, they must be trained and certified to receive a warrant allowing them to spend government money. There is a similar requirement for program managers.

The acquisition workforce brings a very interesting set of capabilities to the table, one being that all uniformed acquisition personnel must be proven company commanders. This doesn't mean they have the extensive experiences of an S-3 (operations officer) or as a battalion commander in their particular branch, but they walk out of their branch and their previous duty assignments with some relationship to, and understanding of, field operations. And in most cases, they have a combat badge.

Then the question becomes, "How do I develop the individuals who are within the acquisition community?" We have cyber, quantum computing, hypersonics, artificial intelligence and other highly technical areas. We have complex sensor systems and complex communication systems. If you're going to truly lead in that area, then it can't be perceived purely as a process. There is no difference between someone who knows how to do an operations order but no idea how to fight, and someone who knows how to design an acquisition strategy but no idea how to make it work.

The requirement is what we want to accomplish; it is what drives the acquisition system to give the Army the materiel it needs.

CRITICAL FEEDBACK
Soldiers work with emerging and maturing technologies in cyber, electronic warfare and intelligence at Cyber Blitz 19 in September at Joint Base McGuire-Dix-Lakehurst, New Jersey. Interlocking requirements and production "allows Soldiers to provide critical feedback early into the development of the materiel," says Jette. (Photo by Edric Thompson, U.S. Army Combat Capabilities Development Command)

In some cases, experience is all you need; in other cases, education is also required. If I'm going to have someone lead our effort in hypersonics, an advanced degree in an appropriate science or engineering field will provide insights into how to lead that program forward.

Army AL&T: When you began your leadership at ASA(ALT), you talked about focusing on product more than process. Congress has enacted new authorities directed at acquisition improvement. How have you been implementing this transition?

Jette: All of the flexibilities that Congress has given us—middle-tier acquisition, other-transaction authority and

INTERLACED FINGERS

The radome being built at Tobyhanna Army Depot will be used to test AN/TSC-167 Satellite Transportable Terminals, replacing temporary structures in use now. Tobyhanna personnel have joined forces with the Program Executive Office for Command, Control and Communications – Tactical's Project Manager for Tactical Network and U.S. Army Communications-Electronics Command's Integrated Logistics Support Center to deliver critical communications systems to the warfighter, in the "interlaced fingers" approach Jette describes. (U.S. Army photo by Thomas Robbins, Tobyhanna Army Depot)

others—are great tools in our kit, but we must approach reform in a process-based way. Acquisition personnel need to understand all the pieces that go into the toolkit, so that they can pull out the right tool to solve the right problem. Then, they must think through the difficulties and opportunities within any given program and put together a package that generates a successful outcome.

I have seen in the past where process was more important, and zero defects was the most important thing in that process. The problem with that is, the process does not guarantee an outcome or product. You can dot every "i", cross every "t", complete every form, submit every document, and have nothing that works to show for it. That's not the outcome. Getting something out because you've done it and it works is the outcome.

Army AL&T: As the Army's acquisition executive, how would you describe the acquisition community in contrast with military commands with which it works to provide materiel to Soldiers?

Jette: The acquisition community has a large commonality with the military commands with which we work—AFC, AMC, TRADOC and others. We all want to ensure the greatest defense for this country. We are all willing to serve and to do whatever it takes to get the job done, which for us is fielding needed capabilities to Soldiers as expeditiously as possible.

WHAT UNDERSTANDING LOOKS LIKE

Understanding Army acquisition is hard.
Depicting how it works is next to impossible.

by Steve Stark

In attempting to come up with a graphic representation of how acquisition works, Army AL&T reached out to our contributors across the acquisition enterprise and asked how their organizations fit with other organizations. What we found was far more complex than we ever expected.

As an example, one program executive office (PEO), Command, Control and Communications – Tactical, which leads the Army's network priority, reported that the organization touches nearly 20 others within the enterprise, with 35 programs. Compare that relatively small number with the Joint PEO for Armaments and Ammunition's more than 417 programs, which touch nearly every major organization within the enterprise, or PEO Soldier's 383, which easily touch more than a dozen others. Still, the numbers tell only a small part of the story.

One of the things we learned in this undertaking is that depicting acquisition is a numbers game, but different kinds of numbers tell different stories. How it all fits together depends on how you look at it. With the following graphic, we're only scratching the surface. (There are figures in this issue that are nearly as complex as our graphic—see "International Innovation," Pages 57 and 58—that only seek to describe one facet of acquisition.)

In our graphic, there are dozens of programs and offices listed, and while they're the core of acquisition, they're hardly all of it. Overall, there are seven major commands and 42 subcommands within the acquisition enterprise, using numbers from the U.S. Army Acquisition Support Center showing where acquisition workforce members work. How you count makes a difference. Most of those commands are not in the graphic.

HOW BIG IS IT?

Inside the acquisition workforce, it can be hard to visualize just how big that workforce is. The scale is mind-boggling. Those who read this magazine may know that Army AL&T often cites the size of the workforce as approximately 40,000. That's true, but what that means is indicative of just how confusing numbers can get.

The phrase "approximately 40,000" doesn't mean that only about that number of people work on Army acquisition. That 40,000 includes only federally employed military and civilians whose jobs fall under the Defense Acquisition Workforce Improvement Act (DAWIA). There are other federal jobs that don't get DAWIA oversight, but they're much harder to count.

Of course, people whose jobs are governed by DAWIA are not the only ones who work in acquisition. The PEO for Intelligence, Electronic Warfare and Sensors, we learned, has 399 federally employed workers, of whom 75 are military (a comparatively high number). But in total, it has about 1,900 employees when you add in the contractors who help do the work. Similarly, the PEO for Simulation, Training

and Instrumentation has 459 federal employees, of whom 29 are military, but, overall, has nearly 1,000 employees, including contractors. In addition, it has employees in 66 countries working on foreign military sales. So, while the size of the acquisition workforce is about 40,000, it's also two or three times that size.

WHY UNDERSTAND?

Because acquisition is so complex, it's fair to ask the question: Why bother? For those who work in acquisition, there are probably three salient reasons. First, because we are spending taxpayer money, we have a duty to do so. Second, by understanding how the parts of acquisition fit together, we are more likely to be able to help all of the parts work together better—the parts of the system itself, but also the parts of the materiel systems. Complexity makes acquisition so easy to misunderstand that it's easy to either make mistakes or fail to take reasonable risks. Finally, and somewhat circularly, understanding acquisition better helps us understand acquisition better.

THE NUTS AND BOLTS

On paper, traditional acquisition appears to be linear. Or it can be made to look linear. It begins with a need and ends with the divesting of the thing that used to be needed. However, it is no more linear than a coastline, nor is it as simple as the graphic that follows would make it appear. It's virtually impossible to render how it works in its entirety in two dimensions. That doesn't mean it can't be understood. Understanding acquisition isn't about getting every last thing. And sometimes it means oversimplifying.

The nuts and bolts of materiel acquisition in the Army are thus: The field expresses a need for a capability. That need gets developed into requirements by the appropriate cross-functional team within the U.S. Army Futures Command (AFC). AFC works to turn the concept into a technology demonstration and perhaps a prototype. The U.S. Army Training and Doctrine Command (TRADOC) has a hand in all of this because it's responsible for doctrine and training. Everything that's acquired has to fit within the Army's conceptual framework of doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF), and TRADOC owns DOTMLPF. (That TRADOC layer isn't the only level that's not in plain sight. More on that in a bit.)

That concept from AFC then gets handed off to a PEO within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)) for development and execution. Once the capability is built, tested and fielded, it's handed off to the U.S. Army Materiel Command (AMC), more or less, and AMC assumes responsibility for sustainment and logistics and, eventually, divestiture and perhaps demilitarization.

However, those exchanges are much more complex than any graphic can show, and differ from program to program. What appear to be dividing lines between the organizations' responsibilities aren't really dividing lines at all, because the organizations and their functions within the acquisition enterprise are so closely intertwined. (Bromides like "acquisition is a team sport" don't just appear out of thin air.) And the system is sometimes circular, too, as with older programs that are being upgraded and sustained indefinitely.

CONCLUSION

As might be clear from the foregoing, the three major organizations that make up the enterprise are AFC, ASA(ALT) and AMC. Other major commands that are involved in the process are the U.S. Army Test and Evaluation Command, the U.S. Army Corps of Engineers, U.S. Army Forces Command and many others. We didn't put them in, for the sake of simplicity.

Acquisition has layers of complexity that are also not depicted. Looked at one way, the acquisition career fields that DAWIA mandates offer a window into those layers. Contracting, program management, engineering, business financial management, life cycle logistics, and test and evaluation are just a few of the layers, each with different imperatives and different work.

So big is Army acquisition that it begins to resemble an infinite coast in the coastline paradox. That paradox has it that the closer you try to measure a coastline, the longer it gets. A coastline is an obviously finite thing, but just how finite depends on how you look at it. Still, it's not hard to find the beach.

That's a lot like Army acquisition—the closer you try to look at it, the harder it gets to understand. But everyone knows where the beach is. And, if it were easy to understand, we wouldn't need Defense Acquisition University.

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, science and technology, he is, as Stephen Stark, the best-selling ghostwriter of several consumer health-oriented books and an award-winning novelist.

HOW ARMY ACQUISITION WORKS

ACQUISITION EXECUTIVE

The assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) is the Army acquisition executive and provides civilian oversight and authority for all of Army acquisition.

ASSISTANT SECRETARY OF THE ARMY ACQUISITION, LOGISTICS & TECHNOLOGY (ASA(ALT))

The Office of the ASA(ALT) comprises the civilian, executive function of the acquisition enterprise. The ASA(ALT) is the Army acquisition executive—the milestone decision authority responsible for the entire portfolio. The office also houses the deputy assistant secretaries of the Army (DASAs), who are essentially the C suite of ASA(ALT). As a whole, the DASAs provide policy guidance and oversight for the enterprise.

DEPUTY ASSISTANT SECRETARIES (DASAs)

DASAs are responsible for policy, guidance and oversight.

DASA for Acquisition Policy and Logistics
DASA for Defense Exports and Cooperation
DASA for Procurement
DASA for Research and Technology
DASA for Plans, Programs and Resources
DASA for Strategy and Acquisition Reform
Deputy for Acquisition and Systems Management

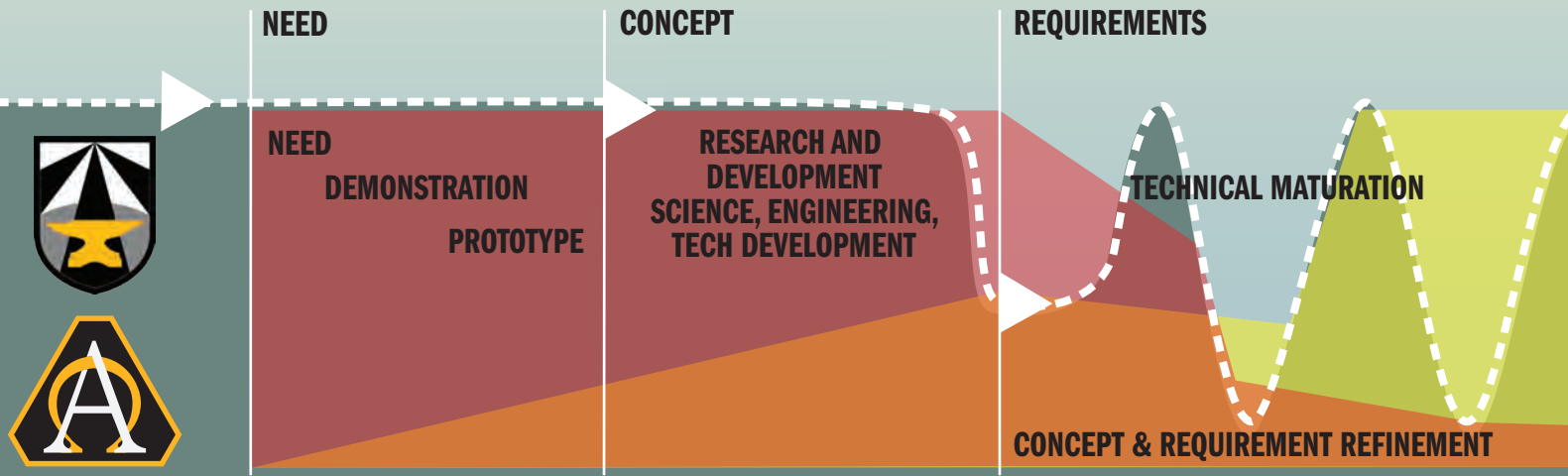
TRADOC and DOTMLPF

The U.S. Army Training and Doctrine Command (TRADOC) encompasses the Army's centers of excellence as well as training resources, and is responsible for training and doctrine—in other words, how doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) fit together. In acquisition, TRADOC is responsible for conceptualizing how technologies to be acquired fit into DOTMLPF.

PROGRAM EXECUTIVE OFFICES (PEOs)

The PEOs are responsible for program management as concepts and requirements are refined and turned into materiel. With the exception of PEO ACWA, they each work extremely closely with one or more of the CFTs to create the systems that arise out of need statements. With tens of thousands of employees in dozens of states and all over the world, this is a massive organization intended to design, develop and deliver dominance on the battlefield. Two of the PEOs are joint offices with responsibility to design and develop for all of the services. Many others work hand in hand with other services on particular capabilities. In the same way that CFTs and other AFC organizations represent different efforts toward a shared goal, so do the PEOs. The CFTs represent the Army's modernization priorities. And while they are separate efforts, they fit a unified vision of a suite of necessary tools. Similarly, the other AFC organizations represent different efforts toward the same result—battlefield dominance.

JPEO for Armaments and Ammunition
PEO for Assembled Chemical Weapons Alternatives
PEO for Aviation
JPEO for Chemical, Biological, Radiological and Nuclear Defense
PEO for Combat Support and Combat Service Support
PEO for Command, Control and Communications – Tactical
PEO for Enterprise Information Systems
PEO for Ground Combat Systems
PEO for Intelligence, Electronic Warfare and Sensors
PEO for Missiles and Space
PEO for Soldier
PEO Simulation, Training and Instrumentation
Medical Research and Development Command
Rapid Capabilities and Critical Technologies Office
Office of the Chief Systems Engineer
U.S. Army Acquisition Support Center



The Army doesn't buy systems without a requirement. When someone from the field or elsewhere expresses a need, that need must be developed into a requirement. AFC has the responsibility for requirements development. With its labs and research, development and engineering organizations, it does a variety and varying levels of research and development on concepts. Concepts get turned into demonstrations, which may get turned into prototypes. As the technology progresses, the cross-functional teams continually refine the requirement so as to make the transition from concept to reality as quick as possible. AFC labs and centers continually research and develop capabilities, and work hand in hand with industry to turn them into products for Soldiers.

U.S. ARMY FUTURES COMMAND (AFC)

AFC's cross-functional teams (CFTs) are responsible for requirements development and driving new capabilities from concept to prototype. The CFTs are tightly intertwined with their counterparts within the PEOs. AFC's capabilities development and integration directorates (CDIDs) determine and develop future force capabilities. Its Combat Capabilities Development Command (CCDC) provides the research, engineering and analytical expertise to deliver capabilities to the Soldier.

AFC Headquarters
75th Innovation Command
Army Applications Lab
Army Test & Evaluation Command
Artificial Intelligence Task Force
Combat Systems Directorate
Medical Research and Development Command

CCDC
Armaments Center
Army Research Laboratory
Aviation & Missile Center
C5ISR Center (Command, Control, Communications, Computers, Cyber, Intelligence, Surveillance and Reconnaissance Center)
Communications-Electronics Research, Development & Engineering Center
Chemical Biological Center
Data & Analysis Center
Ground Vehicle Systems Center
Soldier Center

Cross-Functional Teams
Long Range Precision Fires
Next Generation Combat Vehicle
Future Vertical Lift
Network
Assured Positioning, Navigation & Timing
Air & Missile Defense
Soldier Lethality
Synthetic Training Environment

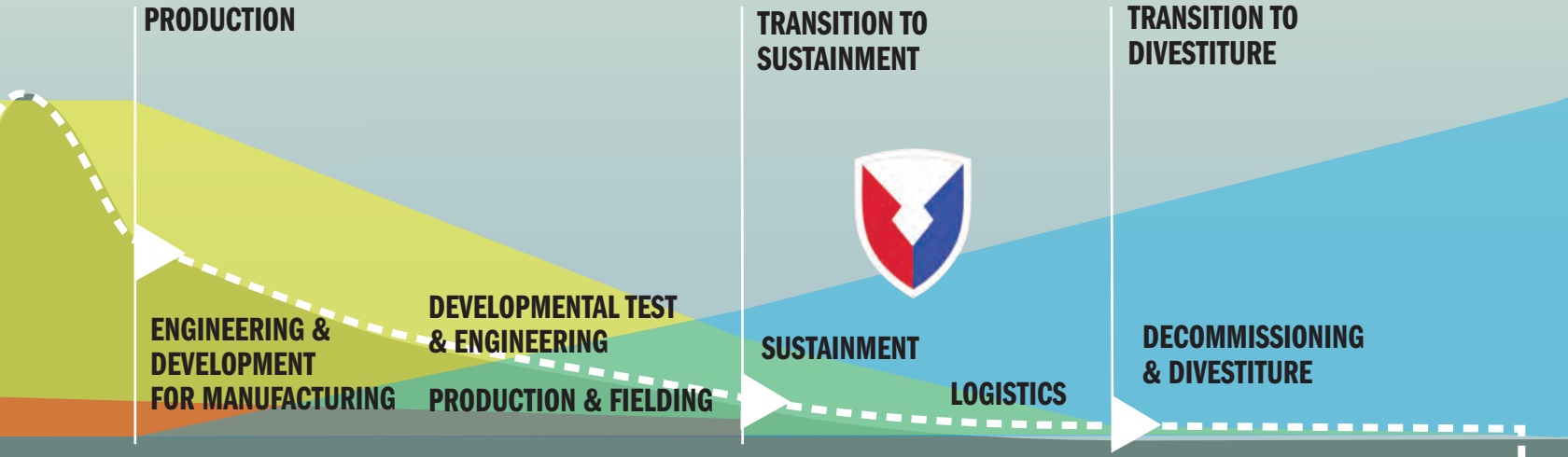
Futures & Concepts Center
Joint Modernization Command
Research & Analysis CDID
Chaplain CDID
Cyber CDID
Intelligence CDID
Fires CDID
Maneuver CDID
Maneuver Support CDID
Mission Command CDID
Sustainment CDID

U.S. ARMY MATERIEL COMMAND (AMC)

AMC synchronizes and integrates the Army's total capabilities, manages the global supply chain and synchronizes logistics and sustainment activities across the Army. The organizations that make up the command most often do exactly what their names suggest.

AMC Commands
Army Contracting Command
Army Financial Management Command
Army Medical Logistics Command
Army Security Assistance Command
Army Sustainment Command
Aviation and Missile Command
Communication-Electronics Command
Installation Management Command
Joint Munitions Command
Military Surface Deployment and Distribution Command
Tank-automotive and Armaments Command

For the sake of comprehensibility, this graphic leaves out many other organizations and many processes that either directly contribute to the acquisition enterprise or are stakeholders of it. All numbers are approximate and, because acquisition is dynamic, could change at any time.



AFC
Location: 25 U.S. states and 25 countries
Size: ~26,000 people

ASA(ALT)
Location: 30 U.S. states and all of the countries where the Army has personnel
Size: ~12,000 people

AMC
Location: 50 U.S. states and 50 countries
Size: ~15,000 people

THE NEED FOR *INTEROPERABILITY* STANDARDS

OCSE aligns IT standards for Army and joint all-domain command and control and mission partner environments to ensure seamless interoperability of command-and-control systems across all echelons.

by William G. Langston, Frederick J. Fable and Steven G. Drake

The Army is undergoing one of the largest technological upgrades in its 244-year history. Major modernization changes to the mission command network and networked systems are being developed and fielded to Soldiers. The major changes to the network and systems, when implemented, will result in better secure communications in all environments and provide an enhanced common operating picture from the Soldier at "the pointy edge of the spear" to the command posts at corps and above.

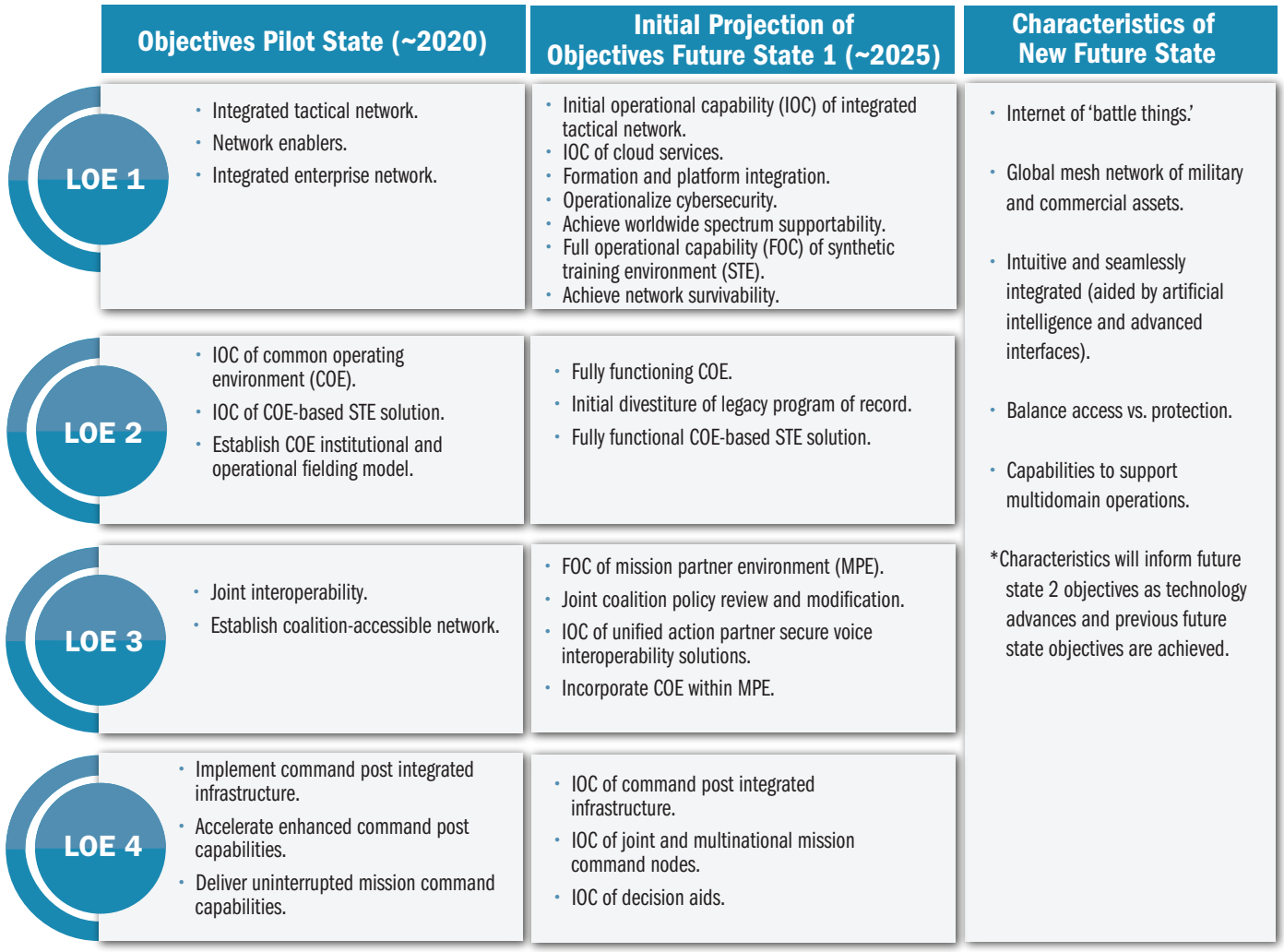
The modernization efforts also will provide commonality across applications, graphics and datasets, as well as interoperability within the Army and with our mission partner environments while enabling joint all-domain command and control.

This is a tall order to accomplish. In the past, the Army has struggled with the complexity of achieving this level of interoperable, networked mission command, because while functional requirements were well-defined, the system-of-system interoperability requirements were difficult to define. The Army's previous attempt at such change was Future Combat Systems (FCS), a

Establishing a mission partner environment capability involves aspects of the human, procedural and technical domains that collectively enable the Army and coalition partners to achieve shared understanding, mutual trust and confidence, and unity of effort in order to seamlessly plan, prepare and conduct unified land and multidomain operations.

Joint all-domain command and control connects distributed sensors and data to forces from and in each domain—land, sea, air, space and cyber—at the scale and tempo required to accomplish the commander's intent. Its success is predicated upon ensuring that common data standards are implemented to achieve interoperability across joint partners.

FIGURE 1



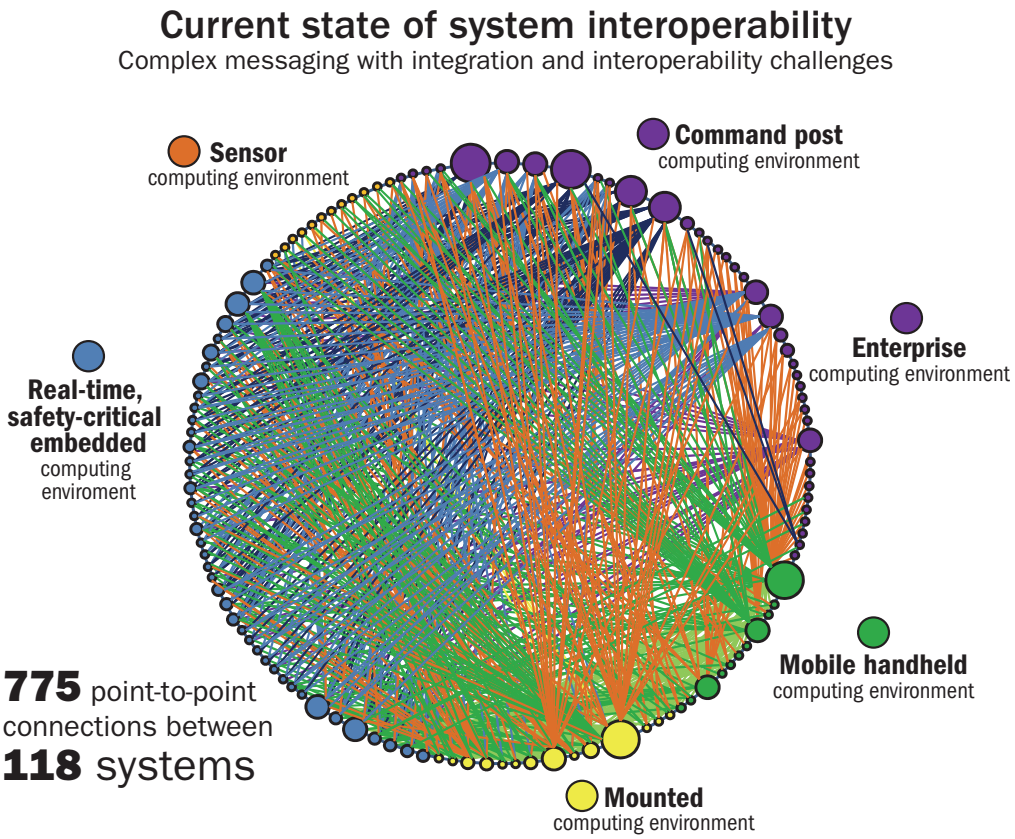
LINES OF EFFORT

Integrated operational requirements are defined along four standards-based lines of effort (LOE), ending in the delivery of a robust, cloud-enabled common operating environment at all levels that is prepared to support transition to joint all-domain operations.(All images courtesy of the authors and the U.S. Army Acquisition Support Center)

program designed to replace all of our network, command-and-control and ground combat platforms. FCS was intended to be interoperable by design; it was developed as a system of systems as opposed to separate warfighting functional areas such as maneuver, intelligence, fires, etc., with interoperability often a secondary design consideration.

Implementing rigorous system-of-systems lessons learned from FCS will be key for the Army to succeed in achieving interoperability. Most important is that networks and systems require the use of an agreed-upon set of information technology data standards. Implementing common data standards allows networks and systems to achieve seamless communication and transfer of information across systems, commands and national boundaries in a timely manner. Secondly, information technology standards must be identified during system development and coordinated among all systems implementing these standards before implementation. Based on government and

FIGURE 2



DATA EXCHANGE

Six computing environments contain 118 systems with 775 unique data exchange interfaces. The goal of OCSE and the common operating environment is to reduce data exchanges among legacy systems.

industry best practices, waiting to address data standards until developmental or operational test events is too late. It's costly and time-consuming to rework the underlying data structures to achieve interoperability once a system has been built.

LEGACY VS. FUTURE

Even though interoperability and the use of data standards are mandated by government statutes, policy, regulations and system key performance parameters, most often these are not the focus of a system development effort. A program manager's development efforts are driven by Army-approved requirements documents and capability delivery priorities set by the U.S. Army Training and Doctrine Command (TRADOC) capability managers. Therefore, in a fiscally constrained environment, the program manager is often forced to choose between the requirement for system interoperability and the higher-priority requirement for warfighting functionality.

Until last year, legacy systems were developed against requirements documents for specific warfighting functions (maneuver, intelligence and fires) that rarely contained details on specific information exchanges with other warfighting function systems. There was no overarching system-of-systems view for interoperability or data exchange requirements. Requirements for networks and networked systems were scattered in multiple documents and written by multiple communities without an overarching view of how all the systems exchange data and interoperate to create a common operational picture.

While TRADOC recognized that standards are important to achieve interoperability, it considered the determination of which standards were needed to do so to be a decision for the materiel development community and not found in the requirements documents. Instead, the requirements priorities of TRADOC capability managers were focused on capabilities that enhanced the specific warfighting functions that they represented. Interoperability was addressed at times, but was seen as a secondary

priority—especially when the program took funding cuts during budget cycles.

PATH FORWARD

In late 2017, Gen. Mark A. Milley, chief of staff of the Army, identified problems with achieving interoperability and developed an execution order in which he said, "Our current tactical network does not meet our warfighting needs … It is not expeditionary, interoperable, and cannot survive contested environments against the current near peer threats."

Recognizing the importance of data standards in achieving interoperability, the chief required that the Army network be based on open-source standards that are inherently interoperable. He required that TRADOC coordinate with the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and the Army's chief information officer to "refine an integrated set of common operating environment standards requirements based on designated open-source standards methodologies." The execution order went on to require implementation of policies and standards that would make the Army's primary tactical operations network one that allows our coalition mission partners to operate on the same network.

Implementing rigorous system-of-systems lessons learned from FCS will be key for the Army to succeed in achieving interoperability.

In support of the execution order, leadership stakeholders from across the Army signed the Army Mission Command Network Implementation Plan, Volumes 1 and 2. Together, they describe how the Army will modernize the mission command network, including all the warfighting functions, from now forward. The intent of these plans is to pivot the Army to a faster modernization path. Foundational to achieving this pivot are integrated operational requirements and integrated, standards-based architectures that allow "plug and play" of new capabilities.

These integrated operational (warfighting) requirements are defined along four lines of effort. (See Figure 1, Page 29.) All four efforts are standards-based, culminating in the delivery of a robust, cloud-enabled common operating environment at all echelons prepared to support transition to joint all-domain operations.

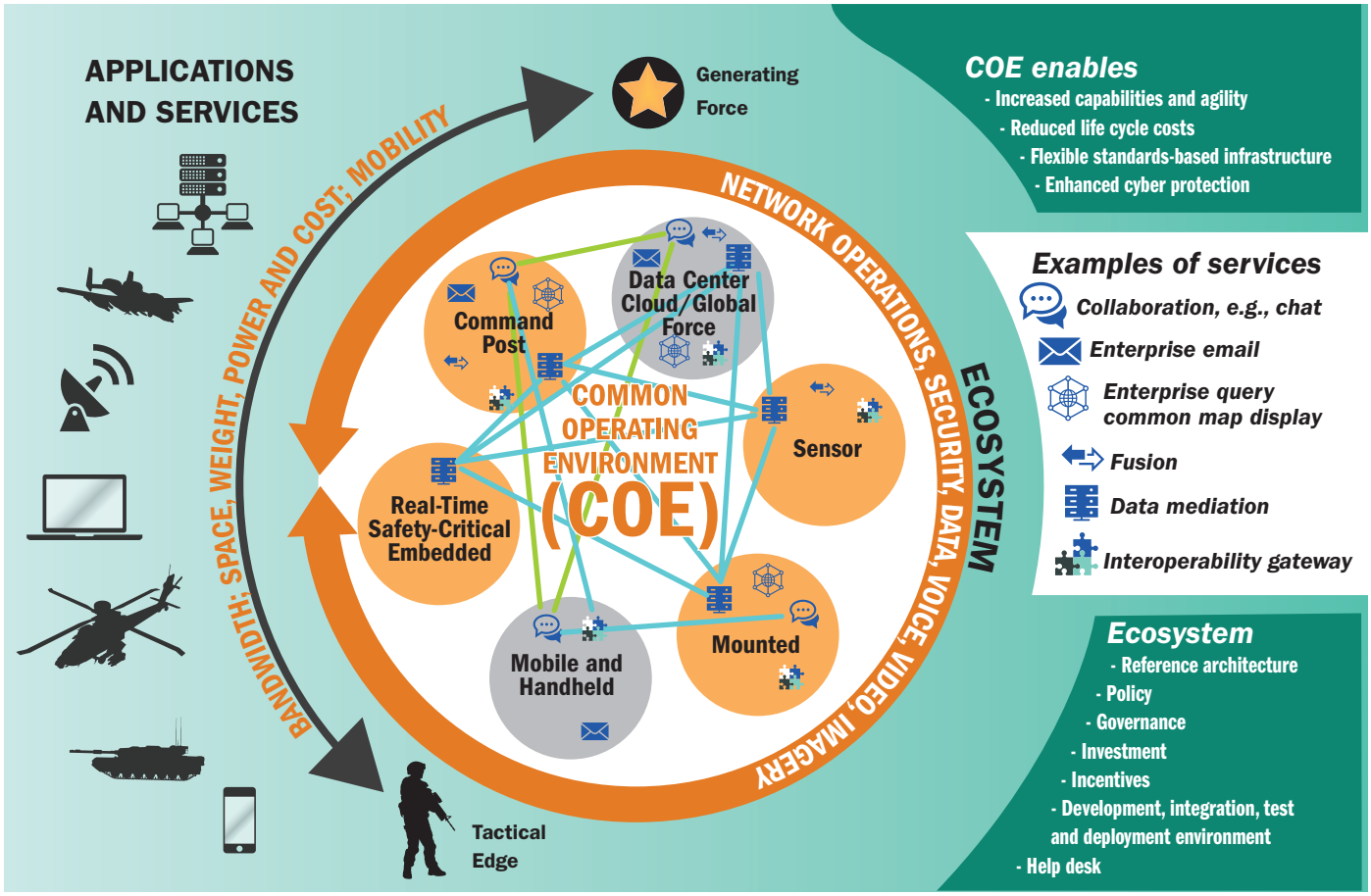
Also, based on the chief's execution order and to accomplish the second line of effort, TRADOC received approval in 2018 for the initial capabilities document for the common operating environment information systems as well as subsequent requirements definition packages. These requirements documents, for the first time, were designed to provide an overarching system-of-systems view of the mission command network and systems. They provide a holistic set of requirements for the common operating environment and break down those requirements into the subordinate definition packages that give each computing component of the common operating environment its portion of Army's warfighting capability. Currently, TRADOC is writing capability drop documents—documents that prioritize incremental delivery of capabilities within 18 to 24 months—the first of which has been approved.

To support the chief's modernization vision for mission command network and systems, ASA(ALT) established the Office of the Chief Systems Engineer (OCSE) in March 2019. OCSE's responsibilities include performing Army-level system-of-systems engineering by maintaining a standards-based Army integrated modernization architecture and communicating the Army data standards to subordinate program managers.

OCSE is also the ASA(ALT) staff lead for overarching governance and management of IT data standards for the common operating environment, including configuration management and promulgating the interoperability standards baseline across the six computing environments and, in coordination with the Army, joint and coalition stakeholders.

The six computing environments contain approximately 118 legacy systems, with 775 unique point-to-point data exchange interfaces. (See Figure 2.) The goal of OCSE and the common operating environment is to reduce the number of legacy system data exchanges by relying on common infrastructures developed by the computing environments. This will allow systems to become applications and services that efficiently leverage the standardized data provided by the infrastructure to achieve warfighter capabilities. (See Figure 3, Page 32.)

FIGURE 3



COMMON CAUSE

A common operating environment transforms the Army's primary tactical operations network into one that allows coalition mission partners to operate on the same network.

To ensure that program managers know which common operating environment data standards to implement, OCSE is working with TRADOC to include a tailored set of key standards within each of the capability drop requirements documents to drive uniform implementation across ASA(ALT) systems and infrastructures. Making standards an inherent part of the program's approved requirements also greatly benefits program managers by giving them a basis to program for the funding needed for implementation.

For the first time, OCSE and TRADOC are collaborating during development of requirements documents by leveraging a common tool—the Army Capability-Based Architecture Development and Integration Environment (ARCADIE) Magic Draw Teamwork Server—to ensure that standards remain consistent across all requirements documents. OCSE is also using the ARCADIE tool to model the interfaces between computing environments that allow efficient integration and facilitate interoperability. The individual system interfaces between two computing environments are consolidated into a single control point that documents the critical information flows and standards, and will eventually include critical coalition and joint partner systems. This type of digital engineering allows OCSE and program managers to identify technical risks to interoperability earlier in a program's development, when design mitigations are much less costly to implement versus during developmental and operational testing.

"Our current tactical network does not meet our warfighting needs. It is not expeditionary, interoperable, and cannot survive contested environments against the current near-peer threats."

CONCLUSION

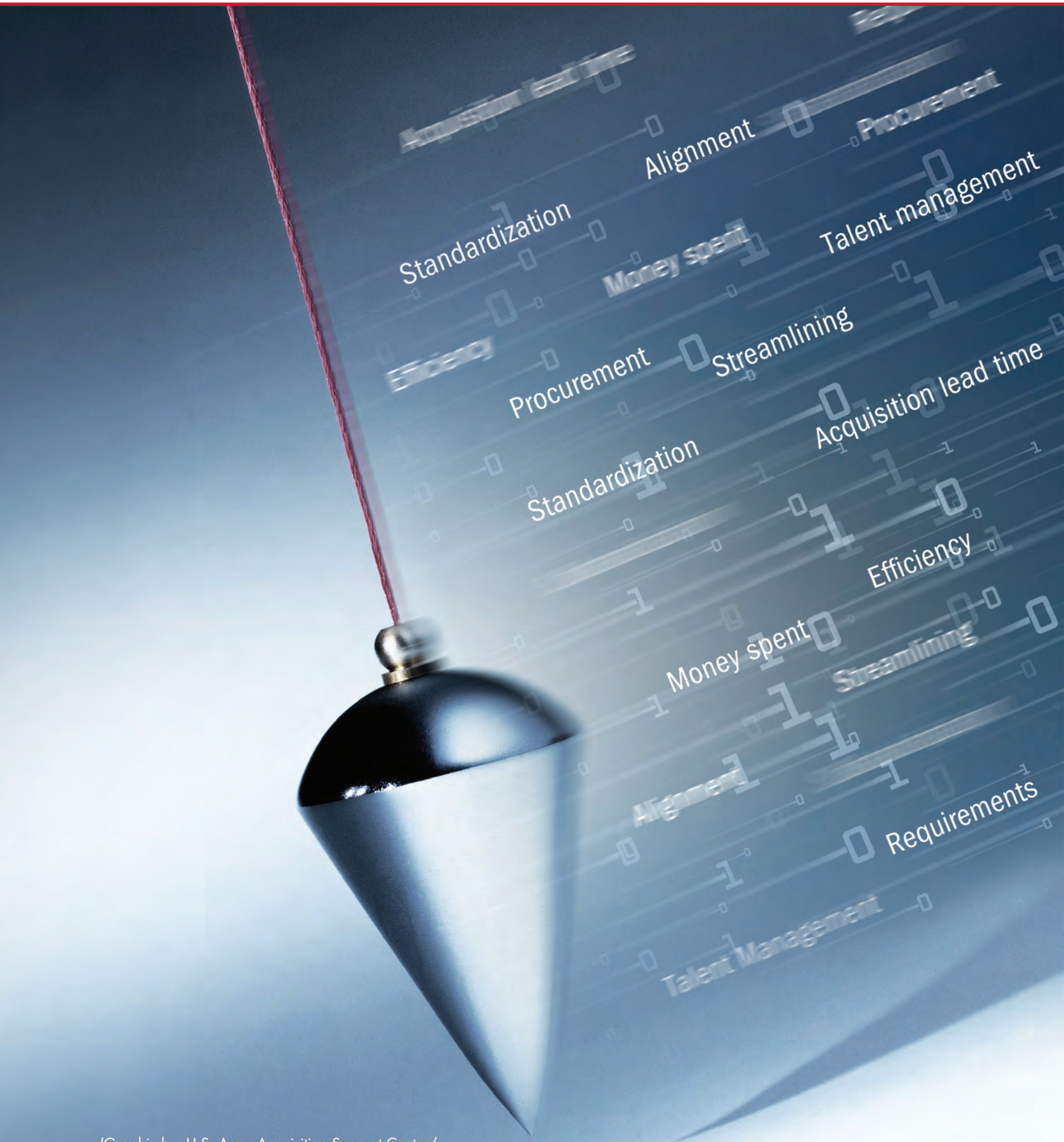
The Army has set itself on a course to modernize the mission command network and systems to change the way it executes warfighting functions. The four lines of effort are key to modernization success, and the standards are essential to those. Implementing system-of-systems engineering and configuration management rigor to maintain a baseline of commonly implemented standards, both within the Army and with our joint and coalition partners, will enable us to achieve needed interoperability to successfully execute mission partner environments and joint all-domain command-and-control warfighting missions. For its part, OCSE will continue to lead the effort to work with the materiel development community, requirements developers, the Department of the Army staff, and joint and coalition standards bodies to define the standards needed by the Army to successfully execute its mission of winning our nation's wars.

For more information, please contact the authors at ***william.g.langston.civ@mail.mil****;* ***steven.g.drake4.ctr@mail.mil****; and* ***frederick.j.fable2.ctr@mail.mil****.*

WILLIAM G. LANGSTON is a deputy director with the OCSE Standards and Interoperability Directorate. He holds an M.S. in computer information systems from the University of Phoenix and a B.S. in marketing from Arizona State University. He served on active duty for more than six years with the Army in the military intelligence and military police fields, where he earned his Veterans of Foreign Wars and American Legion eligibility. Langston has been working in the information technology industry for the past 25 years; in his current role, he is responsible for cross-portfolio strategic planning, tracking and management of systems through advanced development, test, evaluation, production, fielding and identifying associated issues and risks. He is Level III certified in information technology and is an Army Acquisition Corps member, and has successfully completed the Harvard University Program for Senior Executive Fellows.

FREDERICK J. FABLE is a senior systems engineer with the OCSE Standards and Interoperability Directorate. He holds a Bachelor of Engineering in electrical engineering from Stevens Institute of Technology. He has demonstrated experience in systems engineering and program management with over 37 years of experience within the DOD and commercial sectors. He has performed and executed system-of-systems engineering, program management, operational analysis, acquisition management, information technology, performance-based assessments, interoperability standards assessments and systems integration for the Army and joint communities.

STEVEN G. DRAKE is a senior network and systems engineer with the OCSE Standards and Interoperability Directorate. He holds an M.S. in systems acquisition management from the Naval Postgraduate School and a B.S. in geophysics from the University of Texas at El Paso. He served on active duty for over 26 years with the Army in the air defense and acquisition fields. His final assignment was as the director for Army Interoperability Certification testing. After leaving active duty, he spent six years as the director for network interoperability, integration and testing for several companies, supporting system-of-systems integration and testing of command-and-control systems across the Army. He is Level III certified in program management and Level I certified in contracting.



(Graphic by: U.S. Army Acquisition Support Center/ Zoonar/Getty Images)

THE CONTRACTING PENDULUM

The pendulum has swung from complex to streamlined contracts to provide efficient and rapid acquisition in support of the Soldier.

by Veronica Alexander and Dr. Linda R. Herbert

Contracting methods have evolved over time, from three-page, performance-based contracts to specification-based contracts hundreds of pages in length, and now appear set to shift back to shorter contracts. The implementation of statutes, regulations and policies designed to ensure fair and equitable treatment for industry became burdensome and increased the time and complexity of the acquisition process. This resulted in an ineffective procurement process that influenced mission readiness. Since that time, the contracting pendulum has swung to agile, streamlined initiatives.

These initiatives have been spearheaded by several important laws and regulations, including the National Defense Authorization Act (NDAA) for Fiscal Year 2016, which was implemented by the Section 809 Panel, secretary of the Army initiatives and strategic reforms from the Office of the Deputy Assistant Secretary of the Army for Procurement. One streamlining initiative embraced by Stuart A. Hazlett, deputy assistant secretary of the Army for procurement, is "data-driven contracting." Data-driven contracting will facilitate analytics on raw data that can influence factors such as requirements, money spent, talent management and procurement acquisition lead time.

SIGNIFICANT CONTRACTING CHANGES

Historically, there have been significant regulatory changes that have influenced DOD contracting processes. These regulatory changes are the springboard to many contracting initiatives used today. In 1962, Congress passed Public Law 87-653, the Truth in Negotiations Act. That law specifies that when dealing in a sole-source environment, each procurement-contracting officer must certify cost as accurate, completed and current for all cost and pricing data. The Truth in Negotiations Act has been a cornerstone for ensuring that prices paid by the government are considered "fair and reasonable."

In 1974, Congress passed legislation to establish the Office of Federal Procurement Policy (OFPP) within the Office of Management and Budget. OFPP provides direction for government-wide procurement policies, regulations and procedures; it also promotes economy, efficiency and effectiveness in the acquisition process. One way in which OFPP provides this direction is through the Federal Acquisition Regulation (FAR).

The FAR, implemented in 1984, provides uniform policies and procedures governing federal government contracts. Accompanied by the Defense Federal Acquisition Regulation Supplement (DFARS), these regulatory policies inundate contracting professionals and industry partners. In 1984, Congress also passed the Competition in Contracting Act. That act requires competition for award of all government contracts. The theory is that more competition for procurements reduces costs and allows more small businesses to win federal government contracts. It also established that if a protest is submitted to the U.S. Government Accountability Office (GAO) before contract award, the awarding of the contract will be suspended until GAO rules on the protest.

In 1994, Congress passed the Federal Acquisition Streamlining Act. That legislation established a preference for the use of commercial products and exempted commercial products from various statutory and regulatory requirements. It raised the ceiling for the use of "simplified purchase procedures" and raised the threshold for issuance synopsis. It exempted the micro-purchase from virtually all statutory requirements, and it required that paper-based contracting systems be replaced with an electronic contracting system within five years.

CONTRACTING REFORM INITIATIVES

Acquisition reform is important and provides a check and a balance between regulatory accountability and agile acquisition. Because of recent reform initiatives, the contracting pendulum has swung from complex to streamlined contracting processes, providing for efficient and rapid acquisition in support of the warfighter.

Of 312 authorities identified in the FAR and DFARS, the Army delegated 159 authorities to a level lower than the assistant secretary of the Army for acquisition, logistics and technology. This increased efficiency.

In 2005, OMB asked the OFPP to identify goods and services the government can purchase more effectively and efficiently through strategic sourcing. Strategic sourcing is an approach to supply chain management that formalizes the way information is gathered and used so that an organization can leverage its consolidated purchasing power to find the best possible values in the marketplace. As a result, the U.S. General Services Administration and Department of the Treasury established the Federal Strategic Sourcing Initiative to address government-wide opportunities to strategically source commonly purchased goods and services and eliminate duplication of efforts across agencies. An example of strategic sourcing for the Army is in the procurement of commercial hardware and software purchases under the CHESS (Computer Hardware, Enterprise Software and Solutions) program.

Then, in December 2014, OFPP issued a memorandum that directed agencies to take specific actions to implement category management, an approach based on industry leading practices, to further streamline and manage entire categories of spending across government more like a single enterprise. (See "The Power of the Purchase," Page 134.) This approach includes strategic sourcing along with a broader set of strategies, such as developing common standards in practices and contracts, and improving data analysis and information sharing to better leverage the government's buying power and reduce unnecessary contract duplication.

The NDAA passed in 2016 streamlined the acquisition process and eliminated redundant and duplicative requirements. Section 809 of the NDAA required that the secretary of defense establish a nine-member advisory panel consisting of experts in acquisition and procurement policy. The objective of the panel is to review DOD's acquisition regulations and provide recommendations for streamlining procurement.

Some of the significant recommendations made by the panel include expanding and clarifying the use of other-transaction authority for production. Other-transaction authority is the term commonly used to refer to DOD's authority to carry out "certain prototype, research and production projects" other than contracts. Such authority gives

SHORTEN TRAINING TO SPEED PROCUREMENT

One of several efforts to make acquisition quicker and simpler, the Simplified Acquisition Threshold Supply Procurement Program was designed to require minimal training by customers to navigate the online marketplace. (Photo by Sgt. 1st Class Kevin McClatchey)

SHARPENING THE SKILLS TO CONTRACT WELL

Capt. David Ray leads a quality assurance class for Soldiers during a contingency contract administration services training event in March at Fort Bragg, North Carolina. Ray is a 609th Contracting Team contract management officer at Fort Bragg. (Photo by Sgt. 1st Class Terry Ann Lewis)

DOD the flexibility necessary to adopt and incorporate business practices that reflect commercial industry standards into its award instruments. DOD currently has permanent authority to award other-transaction agreements for research, prototype and production purposes. This kind of agreement allows nontraditional vendors a pathway for doing business with the government and introducing new and innovative ideas. In fiscal year 2019, the Army awarded 854 other-transaction agreements valued at roughly $4.9 billion.

FAR and DFARS contract clauses that are required to "flow down" from prime contractors to subcontractors, especially commercial subcontractors, are excessive and create additional burdens on DOD's supply chain. In response, the Section 809 panel updated the FAR and DFARS to reduce burdens on DOD's commercial supply chain, to decrease cost, prevent delays, remove barriers and encourage innovation in the military services.

The panel recommended minimizing the number of government-unique terms in commercial buying. The panel noted that when the Federal Acquisition Streamlining Act was established in 1994, there were only 57 FAR and DFARS clauses applicable to commercial buying. Today there are 165, according to the panel. The proliferation of clauses applicable to commercial buying at the prime contract level directly affects the number of government-unique clauses to subcontractors offering commercial products and services.

The 2018 NDAA amended the Truth in Negotiations Act to increase the threshold for contractors submitting certified cost and pricing data from $750,000 to $2 million. Contracting officers may still require cost or pricing data without certification, as they are tasked with ensuring that the cost or pricing data is fair and

Data-driven contracting will facilitate analytics on raw data that can influence factors such as requirements, money spent, talent management and procurement acquisition lead time.

reasonable. However, this change is widely embraced by contractors doing business with the government.

Finally, the 2018 NDAA made changes to the bid and protest procedures relative to the Competition in Contracting Act and allows for enhanced post-award debriefing rights for DOD. What that means for DOD acquisitions is that, when a protest is filed, the "five-day period" to file a bid protest to trigger an automatic stay of award does not start until after the government delivers a written response to the offeror. Per the NDAA, a disappointed offeror may submit, "within two business days after receiving a post-award debriefing, additional questions related to the debriefing." The law requires that " … [t]he agency shall respond in writing to any additional question … within five business days" and that "the agency shall not consider the debriefing to be concluded until the agency delivers its written responses."

ARMY CONTRACTING REFORM

The Army awards thousands of contracts yearly to support military forces worldwide. In FY19, the Army awarded 212,094 contract actions estimated at $94.59 billion. This does not include grants, government purchase-card buys, cooperative agreements or other authorized transactions that increased the estimate to $104.89 billion.

In 2017, the secretary of the Army directed initiatives to reform Army contracting, issuing "Army Directive 2017-32 (Acquisition Reform Initiative #6: Streamlining the Contracting Process)," which mandated streamlining practices within Army contracting to reduce the time it takes to develop and award a contract.

In accordance with this reform initiative, the deputy assistant secretary of the Army for procurement (DASA(P)) embarked on extensive reformation initiatives. They include:

1. Developed a centralized policy to standardize contracting policies across the Army.

2. Created policies and procedures that will facilitate the efficient implementation of category management. One policy, currently in coordination, aligns contracting activities to categories. This policy will promote habitual relationships among the contracting centers, category managers and customers. The draft policy stipulates that customers shall only submit their requirement to the designated contracting office. Aligning contracting activities with categories will assist in enforcing standard levels of

GET A SENSE OF THE POSSIBLE

Ruben Cruz, procurement analyst for the Army Artificial Intelligence (AI) Task Force, examines sensors in an autonomous robot built at Carnegie Mellon University in the 1980s. The DASA(P) is streamlining contracting so the Army isn't trying to acquire AI and robots in 2020 with the same contracting processes it procured tanks and typewriters with in 1960. (Photo by Gary Sheftick, Army News Service)

MANY CONTRACT TOOLS TO HELP

Maj. Don Lee and Sgt. 1st Class Rechelle Collins of the 639th Contracting Team discuss training on blanket purchase agreements conducted recently at Fort Bragg, North Carolina. Knowing when a contracting tool like blanket purchase agreements is a good fit is a key contributor to contracting speed. (Photo by Sgt. 1st Class Terry Ann Lewis)

services, limit standard levels of service end-run actions, and limit contract-action shopping among contracting centers.

3. Of 312 authorities identified in the FAR and DFARS, the Army delegated 159 authorities to a level lower than the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)). This increased efficiency and eliminated the requirement to staff packages to ASA(ALT) for signature and approval, thereby saving time, money and resources.

4. Established "reform managers" to lead changes to contracting processes and develop new streamlined procedures, e.g., source selection, pricing cell, etc.

5. DASA(P) is also embracing "data-driven decision-making in contracting." This type of contracting involves making decisions based on actual raw data derived from the automated contract systems. Data-driven decision-making improves how requirements are communicated between major stakeholders such as financial managers, program managers, requirements activities and industry partners. The bottom line is that everybody wins through increased productivity in procuring goods and services for the warfighter.

CONCLUSION

On Sept. 30, 2019, in a message to the Army force, Secretary of the Army Ryan D. McCarthy said, "We must maintain a sustainable level of readiness to meet current demands while executing an aggressive modernization strategy to ensure the total Army remains the most lethal ground combat force in the world."

To achieve that end, the contracting pendulum must swing toward less restrictive acquisition policies and procedures.

For more information, go to ***https://spcs3.kc.army.mil/asaalt/procurement/SitePages/PAMHome.aspx#&panel1-3****.*

VERONICA ALEXANDER is director of the Procurement Support Pillar in the Office of the DASA(P). She holds a master's degree from Clark Atlanta University and a B.A. from Southern University. She is Level III certified in contracting and in production, quality and manufacturing.

DR. LINDA R. HERBERT is a procurement analyst in the Procurement Support Pillar in the Office of the DASA(P). She has a Ph.D. from Regent University and holds four master's degrees, including in acquisition materiel management from the Naval Postgraduate School and in strategic studies from the U.S. Army War College. She is Level III certified in contracting and in program management.

DIY DIRIGIBLE

If we didn't have helicopters, balloons and dirigibles would be the ticket for vertical lift. Thanks to some canny market research, however, we have a much more robust capability. (Source: Jasmin Merdan/Getty Images)

ON CONTRACTING

HOW TO CONVINCE THE ARMY TO GET WHAT YOU NEED

Market research can be the basis for vigorous competition in Army acquisition.

by Dennis P. Longo

This is the first in a new series, On Contracting. The author developed the Competition in Army Contracting course for the Office of the Deputy Assistant Secretary of the Army for Procurement to introduce Army acquisition personnel to the competition requirements prescribed in the Federal Acquisition Regulation (FAR), Defense FAR Supplement and the Army FAR Supplement. This article is based on the content of the market research lesson in that course.

Competition drives efficiency and stimulates innovation. For Army acquisition, market research can serve as a powerful driver. While its connection with competition might not be immediately obvious, market research helps the Army identify industry talent and capability. Knowing who potential competitors might be—all of them—is what good market research shows.

For example, let's assume that helicopters don't exist today; they haven't been invented. Someone decides we need a "vertical lift capability" for missions downrange, and you've been assigned to research the market. Your market research consists of contacting aircraft manufacturers Cessna and Piper Cub for white papers on the feasibility of a vertical lift capability. Maybe you also contact a maker of blimps or dirigibles, because that's the current technology that does vertical lift. The manufacturers' responses conclude they have no such capability. Fixed wing won't do vertical, and dirigibles don't have the maneuverability needed. So you conclude that vertical lift is a non-starter.

Pushing aside thoughts that whoever came up with the idea is a lunatic, you decide to limit competition for the development effort to Cessna and Piper Cub.

To your amazement, protests to the U.S. Government Accountability Office (GAO) soon follow from Hughes Aircraft, Sikorsky, Bell and several others, stating they've invented what they call "helicopters." You quickly realize that you can't make conclusions based on what you don't know.

FINDING OUT WHAT YOU DON'T KNOW

Thorough and objective market research will identify commercial capabilities, including the capabilities of small businesses, as well as provide for a good acquisition strategy.

In this regard, defense acquisition uses market research to identify and enhance opportunities for full and open competition. Market research, unlike the helicopter debacle discussed above, will expand insight into the commercial marketplace, determine how quickly technology is advancing, and obtain data on products, services, capabilities and business practices. Market research contributes toward selection of an appropriate contract type. Award of a fixed-price type contract, for example, may be more appropriate to a contractor that has designed and successfully tested a vertical lift capability, as opposed to a contractor that is just entering that market.

A more focused or in-depth approach to market research may reveal that other defense agencies have awarded contracts for the same capability, affording you the opportunity to share current technology. Finally, market research techniques such as exchanges with industry and communicating with other defense agencies may result in refining requirements in terms of form, fit or function, performance and physical characteristics to align with your agency's needs.

CASE STUDIES: MARKET RESEARCH AND COMPETITION

Your twin daughters have both decided to attend the same college in North Dakota—a long way from home. One daughter concludes that a 2019 Corvette will get her to the college and home again for the next four years. You're thinking that, of all the vehicles available on the market, she decides on one of the most expensive and least fuel-efficient, not to mention one that lacks sufficient space for all her clothing. A new vehicle may be expensive, but a 'Vette, in the snow? Your other daughter concludes that the 1981 Volkswagen Rabbit she saw on the internet will satisfy her transportation requirements. You wonder if she really understands what it's going to take to drive to North Dakota and how in the world she found a 1981 Volkswagen on the internet. Obviously, the twins' market research was subjective and limited.

Conducting effective market research for personal requirements is unlike that for Army requirements. The basics may be similar: determining capability, availability, reliability; but Army requirements must not include convenience, personal preferences or motives. The quantities of items being procured and their military application place Army market research at a more focused intensity.

The results of market research should determine if sources are "capable." This may appear logical on its face, but at least three factors should be considered to determine if sources are capable:

1. You must know your requirement.

Just as a 1981 Volkswagen may not endure the North Dakota winters, a single airplane manufacturer may not have the capability to understand a novel military vision of a vertical lift capability. The team conducting market research needs to understand the requirement in order to focus its efforts effectively.

EARLY VERTICAL LIFT

Horace T. Pentecost flies in the Hoppi-Copter, a functional backpack helicopter, in October 1948. Three different versions would eventually be developed, but Pentecost was unable to generate sufficient military or commercial interest to manufacture and sell the vehicles. (Photo by Harold Clements/Express/Getty Images)

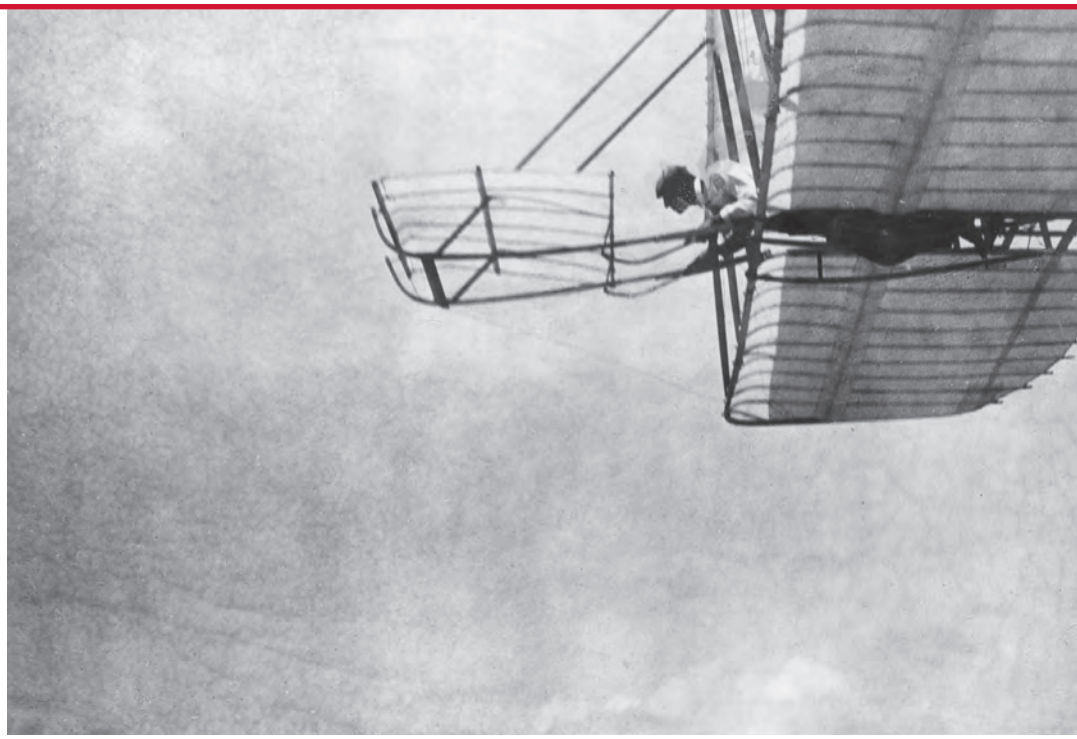
For example, GAO sustained the protest by Triad Isotopes Inc. (B-411360) in July 2015 because the U.S. Department of Veterans Affairs' market research could not have reasonably identified sources capable of responding to the request for quotations, because it was too broad and didn't align with the requirement.

The agency's stated objective in its market research was to award a contract to a contractor that could provide radioisotopes. That research included online searches for the North American Industry Classification System (NAICS) code 325412 (companies that perform pharmaceutical preparation manufacturing of "in-vivo diagnostic substances and pharmaceutical preparations"), which located 676 concerns. That number of apparently capable businesses led the agency to conclude that it was likely to receive viable quotations from at least two responsible small businesses.

Triad Isotopes protested the decision by the agency to issue a request for quotations for the acquisition of radiopharmaceuticals as a small business set-aside. Triad argued that the agency's market research was flawed because the NAICS code includes a large array of pharmaceuticals, including cold medicines and lip balms. In short, Triad asserted that the agency had not demonstrated that there was "even one small business" that would meet both the requirement and the delivery requirements in the request for quotations.

GAO agreed, and the protest was sustained.

The market research unnecessarily restricted its scope of capable offerors because it didn't align properly to the requirement and effective competition was unachievable.



WRIGHTS IN THE AIR
Wilbur Wright flies a Wright No. 1 glider at Kill Devil Hills, near Kitty Hawk, North Carolina. In the early 1900s, Wilbur and his brother Orville were the first to invent aircraft controls—specifically, a three-axis system enabling the pilot to steer the aircraft and to maintain its equilibrium—that made fixed-wing flight possible. (Photo by Hulton Archive/Getty Images)

2. You must know your market.

Just as it's important to know your requirement, an understanding of what's out there to satisfy your requirement is essential for obtaining the most efficient and cost-effective solution.

In a case involving Red River Waste Solutions LP (B-411760.2), GAO sustained a protest because the Army's market research focused on Army contract history rather than customary commercial practices. In short, the market research failed to support the Army's conclusion that its pricing terms were consistent with customary commercial practice.

The Army's solicitation required the contractor to collect and dispose of solid waste in designated areas in and around Fort Polk, Louisiana, requiring price proposals to be submitted on a per-ton basis. Red River protested that the commercial practice for refuse collection contracts was to price such contracts on a monthly or per-container basis, not on a per-ton basis.

The Army explained that its market research supporting the pricing determination was customary commercial practice because other Army contracts were priced on a per-ton basis and responses solicited from industry and a local refuse company both indicated that this was customary commercial practice.

In January 2016, GAO rejected the Army's claim and sustained the protest. It found that the Army's conclusions about pricing drawn from its market research restricted competition because commercial sources were unwilling to engage in a practice that

DEVELOPER BEWARE
Developing a new capability is always a risk—but good market research will prevent you from looking like a total lunatic. (Image by U.S. Army Acquisition Support Center/Getty Images)

was not customary in that particular commercial market. Since the agency didn't understand the market, the solicitation's estimated quantities for the various contract line item numbers were overstated.

3. The results of market research should determine if sources are capable, not "technically acceptable."

Market research should determine if there is a reasonable expectation of receiving acceptably priced offers that are capable of performing the contract.

In 2016, the U.S. Air Force evaluated responses to its request for information (RFI) and industry day discussions and concluded that two of the small businesses that responded were capable of performing the agency's requirements as prime contractors. The Air Force limited competition to two small businesses under a justification and approval.

Analytical Graphics Inc. (AGI) (B-413385) protested, arguing that only one firm could meet nine of the 10 salient characteristics described in the Air Force's RFI, and that a small business set-aside was improper.

GAO ruled in October 2016 that neither the FAR nor GAO decisions require an agency to request, or a prospective small business offeror to provide, a complete technically acceptable approach in response to market research. Agencies need only make an informed business judgment that there is a reasonable expectation of receiving acceptably priced offers from small businesses that are capable of performing the contract.

Making a de facto source selection decision based solely on the results of market research limits the number of qualified sources and restricts competition by eliminating the government's opportunities to leverage commercial solutions.

Lessons learned:

- **Triad**—Make sure the focus of market research aligns with the requirement.
- **Red River**—It is not reasonable to rely on other government contracts to establish what a customary commercial practice is.
- **AGI**—The contracting officer must make an informed business judgment to show that sources are capable of performing the work.

Market research is an enabler that will expand insight into the commercial marketplace, determine how quickly technology is advancing, and obtain data on products, services, capabilities and business practices.

The impact of hasty or superficial market research may restrict competition to sources that cannot offer the best resources toward the requirement. Knowing your requirement, knowing the market and understanding commercial capabilities will avert the lunacy of awarding a sole-source helicopter development contract to a single airplane manufacturer and avoid wasting years of inexperienced resources and millions of dollars.

THE MARKET RESEARCH TEAM APPROACH

We need experts in the field to obtain the best results in market research—as a team. A contracting officer may not be qualified to conduct market research for biological dysesthesia dysfunction (the effects of radiofrequency electromagnetic fields—cellphones, for example—on biological systems) studies. Similarly, a team of 12 personnel to research the commercial market for ventilation filters may be excessive.

CASE STUDIES: CHALLENGES TO MARKET RESEARCH

The extent, or scope, of market research should be adequate to identify the capabilities that are available in the marketplace for meeting agency requirements. Two examples below consider both the scope and adequacy of market research and how they inform competition.

1. SCOPE

Court of Federal Claims Palantir v. U.S. (No. 16-784C)

Issue: Was the scope of the Army's market research adequate to determine whether there were commercial items that could meet its requirements?

In 2015, the Army issued a solicitation seeking a single contractor to be the system data architect, developer and integrator of the Army's Distributed Common Ground System – Army Increment 2, the Army's primary system for processing and disseminating multisensor intelligence and weather information to the warfighter.

Three requests for information preceded the solicitation, and Palantir, responding to those requests, explained that it had a commercial alternative to the development effort and that, therefore, development was unnecessary.

After responding, Palantir continued to try to express to the Army its views and frustration with the direction of the developmental procurement choice by the Army, and with the Army's apparent lack of interest in considering commercially available alternatives. Nonetheless, the Army issued the solicitation.

Palantir submitted a protest to the Court of Federal Claims, contending that the Army acted arbitrarily and capriciously because Palantir claimed it had identified to the Army a commercially available technology that Palantir believed satisfied the Army's requirements.

Palantir stated, "The most cost-effective and lowest-risk procurement approach is the acquisition of an open architecture data fusion platform through open competition for an existing software solution at a firm-fixed price (FFP). FFP vehicles shift performance risk to the contractor, reduce the risk of cost overruns to the government, and shorten delivery schedules."

The Court of Federal Claims agreed, and concluded that the Army neglected to fully investigate possible commercially available alternatives to meet its requirements.

Lesson learned: Here, the scope of the Army's market research was unreasonably limited and therefore inadequate because it focused on

development efforts rather than commercial alternatives. Effectively, the results of the Army's market research made it impossible for another source to offer a commercial item to satisfy its requirements.

2. ADEQUACY

Information Ventures Inc. (B-294267)

Issue: Was the agency's limited search of the potential small business market reasonable?

Despite interest by six small businesses resulting from a pre-solicitation notice, a request for proposals was not set aside for small businesses, but instead was issued unrestricted as the result of market research. From that, the contracting officer determined that there was no reasonable expectation that two or more small businesses could perform the work.

The record indicates that the contracting officer failed to take into account known information indicating the interest of capable small businesses in this procurement.

Lesson learned: In a ruling issued in October 2004, GAO held that the contracting officer did not reasonably consider a small business set-aside and failed to take into account information from the market research report that indicated interest from small businesses.

The requiring activity (the organization with the need) should craft the capability information (the description of what is needed) to be submitted by industry; identify form, fit and function descriptions; review industry capability statements; revise government performance work statements or statements of work based on industry responses; and determine applicability of commercial items and modifications to commercial items to meet the agency's need.

The contracting officer should issue pre-solicitation notices—requests for information and sources sought, and draft requests for proposals—to promote early exchanges of information; host pre-solicitation conferences to involve potential offerors early in the acquisition process; and conduct other means of stimulating industry involvement. All of the tools just mentioned are pre-solicitation notices, and there is no particular order in which they should be done—market research is conducted appropriate to the circumstances, so any number of the notice techniques may be used.

Experts, such as industrial specialists and intellectual property attorneys, should be part of the acquisition team as required.

In market research, we want to gather all of the pertinent information on whatever the capability is, whether it's simple trash collection services or biological dysesthesia dysfunction studies or helicopters. The intent is to identify the availability and capability of commercial products or services that meet the Army's requirements and mission needs.

CONCLUSION

The role of market research is to help the government identify companies that have the potential to meet the government's requirements. That research is flawed when we neglect to fully investigate possible commercially available alternatives to meet Army requirements. The lack of knowledge of the requirement, the commercial market and industry's capability impact decisions related to full and open competition.

When we think we know what we want, or may have formed a predetermined conclusion on the product, service or vendor, we risk not obtaining the full value of expertise and innovation that may be available in the commercial market—as well as the risk of being thought of as a lunatic.

For more information on market research and its impact on competition in contracting, go to ***https://spcs3.kc.army.mil/asaalt/procurement/SitePages/NewTraining.aspx****. A common access card is needed to access the site.*

DENNIS P. LONGO is advocate for competition, task and delivery order ombudsman, and senior procurement analyst at the U.S. Army Contracting Command at Aberdeen Proving Ground, Maryland. A member of the Army Acquisition Corps, he holds a bachelor's degree from University of Baltimore, and is Level III certified in contracting and in acquisition. His assignments include acquisition specialist at the Program Manager for Chemical Demilitarization within the U.S. Army Chemical Materials Activity and procurement analyst at the U.S. Army Legal Services Agency. He served in the Army from 1971 to 1973 at the Southern European Task Force, Italy, and was deployed to Iraq as a civilian in 2003. He authored the Defense Acquisition University Continuous Learning DOD Purchase Card Tutorial in 2003, and has been teaching courses on competition in contracting since 2004.

ENGINEERING THE THEATER

The U.S. Army Corps of Engineers works in water and on land to lay the groundwork for multidomain operations in 2028.

by Nicholas Boone

This is the first in a series of articles about the U.S. Army Engineer Research and Development Center's (ERDC) support for multidomain operations. "The U.S. Army in Multi-Domain Operations 2028" concept proposes a series of solutions for the rapid and continuous integration of all domains of warfare—land, sea, air, space and cyberspace. ERDC and engineer capabilities span the multidomain operations cycle from competing short of armed conflict, to solving a layered standoff, to returning to competition on more favorable terms. This article contains examples of modernized software currently being used to refine war plans, conduct mission rehearsal and disseminate cross-domain intelligence for multidomain operations success.

Even before our nation's formation, the first Continental Congress organized an Army and appointed a chief engineer to assist Gen. George Washington in solving the revolutionary challenges of the time. After partnering with allied nations and delivering success with this inaugural mission, the U.S. Army Corps of Engineers (USACE) broadened its national service and embraced diverse responsibilities, such as managing the nation's first military academy and engineering institution, developing our country's defenses, mapping the western frontier, managing federal flood control, providing hydroelectric power and leading natural disaster response missions.

Based on these successes, our nation's military leaders once again turned to USACE three-quarters of a century ago as they began to consider one of the boldest multidomain assaults in modern warfare. In planning the D-Day invasions at Normandy, the scale of which was unprecedented, national leaders leaned heavily upon the engineering expertise tucked away at the Corps' Waterways Experiment Station in Vicksburg, Mississippi—the location of today's U.S. Army Engineer Research and Development Center (ERDC).

Our engineers advised military leaders on the challenges they could encounter with coastal logistics and built models of Mulberry harbors—the temporary portable harbors developed by the United Kingdom during World War II to facilitate the rapid offloading of cargo onto beaches—to understand their response during extreme seas. Those tests confirmed, if not improved, British designs that aided in calming coastal waters during the invasion. Researchers conducted scaled testing of float bridges and advised the military on which designs provided greater operational capability in extreme river-crossing conditions, a role that continues today. These engineers and scientists also leveraged their geotechnical expertise and forged the beginnings of airfield engineering for military operations, developing design criteria and materiel solutions to support heavy wheel loads required by

new military aircraft—a triservice responsibility still executed in Vicksburg. Similar examples of support can be found in all subsequent armed conflicts.

Today, ERDC stands ready to address the next challenge. The nature of evolving threats prompted Army leaders to overhaul the Army's operating concept and modernize capabilities to counter and defeat near-peer adversaries. As the Army transforms to deliver a force capable of executing multidomain operations by 2028 and ready to do so by 2035, ERDC is actively engaged by providing the engineers, joint force and allied partners with innovative technology tailored for this new extreme operational pace.

The enemy's anti-access layered defenses seek to deny our ability to project combat power, enter and set the theater, and transition to conflict on our own terms. Defeating these defenses will require rapid and continuous integration of all warfare domains—land, sea, air, space and cyberspace. Armed conflict phases will be difficult to commence if we fail to synchronize theater arrival. These critical logistical and engineering details were historically assumed away during tabletop exercises, but they cannot continue to be overlooked. ERDC anticipated this shift and began reposturing its science and technology portfolio away from counterinsurgency problems and toward entry operations and near-peer threats during the "pivot to the Pacific" in 2012. Since this pivot, ERDC has been delivering new technologies to survive near-peer strikes and synchronize time-critical engineering tasks that must be executed with extreme precision, so that follow-on forces can flow through contested air and sea ports.

All aspects of multidomain operations require engineering solutions to succeed. A calibrated force posture combines position and the ability to maneuver across strategic distances. This, in turn, requires modernized power-projection techniques and global access engineering methods to synchronize force arrival during brief windows of exploitation. Specialized equipment requirements often demand unique combat and expeditionary engineering considerations, and if not calibrated properly with adequate maneuver support capabilities, will impede the ability to reinforce the theater.

In addition, the maneuver support elements that enable multidomain formations to identify and neutralize natural and

Not only is ERDC improving the Army's technical intelligence, it uses this intelligence to simulate vessel landings in severe environments and model inland ground vehicle mobility.

SHIPSHAPE STATE OF THE ART

Navy Chief Petty Officer Jake Muehls, a Landing Craft Air Cushion Craftmaster, virtually pilots a vessel in ERDC's ship simulator. ERDC has used ship simulator and vessel-response models since the early 1980s to evaluate federally maintained navigation channels, and has recently begun to apply the state-of-the-art technology to military uses. It gives leaders a tool to simulate vessel landings in severe environments. (Images by U.S. Army Engineer Research and Development Center)

man-made obstacles must be improved. Being able to converge these capabilities requires synchronized mission command and standardized geospatial data updated systematically as the conflict unfolds.

The Army must modernize how we mobilize, project, protect, sustain and train our forces, and ERDC is involved with each function at all echelons across the Army, joint, interagency, intergovernmental and multinational communities.

"Of all [the] organizations I deal with in seeking to mitigate capability gaps and modernize the engineer regiment for the demands of multidomain operations, ERDC is ever present—engaged, aware and proactively finding solutions to tough problems," said Col. Marc Hoffmeister, assistant commandant of the U.S. Army Engineer School.

"This has been a consistent reality for me in multiple senior leadership positions," he said. "I'm confident that my personal experience is indicative of ERDC's responsive and innovative support across the Army. They are truly one of, if not the, Army's most valuable player in the future force modernization enterprise."

OPERATIONS PLAN REFINEMENT

Back in 1944, Allied leaders closely watched weather patterns, ultimately deciding to delay the invasion of Normandy by a day because of forecasted storms. Weather forecasting remains critical today. The difference is that leaders now have access to much more sophisticated predictive tools. Specialized intelligence becomes even more important as enemy anti-access and area denial methods limit port choices and require joint forces to deploy through austere points of entry.

ERDC has developed tools and data analytical capabilities that can tell leaders which ports and beaches are accessible and can provide assurances about whether operating conditions will affect meticulously developed strategies.

ERDC's Rapid Operational Access and Maneuver Support (ROAMS) tool determines if vessels can maneuver in coastal, littoral and riverine zones to access beaches and ports, highlighting debarkation sites and which of the Army's lighterage craft—used to transport equipment, cargo and personnel between ships and from ship to shore—are best suited for mission conditions. Using forecasts of environmental conditions, including water depth, currents and tides, ROAMS calculates navigable routes through the littoral zone and provides those paths over the network to vessel operators and command groups as needed. During ongoing assaults, ROAMS embedded with multidomain formations would enable faster command decisions. Leaders planning operations can seamlessly transfer ROAMS route data to virtual ship simulators for a more high-fidelity analysis that can help them to refine plans.

After selecting a place to land, planners can get the most comprehensive insight into port characteristics by using ERDC's

Port Operations Rating Tool (PORT), a cloud-computing, web-based tool that serves as an in-depth repository of all information for approximately 6,000 ports worldwide. PORT gives the transportation planner the most up-to-date and comprehensive intelligence on sea ports, such as the number of available berths and cranes, cargo capacity and navigation channel depths. This tells military planners what vessels they can bring into a port and gives them the ability to data-mine and analyze port characteristics and their limitations for military use, and receive initial "throughput" estimates for extreme cargo such as the main battle tanks that have never touched some commercial coastal facilities.

In addition to the commonly known major terminals and world ports, PORT is the sole catalog of medium, small, extra-small and fully austere (beach) sites. Planners can rapidly establish an alternate course of action or location when access to a large, primary port is denied. By using overhead imagery and other intelligence data to remotely engineer unavailable maritime critical characteristics, PORT creates models for compact forces to gain footholds in obscure, austere points of entry. It also simulates features like spacing requirements, cargo capacity and ship lanes that are more difficult to plan during austere beach landings. When a port has been heavily damaged, the tool's modeling capability helps engineers sequence repairs and determine the fastest way to bring it back to full capacity.

SHIP-TO-SHORE PROJECTIONS

Not only is ERDC improving the Army's technical intelligence, it uses this intelligence to simulate vessel landings in severe environments and model inland ground vehicle mobility. By seamlessly combining these single-domain tools, planners can virtually replicate the projection of forces from sea to inland objective. They can rehearse how well the natural ship channel will accommodate a military vessel, determine transit times and chart traffic patterns.

KEEPING IT REAL
ERDC'S ship simulator receives information on environmental conditions from tools such as ROAMS, which determines if vessels can maneuver to access beaches and ports. The data supports operations planning as well as actual assaults. ERDC has developed a suite of tools and data analytical capabilities that can provide assurances about whether operating conditions will affect meticulously developed strategies—an important capability in a multidomain environment.

"[ERDC] gives the warfighter and the sustainer some analytical tools to get after some of the challenges we have in the future fight," said U.S. Army Transportation Corps Regimental Chief Warrant Officer Jermain Williamson. "It definitely gives the warfighter some tools to make some decisions based on risk. Technology enhances your ability to make good decisions based on the information."

ERDC has used ship simulator and vessel-response models since the early 1980s to evaluate federally maintained navigation channels in the continental United States, a powerful example of how ERDC is able to leverage the Army Corps' Civil Works mission into technologies for use by the military.

Recently, ERDC has begun to apply its latest state-of-the-art ship simulator to military uses by assisting the U.S. Marine Corps in conducting a virtual amphibious assault on a location very similar to those encountered during the invasion of Inchon, South Korea, in 1950. The U.S. Navy provided experienced craftmasters to pilot the Landing Craft Utility 1600 series used in the virtual assault. Their assessment was that the simulator provided a realistic environment and that the handling of the virtual Landing Craft Utility closely resembled that of an actual craft.

"We are applying the information that we gain from the environmentals that we're able to place inside this particular ship handler," said Thomas McKenna, an amphibious operations subject-matter expert at Marine Corps Intelligence Activity. "Our greatest difficulty when responding to crisis is that in a lot of these areas, there are denied areas or areas where we have not typically operated consistently.

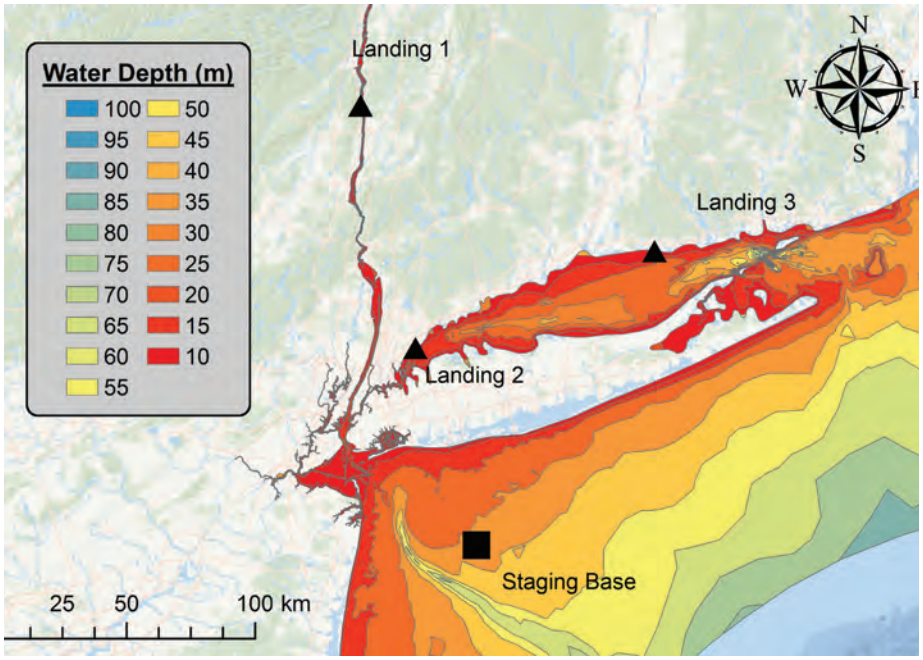
The idea is to show what's in the realm of the possible, given certain conditions, and provide people the ability to assess the risk for whatever that mission is that you're trying to accomplish."

BEYOND THE BEACHHEAD

ERDC's work is also supporting the Army's development of its Next Generation Combat Vehicle. ERDC's developmental investments in the Autonomous Navigation Virtual Environment Laboratory (ANVEL) and its Virtual Autonomous Navigation Environment (VANE) allow virtual testing of autonomous, unmanned ground vehicle systems across complex environments. As highlighted in the 2019 Army Modernization Strategy, understanding the maneuverability and off-road mobility of autonomous platforms is of strategic interest to the Army. ERDC's tools are cornerstones in assessing real-time data and providing early insight into how well autonomous algorithms handle austere conditions.

ANVEL users are able to build complete models of their intelligent vehicle systems, place those models into a virtual environment and perform interactive testing, while collecting data from virtual sensors. The modeling and simulation package combines realistic terrain graphics with sophisticated algorithms. It bridges the gap between high-visual, gamelike driving simulators and very coarse engineering software packages—showing quality performance on real-world platforms.

VANE serves as a high-fidelity tool to simulate unmanned ground vehicle operations, acting as a virtual proving ground. By using DOD High Performance Computing Modernization Program assets, VANE can accurately reproduce sensor-environment and vehicle-terrain interactions. Its goal is to provide the joint services with a reusable, free, open-source



SMOOTH SAILING

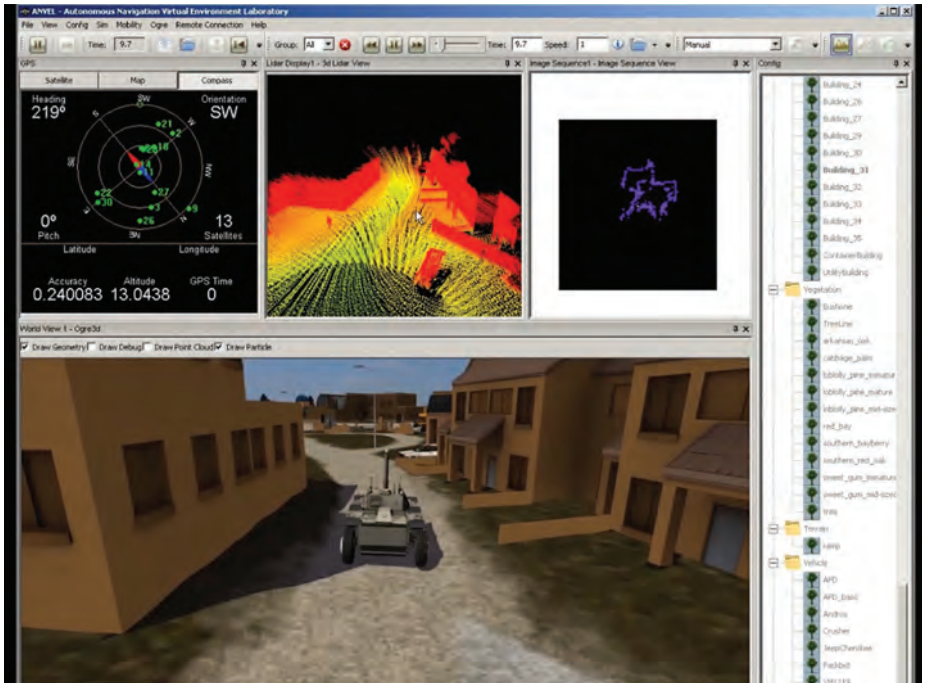
The ROAMS tool can rapidly determine whether vessels will be able to maneuver in coastal, littoral and riverine zones to access beaches and ports. During ongoing assaults, ROAMS enables faster command decisions at the speed of war.

HEADING INLAND

ERDC military analyst Rick Gurtowski, left, and ERDC research military engineer David McInnis use ERDC's ANVEL, which allows users to virtually test models of intelligent ground vehicle systems. By seamlessly combining ANVEL with ERDC's ship simulator, planners can replicate the projection of forces from sea to inland objective.

TEST RUN

ERDC's ANVEL allows users to build complete models of intelligent vehicle systems, place those models into a virtual environment and perform interactive testing.



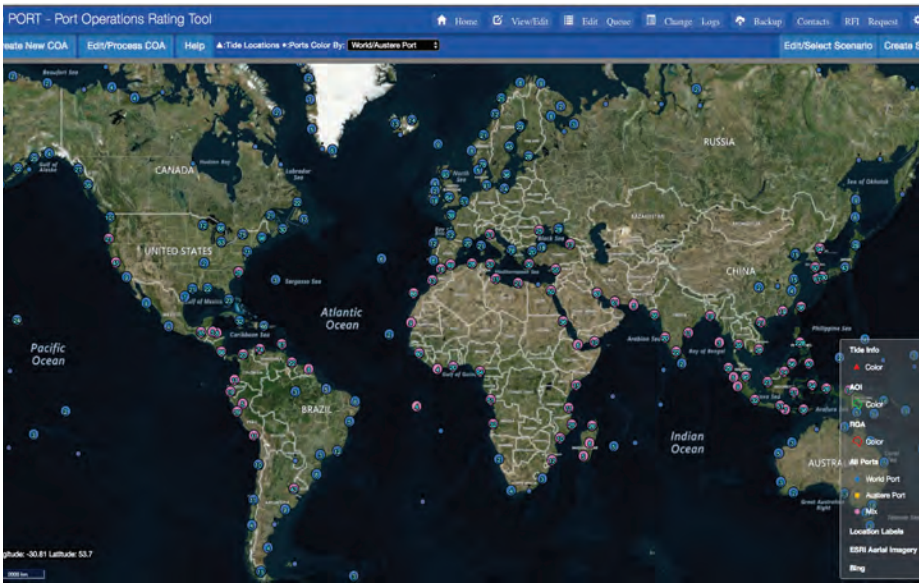
As the Army transforms to deliver a force capable of executing multidomain operations by 2028 and ready to do so by 2035, ERDC is actively engaged by providing the engineers, joint force and allied partners with innovative technology tailored for this new extreme operational pace.

modeling and simulation tool to design, develop, test and evaluate performance of autonomous unmanned ground vehicles.

With high-fidelity simulations of on- and off-road mobility, VANE also provides a tool for end-to-end mission simulations to help users better develop requirements, tactics, techniques and procedures for new autonomous unmanned ground vehicles. When the ship simulator works in conjunction with VANE and ANVEL, planners have a complete ship-through-shore package to shape projection, movement and maneuver mission planning.

"When we pair these two things, we're not just projecting materiel and personnel onto the shore … but the timing of the offloading piece gets better because we can actually simulate it with ANVEL," said Keith Martin, a research physicist at ERDC's Coastal and Hydraulics Laboratory. "We are able to start out at sea and reach all the way to the ultimate objective with one tool."

Anticipating locally changing operating-environment conditions can be a challenge in anti-access and area denial environments. ERDC's modernized software



PORT OF CALL

Through its Port Operations Rating Tool (PORT), ERDC gives users comprehensive insight into approximately 6,000 ports worldwide. PORT is also the sole catalog of medium, small, extra small and fully austere (beach) sites, allowing planners and analysts to evaluate "what if" scenarios.

ON THE GROUND

VANE serves as a high-fidelity tool to simulate unmanned ground vehicle operations, accurately reproducing sensor-environment and vehicle-terrain interactions.

and synthetic environments help leaders to refine operational execution windows and predict likely outcomes during realistic operating conditions. This synthetic rehearsal gives leaders early insight into hidden hazards, natural pitfalls and potential vulnerabilities so they can pivot and ensure the mission's ultimate success.

"Multidomain convergence has three processes we're trying to merge: stimulating the enemy, seeing the enemy and striking the enemy," said Lt. Col. Mark Van Horn, science and technology chief at the Intelligence Battle Lab at Arizona's Fort Huachuca. "I think that one of the key roles ERDC has in shaping technologies for tomorrow's warfighters is understanding how soil conditions, weather and hydrology all interact to impact the Army's ability to do those three things."

CONCLUSION

From the earliest days of the United States, military engineers have supported senior leaders' decisions with sound data and professional judgment. Indeed, ERDC and the Army engineers continue to discover, develop and deliver solutions for Army and joint service to win during multidomain operations.

The diversity of the engineer mission and ERDC's portfolio will require multiple article installments. Future articles will highlight ERDC's critical role in mitigating the enemy's layered standoff during armed conflict, cutting-edge geospatial engineering for convergence of operations, and modernization of installations to streamline fielding and training of the Army's emerging capabilities.

*For more information, contact **ERDCinfo@usace.army.mil**. Watch a related video at **https://www.youtube.com/watch?v=B_ULkdqKE28**.*

NICHOLAS BOONE is the senior scientific technical manager and technical director for Force Projection/Maneuver Support at ERDC. He is currently completing his M.S. in civil engineering from Mississippi State University and received his B.S. in mechanical engineering from Louisiana Tech University. He holds five patents and is a member of the Society of American Military Engineers, the American Society of Mechanical Engineers, the Association of the United States Army and the Army Engineer Association.

INTERNATIONAL

ALLIED INTEROPERABILITY

ITCs started as interoperability offices. In Germany, this meant building collaboration agreements to support development of a main battle tank. The MBT70 is the common ancestor of the M1 Abrams and the Leopard tanks, which have common components, such as the L44/M256 120 mm smoothbore cannon. (Images courtesy of the author)

INNOVATION

The Army's international technology centers seek the most innovative solutions possible through foreign partnerships.

by Lt. Col. Marc Meeker

When the U.S. Army Futures Command (AFC) was created in early 2018, it brought together requirements writers from the Army's Training and Doctrine Command with the scientists and engineers from the newly designated Combat Capabilities Development Command (CCDC). In one bold stroke, the Army put the thinkers with the creators. As part of the deal, AFC also inherited a network of international offices within CCDC. These are the Army's international technology centers (ITCs), tasked with facilitating collaborative research and development around the globe.

The Army originally established research and standardization groups in 1948 to conduct collaborative research with Australia, Great Britain and Canada. These offices also underpinned technical standardization within NATO, which was formed in 1949. When standardization groups moved under U.S. Army Materiel Command, they stayed true to their original intent of facilitating grants for promising research, keeping the Army apprised of the newest international technology developments and working closely with foreign scientists. Now, reflagged as ITCs, they have further evolved into offices that act as international touch points for the Army's research and acquisition enterprises. ITCs answer the call for international collaborative research and development in three ways: opening pathways for collaboration; facilitating maturation of Army-relevant technologies; and finding technologies better than the state of the art to give options to Army program managers. The ultimate goal of ITCs is to give the Army's research and acquisition enterprises the most promising of international options in the materiel development process.

In light of rapidly evolving technological threats and geopolitical tensions, ITCs have become more relevant than ever. China is emerging as a world leader in areas such as artificial intelligence, and Russia is adopting new techniques to counter American superiority on present-day battlefields, such as Ukraine and Syria. Working with international partners is a smart strategy, and ITCs, in close cooperation with the Army science and technology enterprise that they support, are a viable pathway to achieve this goal.

As AFC works to define its international footprint, there are four recommendations to improve and leverage the ITCs: Clearly define strategies and roles in the international arena; keep track of what has been done and who is doing it; show our partners we are serious; and hire the right people with the right talent.

STRATEGIES AND PRIORITIES

The creation of AFC changed established relationships in the Army's acquisition community and created turbulent second-order effects in the complex international arena where ITCs operate. ITCs typically sit at U.S. embassies overseas, where they represent the Army's research and development enterprise in searching for technologies and facilitating interoperability. However, for ITCs to effectively accomplish their international collaboration goals, they must also engage with DOD offices, the Army acquisition enterprise, and international partners both within and outside of NATO. As this interactive network slowly evolves, AFC must define and prioritize the research and technology it is seeking. The "Big Six" modernization priorities represent a solid start; in fact, they are a near-term shopping list for many technologies that were developed 20 years ago and are only now coming to fruition.

To make the most of existing international partnerships and relationships, AFC must ensure that ITCs have a top-level engagement strategy that identifies the most important systems, subsystems and technologies necessary for the Army to dominate the interoperable and high-tech battlefield of tomorrow. The Army Research Laboratory's essential research programs are an example of releasable, far-reaching, relevant technological priorities that can be pushed to foreign universities, friendly foreign ministries of defense and even foreign industry to find world-leading research. However, they compete with the immediate goals of the modernization priorities, the Training and Doctrine Command's Army Warfighting Challenges, and integrated priority lists—often classified and non-releasable—from the Army's subordinate combatant commands.

Combined with DOD-level technology focus areas, the priority list is too long to be effective. By blending input from key stakeholders and nailing down the challenges to U.S. research (in government and industry), AFC can provide an effective path for ITCs to engage with international partners. The result: The best scientific minds around the globe will be thinking about the Army's toughest technological challenges and filling the pipeline for solutions down the road. ITCs are well aware of the Army's modernization priorities and

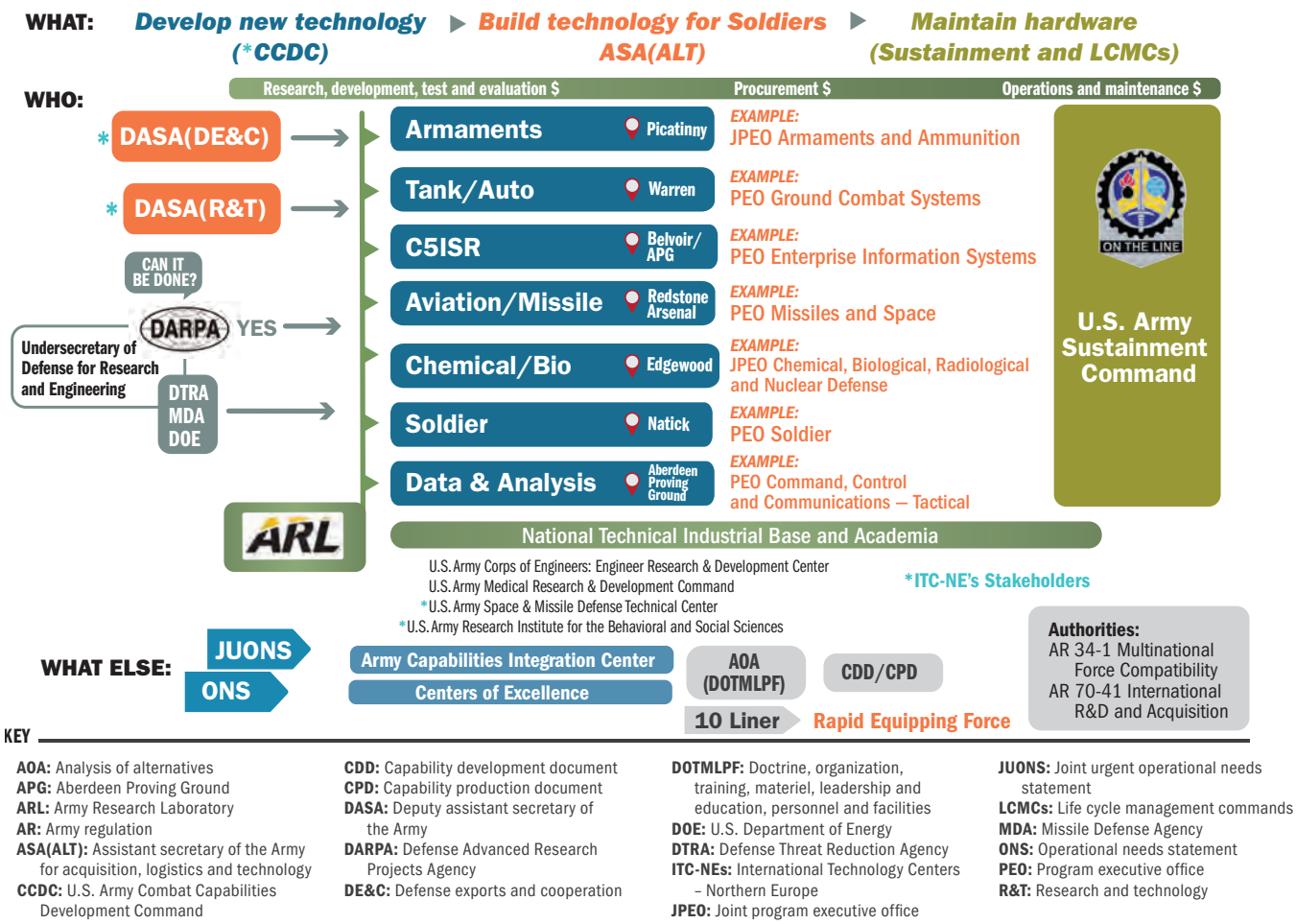
How complicated is ITC's stakeholder network? Very.

The deputy assistant secretary of the Army for defense exports and cooperation (DASA(DE&C)), under the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), has statutory responsibility for international armaments cooperation (which includes collaborative research and development), but Army Futures Command and CCDC own the roughly 13,000 Army scientists and engineers that ITCs tap for the right subject-matter expertise.

ASA(ALT) also owns the deputy assistant secretary of the Army for research and technology (DASA(R&T)), which channels funding for 6.1 to 6.3 basic and early applied research to the Army's science and technology enterprise, both within the United States and on the international front. These research and development funds underpin the grants that ITCs use to mature foreign basic research to answer far-reaching Army technology challenges, but ITCs must keep pace with DASA(R&T)'s research priorities, since DASA(R&T) pays the bills.

Finally, ITCs are funded by HQDA G-3/5/7 to facilitate "interoperability," a term that nebulously describes the Army's ability to fight side by side with foreign allies. Interoperability encompasses two broad areas: the tactics, techniques and procedures needed to work with allies, and the underpinning technology that allows U.S. systems to shoot, move and communicate with allies. Combatant commands focus on the former with joint exercises; ITCs, in conjunction with U.S. Embassy Offices of Defense Cooperation, the eight Army research centers and program executive offices, focus on the latter, facilitating the co-development of defense technologies and systems that work on the international battlefield.

FIGURE 1



STAKEHOLDERS

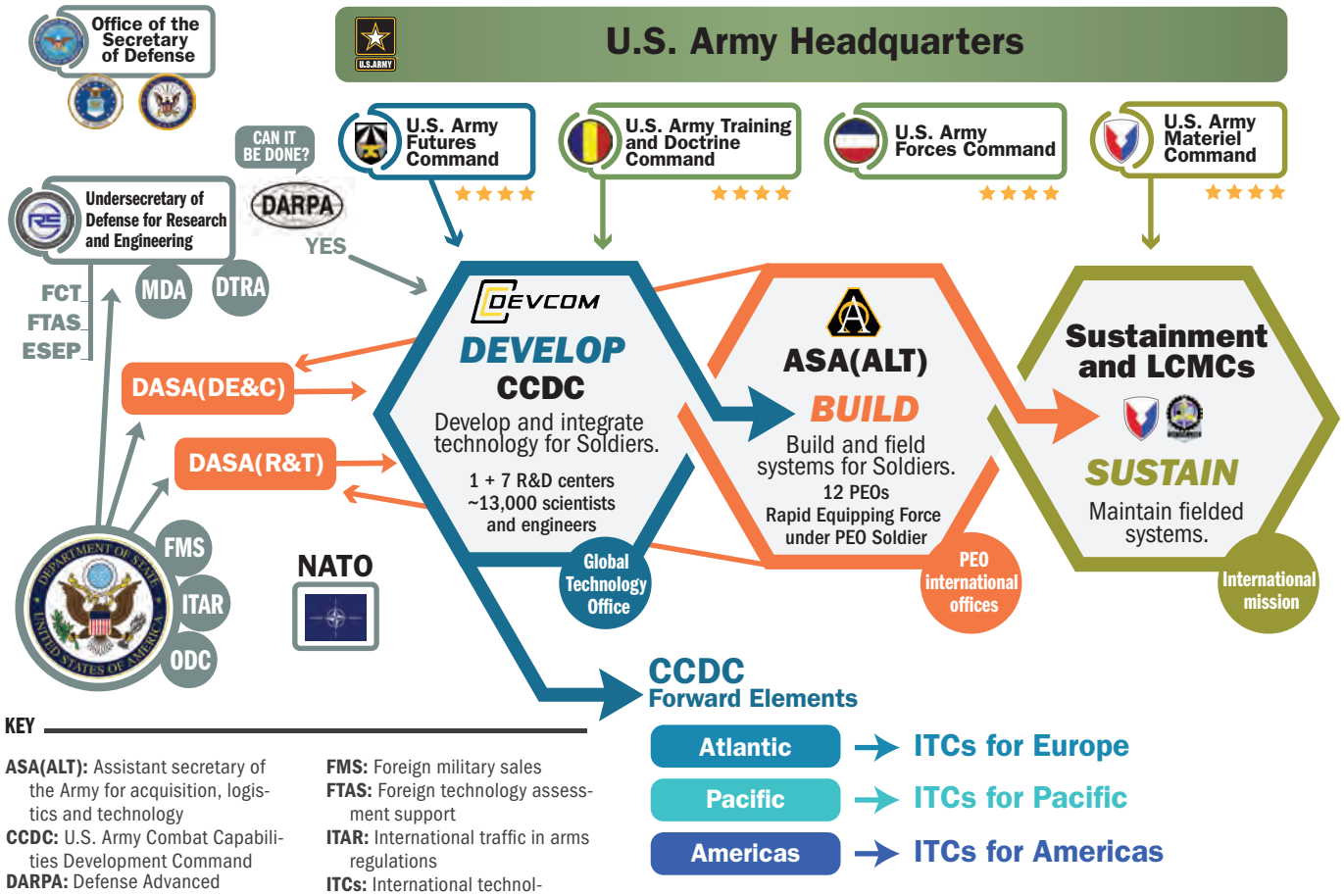
ITCs answer to many masters. For example, the ITC for Northern Europe, located in Koblenz, Germany, has 29 unique stakeholders. ITC efforts ultimately give program managers options to answer technological challenges, with the tangible benefits of improved interoperability, cost savings and world-leading technology, but ITCs also plant seeds for research and development that will take decades to mature. All the while, the work ITCs do benefits the foreign partner providing the technology, too.

eight cross-functional teams. As scientists, engineers, program managers and cross-functional team leads encounter challenges with U.S. technology development, ITCs stand ready to help with long-established relationships and international collaboration tools. (See Figure 1.)

KEEPING TRACK

The CCDC is looking at various methods to track and categorize the wide variety of defense-related technologies in development around the world. Recently, it adopted the Vulcan database used by the Special Operations Forces Acquisition, Technology and Logistics Center. Vulcan is a web-based scouting tool used to discover and facilitate the sharing of vendor technologies. This is a powerful step in the right direction for CCDC, even if Vulcan isn't the perfect tool for the job. A consolidated database would amplify the collection of overlapping efforts from the international arena, which includes ITCs, the U.S. Department of State, DOD, sister services, and Army acquisition offices such as the deputy assistant secretary of the Army for defense exports and cooperation (DASA(DE&C)). (See Figure 2, Page 58.)

FIGURE 2



KEY

ASA(ALT): Assistant secretary of the Army for acquisition, logistics and technology
CCDC: U.S. Army Combat Capabilities Development Command
DARPA: Defense Advanced Research Projects Agency
DASA: Deputy assistant secretary of the Army
DE&C: Defense exports and cooperation
DTRA: Defense Threat Reduction Agency
ESEP: Engineer and Scientist Exchange Program
FCT: Foreign comparative test
FMS: Foreign military sales
FTAS: Foreign technology assessment support
ITAR: International traffic in arms regulations
ITCs: International technology centers
JPEO: Joint program executive office
LCMCs: Life cycle management commands
MDA: Missile Defense Agency
ODC: Office of Defense Cooperation
ONS: Operational needs statement
PEO: Program executive office
R&T: Research and technology

WHO DOES WHAT?

In the far-reaching landscape of defense acquisition, this is where the U.S. Army's ITCs fit. With this many players contributing to its modernization initiatives, the Army is looking for a better database with which the ITCs can track all of those efforts.

In late 2018, ITCs in Europe laid the groundwork for a collaborative workshop on hypersonic materials. A month into this effort, the ITCs discovered that the U.S. Air Force was about to sign a bilateral collaborative agreement on hypersonic materials with a foreign partner. A month after that, U.S. Army Space and Missile Defense Command's Technical Center was named as the lead agency in hypersonic research. These unintentionally convoluted initiatives would benefit from an aggregated and ongoing effort to maintain a database at the AFC or CCDC level, including the network of researchers, supporting agencies, world-leading industry partners and testing facilities.

A technology database isn't exclusively for a high-profile technology like hypersonics, however; AFC would also benefit from aggregating market research on engines for main battle tanks, or helicopter transmissions, or unmanned ground systems. Through painful experience, ITCs have learned that the Army has a Network Cross-Functional Team with a chief of market research, who competes with market researchers at the Program Executive Office for Intelligence, Electronic Warfare and Sensors, who get international trade show input from DASA(DE&C), which competes with work being done or funded by CCDC's C5ISR Center.

All of these entities (under the umbrella of the U.S. Army) share the goal of finding world-leading technology to improve command, control and situational awareness on the battlefield. Any one of them would benefit from a consolidated database that allowed them to build on the previous work of colleagues. A database that tied in the efforts from sister services (the Air Force Research Laboratory and the Office of Naval Research, and DOD), would be even more effective, as all of these offices play a role in the international arena.

A secondary benefit of using an aggregated database to track ongoing work is the ability to keep up with who owns the state of the art in either research or technology. Research journals highlight universities that conduct world-class research and countries that are focused on building fundamental and applied research infrastructure. Databases can quickly leverage analytics to chew through, say, published and peer-reviewed academic papers worldwide. The U.S. Navy's bibliometric analysis tool does this, and ITCs have used it to identify the most promising international universities with which to engage. Analytic tools can refine potential partners for collaborative engagement, though they are most effective when their outputs are vetted by seasoned experts—almost like using Google's language translation algorithms. Users can get a basic translation from them, but to achieve an accurate translation, it is better if users already understand the language's nuances.

A truly useful management tool would capture past and present government projects, a rundown of leading industry for developed technologies and the most highly rated international universities for basic and early applied research. This would allow a new ITC director, program manager, or research center scientist to quickly determine where to apply their efforts for maximum effect. The biggest challenge would be establishing access criteria and classification levels.

WE MEAN BUSINESS

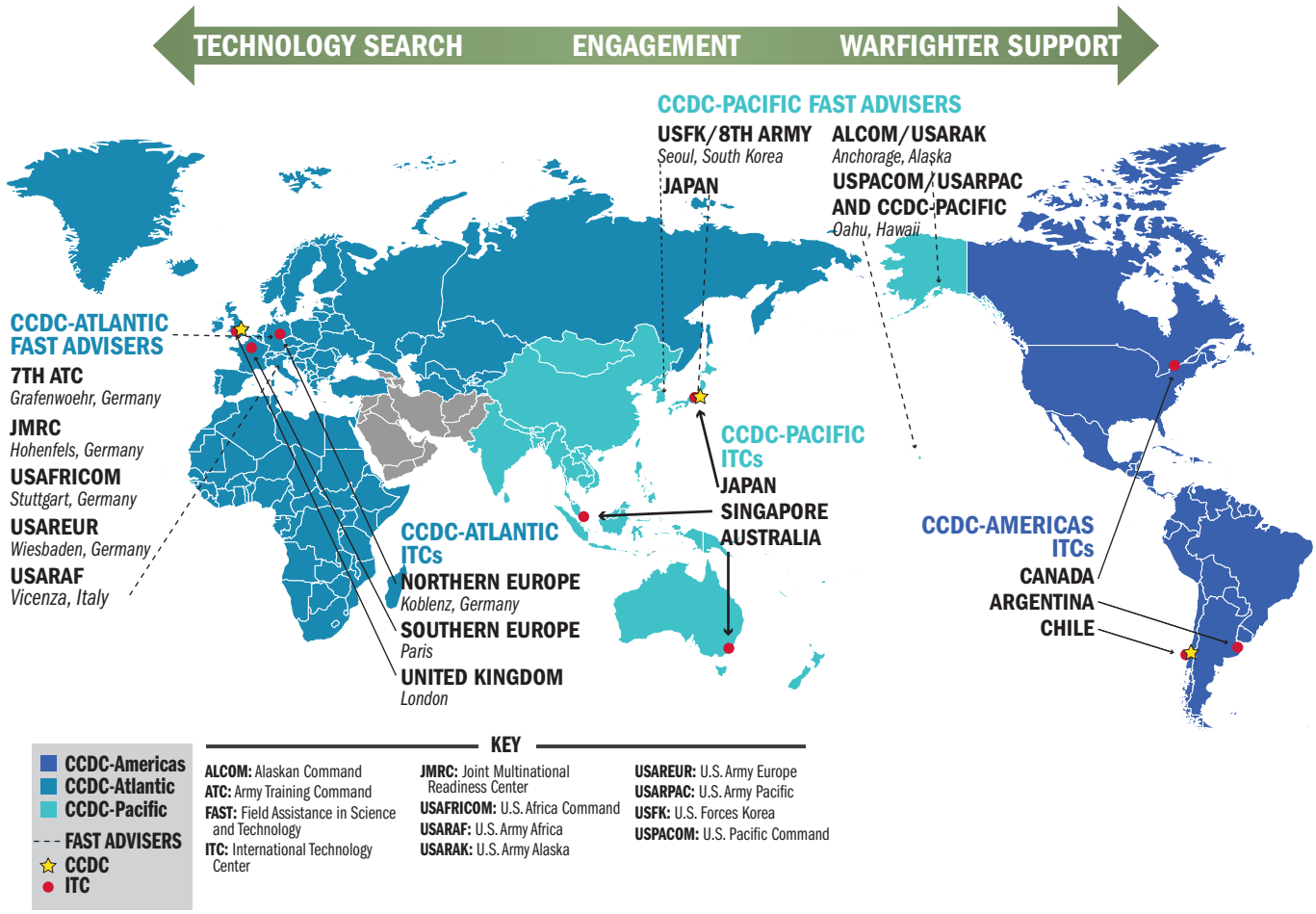
The importance of ITCs cannot be overstated. At times, the director of an ITC represents the breadth of the Army's science and technology across the table from a foreign partner. To bring that science and technology enterprise to bear, ITCs need to be empowered to reach out to key leaders throughout the research and development and acquisition communities. Those key leaders must also be aware that their decisions to engage internationally may produce technological progress, but also political messaging. This is a secondary mission that ITCs bear: communication with the U.S. State Department, DOD, and their foreign equivalents to ensure that collaborative research and development sends (or sometimes, doesn't send) a message to partners and the rest of the world. ITCs don't have the resources to shape political messages, but they must be wary of how their work might be construed and advise senior leaders accordingly.

Innovation internationally speaking: How ITCs demonstrate ingenuity

Innovation means solving a problem in a unique or creative way. ITCs, by definition, are thinking outside of borders, and here are two examples:

1. At the request of Gen. Mark A. Milley, then-chief of staff of the Army, ITCs worked with DASA(DE&C) and NATO partners to gather testing and evaluation data on fielded infantry fighting vehicle systems through existing information exchange agreements. This effort provided an "honest broker" evaluation of existing foreign systems, saving procurement, testing and evaluation dollars in the search for the Army's Next Generation Combat Vehicle (cited in the nomination of the CCDC's Global Technology Office for the 2019 David Packard Award for Acquisition Excellence), while demonstrating solidarity with our NATO allies.

2. An ITC working with South Korea facilitated a co-developmental agreement that directly helped U.S. forces address a real-world challenge: To keep errant training rounds from leaving the range's impact area, tracking radar (part of an international collaborative research project) was put in place at Rodriguez Live Fire Complex to track rounds for safety while characterizing radar performance in combined fires environments. This project was a win for U.S. Forces Korea, the engineers of the system and the South Korean people living near the range, located close to the border with North Korea.



INTERNATIONAL PRESENCE

This map shows the location of the U.S. Army's ITCs around the world.

ITCs should also be empowered to act decisively if experts deem specific research or a certain technology to be "world leading." Currently, CCDC's Global Technology Office acts as the Army's central executive office for the foreign technology assessment support and foreign comparative test programs, both of which are funded at the Office of the Secretary of Defense level. Leveraging those dollars for Army purposes is smart, but slow. Hypothetically, if an innovative foreign company developed a material that could make Soldiers invisible on the battlefield, the purchase of a $300 sample of the material for testing would take 12 to 18 months. If AFC is serious about capturing innovative foreign technologies, at least on a small scale, an internal pot of money for rapid acquisition of test samples would prove effective.

Similarly, in the area of basic or early applied research, the grants proposed by ITCs to foreign academic researchers often pale in comparison with those from private industry, venture capitalists and even other foreign governments. If AFC aims to capture the best of foreign research for the United States, it must be willing to up its game if required. If the research is truly world-leading, then AFC only stands to benefit.

Finally, the Army's Engineer and Scientist Exchange Program can build sincere relationships with partners. (For more on the program, see "Overseas Opportunities" in the January-March 2018 issue of Army AL&T.) Long-standing partners in the exchange program include Germany, South Korea and the Netherlands, for yearlong research projects on technology that is relevant to Army priorities. ITCs work hand in hand with DASA(DE&C) to make the most of this valuable program, and sponsorship by AFC and CCDC leadership would further enhance it.

By bringing ITCs (or their higher headquarters at CCDC forward element commands) in early and often, science and technology and acquisition leaders can facilitate a consistent and intentional message to foreign partners: We are serious about collaborating with our allies and will do so in a logical, defined way.

TALENT MANAGEMENT

Working at an ITC is not for everyone. Despite international locations, the job comes with surprising challenges: Every project is slow-moving, return on investment is hard to define, and frequent travel means that bags are always packed. An ITC team member has to be extroverted, emotionally intelligent, multilingual, technically competent (engineering degrees preferred), and familiar with the breadth of the acquisition enterprise. (For a recent participant's perspective, see "Working Globally, Thinking Locally," Page 62.)

Military ITC members also need some slack in the career timelines: Despite their level of responsibility, ITC directorships are not board-selected key leadership ("command slate") positions, so being in one too long will impact promotion prospects. For many potential candidates, family concerns also dominate, as an international move can uproot school-aged children, force decisions on real estate and limit job opportunities for spouses.

Finally, international experience is a plus, but there is no substitute for training in international program management. The Defense Acquisition Workforce Improvement Act provides only three career certifications for Army officers: contracting, program management, and test and evaluation. However, despite the lack of an international career certification similar to the one offered to Army civilians, Army officers can still take Defense Acquisition University classes, which are essential to developing a foundation for presenting competent and capable collaboration in support of the Army's international search for the world's best technology.

NEW TECH, FOUND

An ITC director engages with the Dutch and German armies as they roll out the Leopard IIA6 FüFa, a network-enabled main battle tank with improved situational awareness for NATO missions.

CONCLUSION

ITCs have been in place for over 70 years and have well-established mechanisms and networks for international research and development collaboration. What does this ultimately mean for the warfighter? In the past, it meant integration of systems such as the L/44 120 mm smoothbore cannon on the M1 Abrams main battle tank (the L/44 was developed in Germany), as Jean M. Dash and David J. Gorsich state in their 2012 publication, "The TARDEC Story: Sixty-Five Years of Innovation."

In the future, it could mean artificial intelligence algorithms developed in conjunction with Czech universities, unmanned aerial systems underpinned by Austrian Army research, and third-generation forward-looking infrared scopes built with technology from Lithuania. As AFC seeks to answer the Army's technology needs, ITCs bring the best of what the world has to offer.

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

LT. COL. MARC MEEKER is director of the International Technology Center – Northern Europe, with offices at the Frankfurt Consulate and Koblenz, where he is co-located with the German Ministry of Defense's acquisition arm. He holds an MBA with an acquisition focus from the Naval Postgraduate School and an undergraduate degree in mechanical engineering and design technology from Oklahoma State University. He is Level III certified in program management and an Army Acquisition Corps member. He speaks conversational Spanish and is fluent in German (with a hint of a Bavarian accent).

DR. GENEVIEVE FLOCK

COMMAND/ORGANIZATION: U.S. Army Combat Capabilities Development Command Soldier Center

TITLE: Research biologist

YEARS OF SERVICE IN WORKFORCE: 3.5

EDUCATION: Ph.D. and M.S. in animal science and B.S. in environmental science, University of Connecticut

WORKING GLOBALLY, THINKING LOCALLY

Recently returned from a four-month assignment in Frankfurt, Germany, Dr. Genevieve Flock is hoping that international contacts she developed can help keep American Soldiers safe around the world.

Flock is a research microbiologist on the Food Protection and Innovative Packaging Team (FPIPT) in the Combat Feeding Directorate at the U.S. Army Combat Capabilities Development Command Soldier Center (CCDC-SC) in Natick, Massachusetts. She supports the mission of testing food and water safety technologies and conducting applied research with the goal of understanding and preventing food and water safety risks that could affect warfighters.

"Being a part of the Army Acquisition Workforce allows me to be part of the greater mission and contribute to improving capabilities—a noble cause that's not driven by profit," she said. "I feel lucky to work for an organization that is driven by scientific and engineering solutions and is committed to training future leaders."

As part of that training, Flock completed an assignment with the International Technology Center (ITC) – Northern Europe, part of CCDC – Atlantic. In all, there are nine ITCs worldwide, tasked with engaging with academia, industry and foreign defense ministries to facilitate international collaborative research and development. Flock's 120-day tour, funded by the Defense Acquisition Workforce Development Fund, provided her the opportunity to learn about international collaborations involving Army modernization priorities and to understand the tools that are available to make these engagements successful.

"I was intrigued to apply for this opportunity to learn about international collaborations and be immersed in diplomatic meetings to increase my understanding of the Army's mission abroad," said Flock, who has been in acquisition for nearly four years. "In this early stage of my career, I think it's important to be continually challenged and exposed to new ways of thinking in order to increase my effectiveness in my current position and for future positions. What I liked about the ITC assignment was the

VALUABLE MENTORS
Flock with Tony Lee, center, ITC research engineer, and Lt. Col. Marc Meeker, ITC director. (Photo courtesy of Dr. Genevieve Flock)

opportunity it presented to increase my soft skills in networking, diplomacy and cultural relations."

The assignment "was even more rewarding than I could have imagined," she said. "Involvement with career-broadening meetings and working with ITC members provided me with new perspectives." She also gained a better understanding of the international collaboration tools, including foreign technology assessment support (FTAS) funding, basic and applied research grants and Coalition Warfare Program projects. FTAS is an Army program that awards funding, usually for a year, to conduct technology assessments, basic research studies and test and evaluation efforts on unique foreign technologies. The Coalition Warfare Program, governed by the undersecretary of defense for acquisition and sustainment, provides funding to DOD organizations to conduct cooperative research, development, testing and engineering programs with foreign partners. Funding is focused on projects that increase coalition capabilities in support of operational, technological or political objectives.

"I am now able to confidently discuss these funding opportunities to facilitate research projects with foreign partners, and I'll pass along information to CCDC-SC project officers to ensure they are aware of the benefits of collaborating internationally," Flock said.

She noted that the assignment also exposed her to "strategic thinking and the effort to broaden U.S. research relationships with numerous countries. I hadn't had a lot of exposure to that kind of big-picture thinking before." It also "reinvigorated my curiosity and interest in looking for technological solutions from nature. Meeting creative scientists conducting research in synthetic biology and invertebrate vision reminded me to think outside the box in my own research objectives and underscored the importance of interdisciplinary collaborations."

Her work wasn't limited to biology, she noted. It provided the opportunity "to work alongside excellent mentors," including Lt. Col. Marc Meeker, ITC director; Mark Cumo, ITC technical director; and Tony Lee, a research engineer at ITC who is part of the CCDC Ground Vehicle Systems Center.

"I had never worked with vehicle systems before, and in working with Tony, I learned a great deal—how threats to the system are always changing, for example, how the vehicle is designed to keep up with those threats, and exploring whether international partners might have already developed solutions for some of those challenges," she said. "In CCDC-SC, our focus is on the modernization priority of Soldier lethality, and it was great to work on issues in other priority areas."

Now back in the States, she has stayed in touch with the ITC members about possible collaborations with CCDC-SC. "I am happy to continue to help find the right connections within the Soldier Center to ensure new technologies are being passed along to the most applicable subject matter expert within the Army research labs," she said. "Also, I've been looking at the way we do things with a different perspective and trying to identify places where I can incorporate the approaches I saw at ITC in the work we do here."

Flock recommends the assignment to scientists or engineers in an earlier stage in their career who want to broaden their understanding of the Army mission and receive training in diplomacy, leadership and international engagements. "Anyone with an interest in seeing a different side of grants and data exchange agreements would benefit from this experience," she said. "It is always worth applying to an opportunity that places you outside your comfort zone in order to facilitate learning and career growth."

And for those just starting on an ITC assignment, Flock had this advice: "Don't be afraid to ask a lot of questions. The ITC staff are knowledgeable and really helpful—and if they don't know the answer to a question, they can put you in touch with someone who does. And don't be afraid to get involved in areas outside of your expertise," she added. "The best way to learn is by doing, and this program is a great opportunity for that."

Flock joined the Army Acquisition Workforce in 2016 after completing her master's degree. "At the start of the position, I was introduced to acquisition terminology and was encouraged to learn about technology transition and where research and development fits into this process. I am encouraged to be creative and collaborate with innovative researchers from academia to accomplish goals more effectively."

Even in her relatively short tenure in the Army Acquisition Workforce, she has noticed changes taking place. "Project timelines are becoming shorter," she said. "We used to see a lot of four-year projects, but now they're three years or fewer. Fortunately, programs like ITC and the contacts I've made through my assignment can contribute to overcoming that challenge. I've learned about the value of collaborating with industry and academia, both domestically and internationally, which provides more tools and options for getting projects completed on shorter deadlines."

— SUSAN L. FOLLETT

HIGH-PERFORMANCE ADVANTAGE

SB>DEFIANT
The SB>DEFIANT produced by Sikorsky-Boeing is one of two aircraft selected for further testing under the JMR-TD program, a precursor to the Army's Future Vertical Lift effort. (Image courtesy of Boeing Co.)

Supercomputing allows acceleration of the acquisition timeline.

by Scott Sundt, Alexandra Landsberg, Megan Holland and Owen Eslinger

The rollout of the National Defense Strategy in early 2018 had an immediate impact on the way DOD approaches its mandate for defending the United States. It has sent ripples throughout the services and caused much focused reflection on the strategic, operational and tactical priorities that must be addressed in a future world where potential near-peer adversaries may have reached parity with our own force structure. Within DOD research, development, test and evaluation communities, the call has gone out to speed up innovation, reduce acquisition timelines, and produce game-changing weapon systems at reduced cost and risk. The directive from the National Defense Strategy is clear: "Deliver performance at the speed of relevance." The American warfighter needs 21st-century weapons systems now, not 10 or 15 years from now.

Fortunately, DOD finds itself at a unique moment thanks to the steady progress of digital engineering and high-performance computing over the past 20 years. In response to increasing access to supercomputing, massive data collection, high-fidelity physics-based software development, and high-speed networks, DOD released its Digital Engineering Strategy in June 2018. This document has set a course for DOD and the services to take advantage of these enabling assets and apply them to the emerging technology challenges.

The combination of the National Defense Strategy and the Digital Engineering Strategy has provided the Army with the impetus for fundamentally restructuring the way it equips its forces for the future. The Army's top six modernization technologies (long-range precision fires, Next Generation Combat Vehicle, Future Vertical Lift, the network, anti-missile defense and Soldier lethality), along with its eight cross-functional teams and a new four-star U.S. Army Futures Command, have provided a solid foundation and direction for the Army research,

development, test and evaluation community and program executive offices.

HIGH PERFORMANCE COMPUTING PROGRAM

The DOD High Performance Computing Modernization Program provides high-performance computing capabilities and expertise, enabling National Defense Strategy priorities across DOD. It provides DOD with a comprehensive computational modeling and simulation ecosystem that integrates supercomputing capabilities, high-speed networks and computational science expertise that enable scientists and engineers to conduct a wide range of focused research, development and test activities.

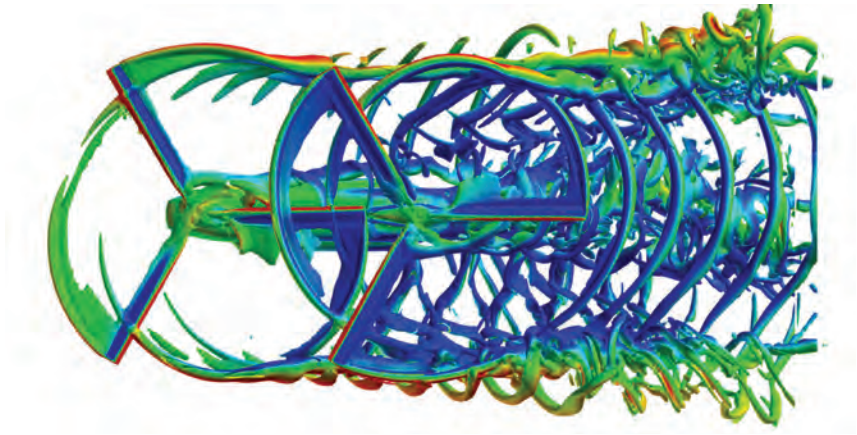
The program, with a $280 million annual budget, was chartered by Congress to revolutionize warfighter support through increased application of high-performance computing to critical research, development, test and evaluation and acquisition engineering initiatives. This is a triservice effort managed for the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) by the deputy assistant secretary of the Army for research and technology and executed by the U.S. Army Engineer Research and Development Center (ERDC) in Vicksburg, Mississippi.

By amplifying the creativity, productivity and impact of the research, development, test and evaluation and acquisition engineering communities, high-performance computing provides unprecedented insight into the physical world that would be too costly, dangerous or time-consuming to obtain through observation and experimentation alone. The program includes DOD supercomputing resource centers; software applications; and secure networking. The High Performance Computing Modernization Program also leverages specialized expertise from DOD, other federal departments and agencies, industry and academia to mature leading-edge software application codes. This expertise complements that of DOD scientists and engineers, helping customers achieve critical mission objectives.

As the demands and availability for computational resources have grown over the years, the user base and the size and complexity of jobs have grown to take advantage of the opportunities afforded by increased resources. In fiscal year 2019, the High Performance Computing Modernization Program internal database indicated there were over 3,000 active users. Large-scale high-performance computing simulations have transformed from a niche activity to a mainstream activity.

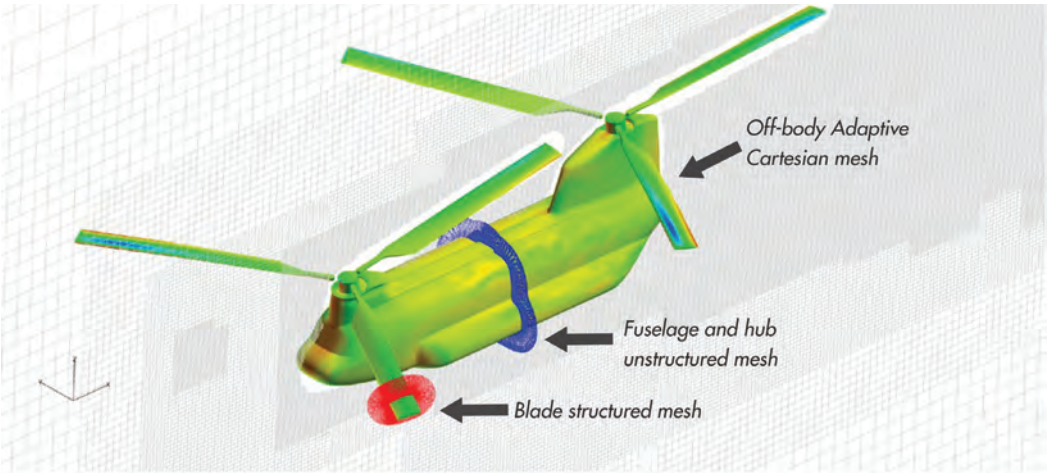
The software applications of the High Performance Computing Modernization Program provide a suite of software development and support services aimed at optimizing software capabilities to design, develop, test and deploy superior DOD capabilities. These efforts and services include the Computational Research and Engineering Acquisition Tools and Environments (CREATE) software development activity, which furnishes critical modeling support in the world of digital engineering prototyping.

CREATE is the program's premier vehicle for addressing DOD's current and future design and analysis efforts for its major acquisition programs. CREATE provides innovative applications of its software tools for developing and optimizing aircraft, ship, ground vehicle and radar antenna designs, and allows the acceleration of the acquisition timeline. It has expanded the acceptance, use and adoption of its various physics-based software tools to over 160 defense organizations. Its products are now becoming an integral part of major defense acquisition programs for design space exploration, design analysis, and performance prediction and testing across the weapon system life cycle.



IDENTIFYING ISSUES

Helios software captures complex, unsteady aerodynamics phenomena to identify potential performance issues and evaluate mitigation designs for the Advanced Chinook Rotor Blade. (Image by Andrew Wissink, U.S. Army Aviation Development Directorate)



SIMULATION ACCURACY
An ERDC visualization of a CH-47 Helios computational fluid dynamics mesh system helps engineers understand the quality and accuracy of simulations. (Photo courtesy of High Performance Computer Modernization Program)

Present acquisition programs largely follow an empirical "design-build-test" iterative methodology. This results in late discovery of design flaws, issues of immature technology and system integration problems. Rework and redesign efforts contribute substantially to cost overruns and schedule delays. By employing a "model-test-build" paradigm, optimized engineering designs can be developed early in the acquisition process using CREATE tools. Costs can be substantially reduced; schedules shortened; and design and program flexibility and agility increased. Above all, the reduction of design flaws, the quick and flexible development of sound engineering concepts and designs, and beginning the systems integration engineering much earlier in the acquisition process all improve the performance of acquisition programs.

IMPACT ON ARMY PROGRAMS

High-performance computing supports the entire life cycle of a weapon system. Using the Army's helicopters as an example, high-performance computing is critical to the updating of legacy platforms such as the CH-47 Chinook and the H-60 Black Hawk, as well as the Army's Future Vertical Lift effort. CREATE-AV's (Aviation Vehicles) Helios software is a high-fidelity, multi-physics analysis tool for rotary-wing aircraft. Helios can calculate the performance of a full-sized rotorcraft, including the fuselage and rotors. It can also handle arbitrary rotor configurations, and analyze and predict prescribed maneuvers with tight coupling of rotor aero-structural dynamics. A highly accurate treatment of the complex air flow generated from rotor blade tips—vortex shedding—gives Helios the unique capability to assess the interaction of these vortices with the fuselage and nearby rotor blades. The large-scale calculations with Helios are run on the program's supercomputers. Helios offers the ability to predict phenomena that, a decade ago, could only be observed in flight test.

The CH-47 Block II Advanced Chinook Rotor Blade is designed for improved lifting capability in hover without compromising forward speed. Initial flight tests showed high-control system loads for the rear rotor in high-speed forward flight. Army engineers, Boeing Co. and the Project Manager for Cargo Helicopters under the Program Executive Office for Aviation formed an engineering team to address this problem. Helios was used to capture the complex, unsteady aerodynamics phenomena and explore design space to restore high-speed performance while retaining the modified rotor blade's benefits for hover. Army engineers have been able to identify potential performance issues and evaluate mitigation designs. The modified rotor blade design was successfully tested in late 2018, resulting in a significant enhancement to the combat capability of the 400-plus Chinooks in the Army inventory. In testimony to the Senate Armed Services Airland Subcommittee, Lt. Gen. Paul A. Ostrowski, principal military deputy to the ASA(ALT), highlighted the importance of the High Performance Computing Modernization Program to Army acquisition programs.

"It is absolutely critical," said Ostrowski. "With respect to the Block II Chinook (helicopter), we have avoided about $50 million of cost in terms of flight based on being able to supercompute the effects of the new rotor blades."

The Joint Multi-Role Technology Demonstrator (JMR-TD) program is a precursor to the Army's Future Vertical Lift effort, intended to demonstrate transformational vertical lift capabilities to enable programmatic decisions. Requirements for the JMR-TD aircraft were established in 2012. In 2013, technology investment

CRITICAL UPDATES

High-performance computing is critical to updating legacy helicopters, such as the Sikorsky UH-60 Black Hawk. (U.S. Army photo by Gertrud Zach, Training Support Activity Europe)

V280 VALOR

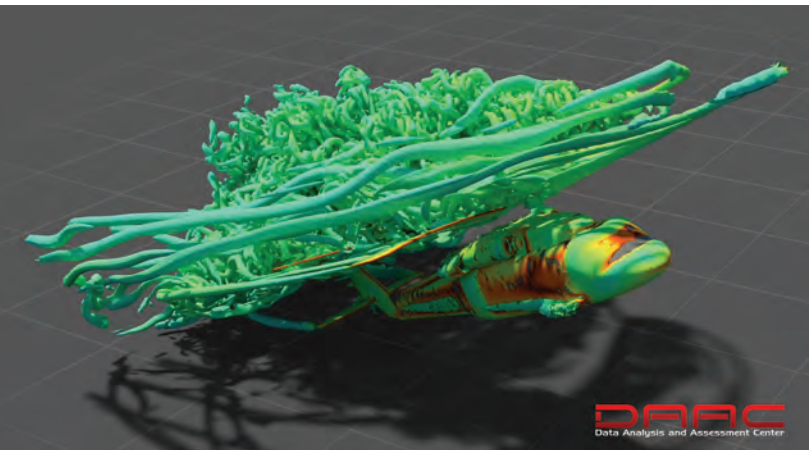
This Bell V-280 Valor is one of two aircraft selected for further testing under the JMR-TD program. (Image courtesy of Bell)

agreements were awarded to four companies—AVX Aircraft Co., Bell Textron Inc., Karem Aircraft Inc. and Sikorsky Aircraft Corp. teamed with Boeing. In an effort to better understand the aircraft and technologies being developed under JMR-TD, Helios was applied to all four of the configurations awarded under the technology investment agreements in 2013. This enabled Army aviation engineers to conduct an independent analysis of contractor proposals, resulting in more informed and timely acquisition decisions. Results from the analysis were used during the initial design and risk review to guide selection of the two demonstrator aircraft from Bell and the Sikorsky-Boeing team. Helios continues to be used to carry out further analysis on the two test-bed aircraft selected for development. Because the actual vehicles have proprietary information, these results cannot be disseminated openly.

The High Performance Computing Modernization Program also works closely with the Engineered Resilient Systems program, an effort initiated in 2012 to accelerate acquisition through the use of high-performance computing. The Engineered Resilient Systems approach combines high-fidelity, physics-based modeling, advanced data analytics, machine learning and process automation with high-performance computing to enable better-informed decisions before major acquisition milestones. The partnership with Engineered Resilient Systems allows Army high-performance computing to be used in new ways; the program recently developed an artificial intelligence and machine learning ecosystem for large-scale data management. As a result, the Army was able to consolidate terabytes of H-60 helicopter data, giving analysts the ability to explore the full maintenance dataset and enabling true predictive maintenance for the first time. When fully

VISUALIZING DECISIONS

The ERDC Data Analysis and Assessment Center provides a visualization of Helios simulations of maneuvering rotorcraft. The Engineered Resilient Systems program, using Helios high-fidelity simulations, enables better-informed decisions before major acquisition. (Image by Andrew Wissink, U.S. Army Aviation Development Directorate)



TURBULENT MODEL

The ERDC Data Analysis and Assessment Center provides a visualization of a Helios UH-60 model showing rotor wake turbulence triggered by a pull-up maneuver. (Image by Andrew Wissink, U.S. Army Aviation Development Directorate)

implemented, 100 percent of the H-60 fleet will be eligible for the oil cooler life extension program versus the 20 percent previously eligible. This has the potential to double the maintenance interval for the oil cooler, a critical component that costs several hundred thousand dollars to replace. This practice is already being extended to fleets of ground vehicles and other Army platforms.

CONCLUSION

The High Performance Computing Modernization Program is a national asset delivering high-performance computing capabilities and expertise to mission-critical challenges. Together with the Engineered Resilient Systems program, it is striving to improve acquisition efforts across all phases of the weapon system life cycle and to enable more informed and timely acquisition decisions. These programs have already demonstrated the ability to accelerate the acquisition timeline, while also reducing risk and cost to DOD, and will continue to engage in new partnerships to address the department's highest priorities.

SCOTT SUNDT is a retired Navy captain with over 30 years of active-duty service, including command at sea. He is the lead for High Performance Computing Modernization Program Acquisition and Digital Engineering. He holds an M.S. in electrical engineering from the Naval Postgraduate School, an M.S. in national strategic studies from the National War College and an M.S. in national resource studies from the Industrial College of the Armed Forces of National Defense University, and has a B.S. in physical science from the U.S. Naval Academy.

ALEXANDRA LANDSBERG is the deputy director of the High Performance Computing Modernization Program. She holds an M.S. and a B.S. in aerospace engineering from the Massachusetts Institute of Technology. She has over 25 years of experience with the federal government in high-performance computing.

MEGAN HOLLAND is a knowledge management specialist at the ERDC Information Technology Laboratory in Vicksburg, Mississippi. She has an MBA with an emphasis in marketing from Mississippi State University and a B.A. in English with an emphasis in writing from Mississippi College.

OWEN ESLINGER is the Engineered Resilient Systems program manager and a computer scientist at the ERDC Information Technology Laboratory. He holds a Ph.D. and an M.S. in computational and applied mathematics from the University of Texas at Austin, and a B.S. in mathematics from North Carolina State University.

WAVEFORM STRENGTH

Lt. Col. Brian Wong, center, chief of market research for the Network Cross-Functional Team, assesses the waveform strength of several mobile ad hoc network radio signals during the Rapid Innovation Fund capstone event at Yakima Training Center, Washington, in September. (Photos courtesy of PEO C3T Public Affairs)

SEAMLESS WAVEFORMS

The Rapid Innovation Fund enables the military and nontraditional contractors to work together.

by Kathryn Bailey

As DOD seeks to spur development of new technology, its Rapid Innovation Fund provides the financial backing for the military to work with nontraditional defense contractors to bring promising capabilities to fruition. Lt. Col. Brian Wong, chief of market research for the U.S. Army Network Cross-Functional Team (N-CFT), and Dr. Sayeed Hasan, chief engineer for Product Manager Waveforms, assigned to the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T), explained the process and preliminary outcome of their first Rapid Innovation Fund (RIF 2017) effort during a conversation conducted before the contract award.

The cross-functional team and PEO C3T are using DOD's Rapid Innovation Fund, which is intended to rapidly prototype and experiment with novel ideas from industry, and then deliver those capabilities into the hands of Soldiers in less than 12 months. They are currently implementing four separate Rapid Innovation Fund efforts.

The fund is administered by the undersecretary of defense for research and engineering and the DOD Office of Small Business Programs to provide an avenue for nontraditional vendors to work with Army programs of record to rapidly insert their technologies into acquisition programs to meet specific defense needs.

PEO C3T and the cross-functional team recently culminated RIF 2017, in which they teamed with the 1st Battalion, 504th Parachute Infantry Regiment (1/504 PIR), 1st Brigade Combat Team, part of the 82nd Airborne Division, to assess several commercial waveforms as part of an automated failover primary, alternate, contingency and emergency plan for Soldiers (automated failover is the process of automatically moving an application to a standby server in the event of a system compromise). Wong provided oversight of the entire operation, while Hasan coordinated radio training and operations.

TEAM EFFORT
PEO C3T and Network Cross-Functional Team members and vendors assess commercial waveform strength during their Rapid Innovation Fund capstone event at Yakima Training Center.

ASSESSING THE PACE
Soldiers with the 1/504 PIR participate in the Rapid Innovation Fund capstone event, where they assessed three separate commercial waveforms designed to enhance the PACE plan for Soldiers operating in contested or congested environments.

Kathryn Bailey: Please explain primary, alternate, contingency and emergency plans, and how commercial waveforms fit into the equation.

Lt. Col. Brian Wong: PACE [primary, alternate, contingency and emergency] plans are created to provide continuity of communications from user to user, or Soldier to Soldier. Commercial waveforms are a set of software instructions that dictate things such as wavelengths, encryption and rapid frequency changes. Even though the enemy can jam one or more of these waveforms, it would be nearly impossible to jam every single one. If we provide multiple wavelengths, or pathways, we can ensure redundant communications in congested or contested environments—both of which can degrade or deny Soldier communications. Automated failover is critical since most Soldiers are not trained to manipulate complex network configurations. When we provide automated failover PACE plans, we are seamlessly routing data to the unjammed wavelengths. Soldiers are unaware of what is happening in the background and are therefore able to concentrate on the mission.

Bailey: What is meant by nontraditional vendors?

Dr. Sayeed Hasan: Nontraditional vendors are those who may have mature, relevant technologies, but they have not typically been embedded in a program of record. They are just looking for an opportunity, and guidance, on how to introduce their technologies to the government. In this case, they had to explain to us how they would integrate their technologies into the tactical network. However, there is one caveat—the vendor's capability must have been tested in a relevant environment. OSD [the Office of the Secretary of Defense] makes occasional exceptions if the capability is deemed "game-changing" and if it meets other strict criteria. During the RIF effort, we leveraged an OTA [other-transaction authority] process, which is tied to the RIF process, to award contracts for prototype capability and experimentation.

Bailey: How are PEO C3T and the Network Cross-Functional Team implementing the Rapid Innovation Fund process?

Wong: We began our RIF 2017 process in April 2018 by posting a request from the Network Cross-Functional Team for white

papers on the National Spectrum Consortium site and FedBizOpps, where we solicited novel ideas from industry on how to automate PACE plans using commercial waveforms. We received a total of 30 white papers and selected the three we felt were most promising for PACE plans. In less than a month we solidified agreements, and then requested prototype equipment deliveries followed by Soldier experimentation.

It is also important to note that the Network Cross-Functional Team coordinates with FORSCOM [U.S. Army Forces Command] to source all maneuver unit experimentation.

Bailey: What did some of the initial experiments entail?

Hasan: We conducted three field-based risk reduction events, using one vendor capability at each event, in three separate states from the spring through the early fall of 2019. The first event took place in New York City, where we tested a new commercial waveform designed to act as a mobile ad hoc network for situations where Soldiers' missions take place in environments not conducive to signal transmission. What better place than New York, where we could test the waveforms on the subway, the Midtown Tunnel and among the skyscrapers?

We also traveled to Burneyville, Oklahoma, to assess network connectivity in dense foliage and then to Southern California, where we obtained an ad hoc network using a commercial waveform to stream video and voice from the 15th floor of an L.A. [Los Angeles] building to its underground garage. We used the same waveform to travel across many kilometers of vegetation throughout areas of the Santa Monica Mountains.

UNDERGROUND TESTING
Engineers with PEO C3T and the Network Cross-Functional Team travel underground to the New York City subway in May to test the range and PACE plan of a commercial waveform in a GPS-denied environment. The exercise was part of a field-based risk reduction effort and designed to help usher technologies from prototype to fielding in a year or less.

HEADSETS ON
Members of the 1/504 PIR, part of the 82nd Airborne Division, receive training on a mobile ad hoc network radio on Aug. 28 at their home station at Fort Bragg, North Carolina. The 1/504 is the participating unit for the PEO C3T and Network Cross-Functional Team Rapid Integration Fund effort, designed to identify commercial waveform technologies that will operate in contested and congested environments.

A DIFFERENT VIEW

PEO C3T and Network Cross-Functional Team team members gather in Southern California in July as part of a field-based risk-reduction effort. This third of four assessments for the Rapid Innovation Fund 2017 effort took place in both urban Los Angeles and the more rugged terrain of the Santa Monica Mountains.

Bailey: How did you conduct the Rapid Innovation Fund capstone event?

Hasan: This September, we gathered all of the vendors and their respective capabilities for a capstone event at Yakima Training Center, Washington. Following training from their home base in Fort Bragg, North Carolina, Soldiers from the 1/504 PIR jumped into Yakima for their joint forcible entry and further situational training exercises. All three vendors operated their waveforms and networks over a 36-hour mission, where Soldiers formed three companies—two friendly and one opposing force—to assess the radio waveforms. We monitored network connectivity, number of nodes and positioning location information.

Wong: As part of our data collection process, ATEC [U.S. Army Test and Evaluation Command] joined PEO C3T and the N-CFT at Yakima to engage with Soldiers during pauses in the exercise, where they gathered valuable user feedback on radio versatility, operation, strength of voice quality, strength of signal quality, reliability and ergonomics to inform the next generation of radio requirements and acquisitions.

Bailey: What method do you use to ensure you successfully extract the right type of feedback and then quickly use that feedback to develop a relevant capability?

Hasan: The network modernization effort continues to embrace the developmental operations, or DevOps, model to rapidly mature capabilities. DevOps puts Soldiers and developers side by side throughout the entire process. It provides an opportunity for Soldiers to assess and experiment with the technology early in the process and provide feedback to inform the next generation of radio requirements. Vendors are taking that and fixing software, looking at Soldier usability, design, form, fit and function.

Wong: We have found that the DevOps process has proven to be a great success in terms of rapidly getting the right technology into the hands of Soldiers. Even though we think of DevOps as field-based experimentation, we had also much collaboration on the back end between the developers and vendors in both the lab and the field prior to the actual Soldier experimentation. By doing so, we were able to identify and correct issues before a Soldier even touched the waveform capability.

Bailey: What are the Soldiers and vendors saying about working within the DevOps process?

Wong: As a Soldier, I know firsthand this a tremendous morale booster. We are talking to units differently, demonstrating that we are listening to them so that we can return with a better product. They have told me they are thrilled to have the opportunity to assess performance issues and have them repaired on the spot, or see firsthand how their feedback yields a better design a few months versus a few years down the road, or when they have moved on or the technology is obsolete.

Our vendor feedback is just as positive; they have a huge desire and willingness to learn about the conventional Army side of business, including situations such as what it means to be a company commander and maneuvering or a battalion commander leading an airborne exercise. Each of the vendors collaborated very well with the unit.

Bailey: How are you consolidating the feedback to make an informed fielding decision?

Wong: We have a close working relationship with ATEC. Their representatives engaged with Soldiers during pauses in the exercise to gain valuable user feedback on radio versatility, operation, reliability and ergonomics to inform the next generation of radio requirements and acquisitions. We are still consolidating the data, and we know that it is critical that we turn this feedback around and deliver the product they want and need.

Bailey: What was the outcome of the experiments?

Wong: We are in the process of analyzing the Soldier feedback and ATEC data to help inform potential network design for our upcoming network capability sets. We have also provided feedback to the vendors who participated in the [Rapid Innovation Fund] effort so they can continue to operationalize and improve their products.

Bailey: What topics are you addressing for RIFs 18, 19 and 20?

Wong: [Rapid Innovation Fund] 18 is supporting Project Manager Mission Command's Joint Battle Command – Platform, where we are looking at anti-jam and multipath blue force tracker antennas. For [Rapid Innovation Fund] 19, we are finalizing vendor selections for capabilities that provide next-generation high frequency, high-bandwidth SATCOM [satellite communications] on helicopters, AI [artificial intelligence]-enabled radios and a protected SATCOM chipset. We expect to make a final award in early 2020.

We will spin these technologies into viable prototypes and Soldier experimentation in 12 to 18 months.

Bailey: What advice could you pass on to other organizations—acquisition, industry and Army units, who are considering using the Rapid Innovation Fund for their rapid fielding efforts?

Hasan: I have been working at the forefront of engineering for many years and have had the opportunity to work with technology leaders, radio developers, Soldiers and Army leaders. This is one of the first times I was able to work in the field with Soldiers and vendors during a 48-hour mission. Support from our leadership, partnering with N-CFT and 82nd Airborne, combined with our team's commitments, helped us to accomplish [Rapid Innovation Fund] goals and objectives. At the end of the effort, we found that Soldiers truly appreciated these technologies, and that is my greatest satisfaction.

Wong: The [Rapid Innovation Fund] and DevOps have been a game changer for us, and I am certain would be for other organizations seeking to rapidly insert the products Soldiers need, and expect, to enhance their missions. Our goals are always the same: Deliver capabilities that are simple, support the mission, are user-friendly and provide our Soldiers with the confidence they deserve.

For more information, go to: ***https://business.defense.gov/Programs/RIF/.***

FINDING THE SIGNAL

Master Sgt. Charles Vaughn, Network Cross-Functional Team operations lead, assesses the signal strength on a commercial waveform in September during the PEO C3T and Network Cross-Functional Team Rapid Innovation Fund capstone event at Yakima Training Center, Washington.

FIGHTING CONGESTION TOGETHER

Dr. Sayeed Hasan, PEO C3T chief engineer, and a Soldier from the 1/504 PIR pause during a break in the capstone event at Yakima Training Center. PEO C3T, along with the Network Cross-Functional Team, assessed three separate commercial waveforms designed to enhance the PACE plan for Soldiers in areas where communications might be difficult.

KATHRYN BAILEY is a public communications specialist for Bowhead Business and Technologies Solutions, assigned to PEO C3T. She holds a B.A. in communications studies from the University of Maryland University College.

CAN YOU HEAR ME NOW?
A forward observer with the 508th Parachute Infantry Regiment, 82nd Airborne Division uses Integrated Tactical Network components during a live-fire exercise at Camp Atterbury, Indiana, in January 2019. (U.S. Army photo by Kathryn Bailey, PM Tactical Radios, PEO C3T Public Affairs)

RAPID NETWORKING

PEO C3T leverages rapid acquisition and prototyping to improve network management for new software-defined radios.

by Maj. Nicholas Milano, Keith Whittaker, George Senger and Amy Walker

The Army has been fielding new software-defined radios, such as the 2-Channel Leader Radio, to enable voice and data exchange across U.S. Army, joint and coalition forces on the battlefield, at extended ranges and with greater capability than ever before. However, once deployed, Soldiers began asking for easier and faster ways to perform the initial, labor-intensive networking tasks required to enable these advanced radios to communicate across the battlespace.

To address their request, our team at the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T) leveraged the Army's rapid acquisition prototyping processes and reduced the time it takes to conduct these networking tasks for a brigade's worth of radios from four weeks to just minutes. These once labor-intensive tasks include:

- Radio initialization, which prepares the data products needed for the unit to run on the network, including unique identifiers, roles and Internet Protocol addresses, and takes into account a unit's mission, personnel footprint and mix of networked mission command systems.
- Radio planning, which designs the radio networks and provides needed planning information such as location data, configurations and settings.
- Loading all of the data and software into each radio.

Along with speeding these tasks, the new user-friendly software prototype tools (see "Integrating Elements to Expand Capabilities," Page 80, for specific software prototypes) are less complex compared with the Army's current capability in use today, which means

that tasks once performed by advanced signal Soldiers can now be performed by general-purpose users. Additionally, when a commander needs to reassign a unit on the battlefield, the software tool suite makes it easier for signal Soldiers to more rapidly complete the extensive radio networking tasks needed to support such changes, a process known as unit task reorganization.

Taking full advantage of the Army's acquisition processes for rapid prototyping, which are outlined in Section 804 of the National Defense Authorization Act for Fiscal Year 2016, our team was able to develop these software prototypes in just three months, compared with the 12 to 18 months a traditional, fully custom Army development effort would have taken. By fully adopting rapid acquisition concepts and better business practices, DOD organizations like PEO C3T can deliver new technologies to the field faster and outpace U.S. adversaries in the technology race.

RADIOS GOING LIVE
A Soldier with the 1st Battalion, 508th Parachute Infantry Regiment, 82nd Airborne Division configures a Leader Radio in preparation for a live-fire exercise at Camp Atterbury, Indiana, in January 2019. (U.S. Army photo by Kathryn Bailey, PM Tactical Radios, PEO C3T Public Affairs)

NEW WAYS TO GO FAST

As part of its acquisition reform, the Army has been implementing new ways to speed acquisition processes to deliver capabilities that will prepare our forces to fight and win a war against any adversary. Among these reforms is the other-transaction authority, which enables program managers of smaller programs to enter into contracts with vendors to prototype new technologies. PEO C3T's other-transaction authority efforts include the accelerated prototyping of capabilities that incorporate common network planning, configuration, monitoring, provisioning, management and cyber defense. We are using these authorities to prototype solutions, such as our radio management tool suite, to configure and integrate tactical and enterprise networks, enabling the delivery of information and communications among Soldiers at all echelons and using network resources prioritized according to the commander's intent.

The Army's Network Cross-Functional Team continues to identify capability gaps and integration challenges across existing network programs. Our team rapidly developed each of the prototype software-defined radio management solutions to address some of these gaps under the Unified Network Operations middle-tier acquisition authority, which was granted by the Army acquisition executive in March 2019, with PEO C3T named as the decision authority and the office of primary responsibility. At the time, it was the eighth middle-tier authority to be approved by the Army. The authority enabled us to prototype industry software to support existing operational needs without formal requirements documentation and to gain Soldier feedback to continue to enhance the capabilities and inform Army fielding decisions.

UNIFIED NETWORK OPERATIONS PROTOTYPES

On the battlefield, communications officers from the tactical edge up through corps use network management software capabilities to plan, configure, manage, monitor, control, secure and defend their network assets—the combination of which is referred to as network operations.

The Unified Network Operations middle-tier acquisition authority is helping us to provide a more integrated, standardized and simplified network operations architecture. In one of the first efforts under the agreement, in March 2019 we concentrated on prototyping existing commercial software applications for network planning and management, integrating them into existing government programs of record, and then quickly inserting them into military formations to gain feedback for further enhancements and to support future Army capability decisions.

A TEAM-OF-TEAMS

It was apparent early on that an integrated tool suite would require an integrated team that promoted alignment, collaboration and rapid delivery. From the beginning, we worked closely with Army stakeholders, including the Network Cross-Functional Team, to ensure that our PEO C3T team was synchronized with Army network modernization efforts and requirements. Our team created a methodology to rapidly integrate and align development activities between the offices, implementing software development techniques found in the commercial software development world—including Agile software development; a scaled Agile software framework, which guided the team in applying lean and Agile practices for rapid development and delivery; and a unified team of teams that managed a tightly integrated software release cycle, known as an Agile release train.

Following middle-tier acquisition authority guidelines, we looked at leveraging commercial technologies, existing Army programs and resources to meet the network operations gaps in support of evolving unit formations, such as the Expeditionary Signal Battalion – Enhanced pilot unit and the security force assistance brigades, and the emerging network operations requirements that support them. We looked at resources that were available within PEO C3T that were already being used in different project offices to satisfy specific needs. We found significant synergies in software-defined radio capability development among the Project Lead for Network Enablers, the Project Manager (PM) for Tactical Network and the Project Manager for Tactical Radios, and we knew that combining and integrating efforts would be an exponentially more efficient and effective process.

We created an integrated team of over 20 engineers, including a senior engineer from each of the three project management offices. Instead of each office focusing on its own product, the team worked together to pull the different products together to work as one functional business process. We looked for innovative ways to enhance one another's separate capabilities, which eventually led to enhancement of the radio management tool suite as a whole.

We did not build an entirely new Army system or write mountains of new code, but instead used common interfaces and protocols—work that already had been done in commercial industry. We integrated commercial applications and tools into our existing systems so they could work in new ways. Within three months of working together, we were able to reduce the process to initialize,

TO THE FIELD

PEO C3T provided a leaders' professional development session to the 1st Brigade Combat Team, 82nd Airborne Division (1/82 ABN) in August, in preparation for the fielding of Integrated Tactical Network capabilities. (U.S. Army photo by 1/82 ABN Public Affairs)

plan and load a brigade's worth of radios from four weeks to just minutes.

NONTRADITIONAL VENDORS

As permitted in middle-tier acquisition guidelines, we did not need to wait for formal requirements documents and other time-consuming documentation, enabling our team to quickly perform market research with industry to speed development of the radio network management tool suite. Through requests for information and technical exchange meetings initiated by the Network Cross-Functional Team, where we explained to industry the software capabilities that we were looking for, we were able to determine the best options for integrating existing capabilities with minimum development efforts. Where possible, we created capability that is not vendor-specific to spur innovation and keep costs down through increased competition.

To create the prototype capabilities, the other-transaction authority spurred us, when possible, to contact smaller vendors that traditionally do not support military efforts. Other-transaction authority also enabled us to continually assess experimentation results and Soldier feedback to see how these products could potentially support a more mature system that we could eventually field across the force. If results reveal that a product is not the right fit, we can look for something else that works better, before fielding the capability to numerous units.

We had to bridge language barriers in technology and processes in order to make sure new vendors understood the military requirements, and we had to understand what the proposed commercial off-the-shelf technologies could do for us. In the end, when we applied the nontraditional vendor's existing technologies to our evolving military systems, the technologies

INTEGRATING ELEMENTS TO EXPAND CAPABILITIES

The Army's new, user-friendly software prototype tool suite for network operations planning and management can initialize, plan and load a brigade's worth of radios faster than ever. Each integrated piece of software works in unison in a beginning-to-end network planning and initialization workflow. The software includes several components:

Integrated Planner is an overarching system that plans and creates network configuration files for numerous network elements, including the software-defined radios supporting the Army's tactical network. This planner was developed to integrate or replace existing network planners.

Network Operations Management System is an overarching prototype system used to manage the network and support unclassified, classified and coalition network enclaves with a common look, touch, feel and functionality.

Initialization Tool Suite enables Soldiers to manage and modify their data products on the ground in theater. Data products provide the information required to enable end-to-end network connectivity and interoperability across the Army's tactical internet.

Codex is a database with a common data model and open application programming interfaces (APIs), enabling standard access to the data products. APIs enable applications to "talk" to each other.

Atom is a simplified radio planner that provides intuitive workflow and an open API that uses the data product network design to provide a radio waveform plan. The Atom prototype will inform enhancements and future capability and fielding decisions on the final solution to support existing and emerging planning requirements, potentially replacing the legacy Joint Enterprise Network Management Capability.

Black Sails is a simplified radio configuration tool that uses the waveform plan through an open API to configure software-defined lower tactical internet radios. Atom and Black Sails work hand in hand: Atom creates the plan, and Black Sails generates the configuration files and loads the radios.

As DOD postures itself to retain advantage over near-peer adversaries, these new prototype software tools are expected to dramatically increase unit readiness, data exchange, agility, operational flexibility and network communication range, and to reduce unit burden on the battlefield.

ENGINEER VERIFIED

PEO C3T engineers work on software-defined radios during the Integrated Tactical Network (ITN) verification and validation event at the PEO C3T ITN facility in September at Fort Bragg, North Carolina. The team prepared the expeditionary ITN equipment set for an upcoming pilot that will be supported by the 82nd Airborne Division. (U.S. Army photo by Amy Walker, PM Tactical Network, PEO C3T Public Affairs)

functioned in new ways. The vendors did not need to change their internal business processes to provide their technologies to us, enabling them to enter into an arena once monopolized by larger, more traditional defense contractors.

USE OPEN FRAMEWORKS AND STANDARDS

Adopting an open framework and standards was a key component that enabled us to use nontraditional vendors. It also provided common network planning, configuration, management and monitoring capabilities. Throughout the process of developing the radio network operations software tool suite, we purposely laid a foundation for an open framework and open standards, including open application programming interfaces that enable applications to "talk" to each other. This open architecture ensures that future DOD software and system development will most effectively share information between systems and more easily and rapidly integrate future systems to improve functionality and capability. The open construct will be critical to future network modernization endeavors. DOD continues to develop integrated capability, such as its Integrated Tactical Network, which includes multiple vendors, hardware, software, configurations and systems that overarch multiple programs. The Integrated Tactical Network design enables commanders to leverage military and commercially available networks for communication and more easily share information with their coalition mission partners. The commercial off-the-shelf equipment package includes new expeditionary satellite terminals, high-capacity line-of-sight capability, mobile broadband kits, radio waveforms, a 2-Channel Leader Radio, single-channel radios, smartphone devices, network gateways, unified network operations tools and data products.

IMPLEMENT DEVELOPMENTAL OPERATIONS

To get the new prototype software tool suite to the field faster and to continue to improve capability, we are conducting ongoing experiments and using a developmental operations

We looked for innovative ways to enhance one another's separate capabilities, which eventually led to enhancement of the radio management tool suite as a whole.

construct that puts developers alongside Soldiers and commanders in operational units. The Soldiers put the capabilities through their paces in training and field exercises, and we incorporate their feedback to continually inform requirements. This incremental development process enables our team to evaluate new technology concepts and potential solutions earlier and more frequently, collect feedback in real time, and rapidly generate new requirements as needed.

Under the developmental operations construct, our engineers implemented Agile release train principles used in the software industry that are designed to bring the team of teams together to deliver regular planned upgrades. Continuous exploration and integration fed quarterly software releases that were part of quarterly Soldier touch points with various units, including 1st Brigade Combat Team, 82nd Airborne Division; 1st Battalion, 508th Infantry Regiment, 3rd Brigade Combat Team, 82nd Airborne Division; and the 10th Mountain Division.

Through these Soldier touch points, we are gaining continuous feedback on the prototype software design, which is immediately fed back into the software development sprint cycles, to be refined again as part of the next quarterly release cycle. Using this common cadence, each of the three PEO C3T program offices has dedicated resources to continuously define, build, test and deliver the best possible capability to the Army before fielding it across the force.

CONCLUSION

The Army's new rapid acquisition processes have empowered our PEO C3T team with new ways to use commercial technologies and synchronize existing resources to effectively meet the Army's evolving network operations needs. By fueling open relationships with our industry partners; creating open standards and architectures that enable nontraditional vendors to compete; and leveraging prototypes, experimentation and Soldier feedback to continually inform requirements and enhancements, we can arm our Soldiers with the most innovative and relevant network capability possible. To keep ahead of our near-peer adversaries, we have to remain ahead in the technology race.

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****.*

MAJ. NICHOLAS MILANO, a basic branch engineer officer, serves as the assistant product manager for the Product Manager for Tactical Cyber and Network Operations (PM TCNO) and the project lead for the Network Manager and Codex efforts. He has an M.A. in management from American Military University and a B.A. in computer studies from the University of Maryland. He has been in the acquisition workforce for two years, is a member of the Army Acquisition Corps (AAC) and is Level II certified in program management.

KEITH WHITTAKER serves as the product lead for network planning in PM TCNO. Over the last five years, he has supported PEO C3T in various capacities, serving as an expert in network operations and software engineering for Army and joint service programs of record. He holds a B.S. in information systems management from Columbia Southern University, and is a member of the AAC. He is Level III certified in information technology and Level II certified in program management.

GEORGE SENGER is a computer scientist serving as the software and services assistant product manager for the Product Manager for Waveforms, and the lead engineer for Project Black Sails. Over the past few years, he has supported PEO C3T and the Project Manager for Tactical Radios as a tactical radio and software engineering expert. He has an M.S. in computer science from Montclair State University and a B.A. in communications from William Patterson College. He is a member of the AAC and is Level III certified in systems engineering.

AMY WALKER has been the public affairs lead at the Project Manager for Tactical Network for the last nine years, and was the public affairs lead at PEO C3T for the previous two. She has covered a majority 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. She is a frequent contributor to Army AL&T.

SHARED DEFENSE
A refurbished UH-60 Black Hawk helicopter is uploaded into an Antonov AN-124 transport aircraft in April, en route to Afghanistan as part of a USASAC FMS case. (U.S. Army photo by Richard Bumgardner, USASAC Public Affairs)

SUSTAINING FMS ACQUISITIONS

USASAC's total package approach keeps FMS customers up and running.

by Adriane Elliot

There's no doubt that foreign military sales (FMS) are a critical component of U.S. foreign policy. From bolstering our allies' counterterrorism capabilities and regional stability to ensuring their interoperability and competency in helping the U.S. shoulder the burden of coalition operations, FMS will continue to play a role in our military's ability to fight and win the multidomain battle.

One of our nation's staunchest allies, Poland, completed an FMS package in February 2019 that was valued at $411 million. It includes 20 M142 High Mobility Artillery Rocket Systems. This purchase, combined with last year's $4.6 billion FMS purchase of the Patriot Advanced Capability-3, is a significant boon to Poland's widely touted military modernization plan, and to NATO capabilities.

With a volatile Russia on its eastern flank, Poland has aggressively stepped up its efforts to obtain more advanced weapons and to expand its defensive capabilities. The Patriot is one of the world's most powerful air defense missile systems, and its purchase is Poland's largest military procurement ever.

"Allies and partners buy from the United States because we sell the world's most advanced defense systems," said Lt. Gen. Charles W. Hooper, director of the Defense Security Cooperation Agency, which administers the FMS program for DOD. "Through the uniquely American approach to security cooperation, we also ensure our allies and partners have all the necessary training, education and institutional capacity to effectively employ and sustain the equipment we provide."

The U.S. Army Security Assistance Command (USASAC) at Redstone Arsenal, Alabama, manages approximately 6,000 FMS cases valued at greater than $200 billion. The command interfaces with 119 security cooperation offices worldwide and provides security assistance and FMS to more than 150 nations and international partners.

When FMS customers enter into an FMS case with the United States, they are purchasing a portfolio of services that includes training, spare parts, technical manuals and the full backing of the U.S. government. This is known as the "total package approach."

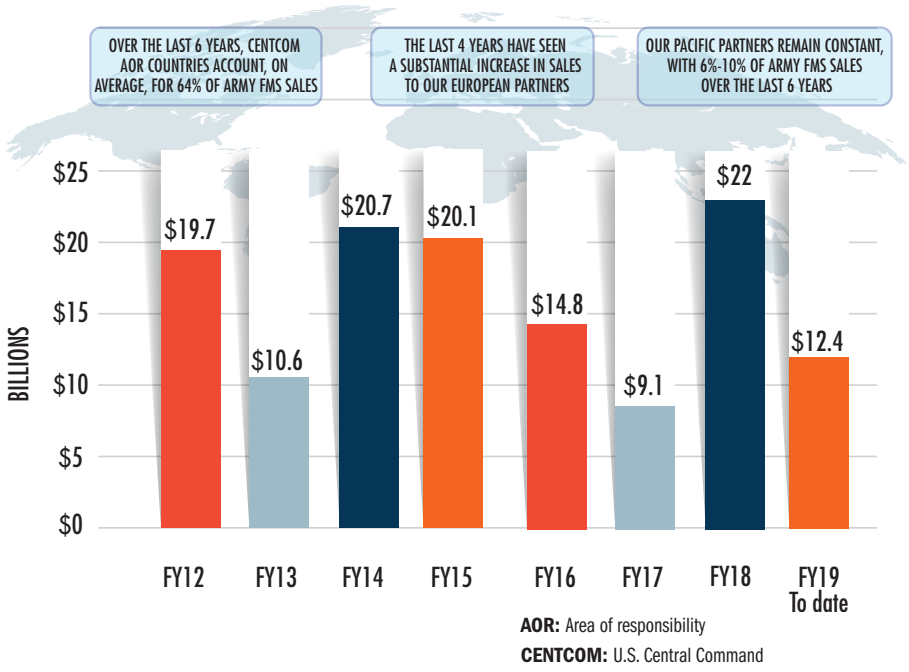
Without this sustainment support, "components will eventually break down. If an FMS customer purchases a tank but can't acquire spare parts and other maintenance necessities, that tank is nothing more than a huge paperweight in their motor pool," said Cindy Decker, chief of the Services and Products Division within USASAC's G-4 Acquisition Support Branch.

FINDING THE HARD-TO-FIND

Sustainment is so important that it's often the case that long before partner nations receive an FMS weapon system, spare parts and other capabilities have already been delivered. Some nations, however, have FMS equipment that requires nonstandard items. A nonstandard item is one that DOD does not manage, either because it has been retired or because it was never purchased for DOD components.

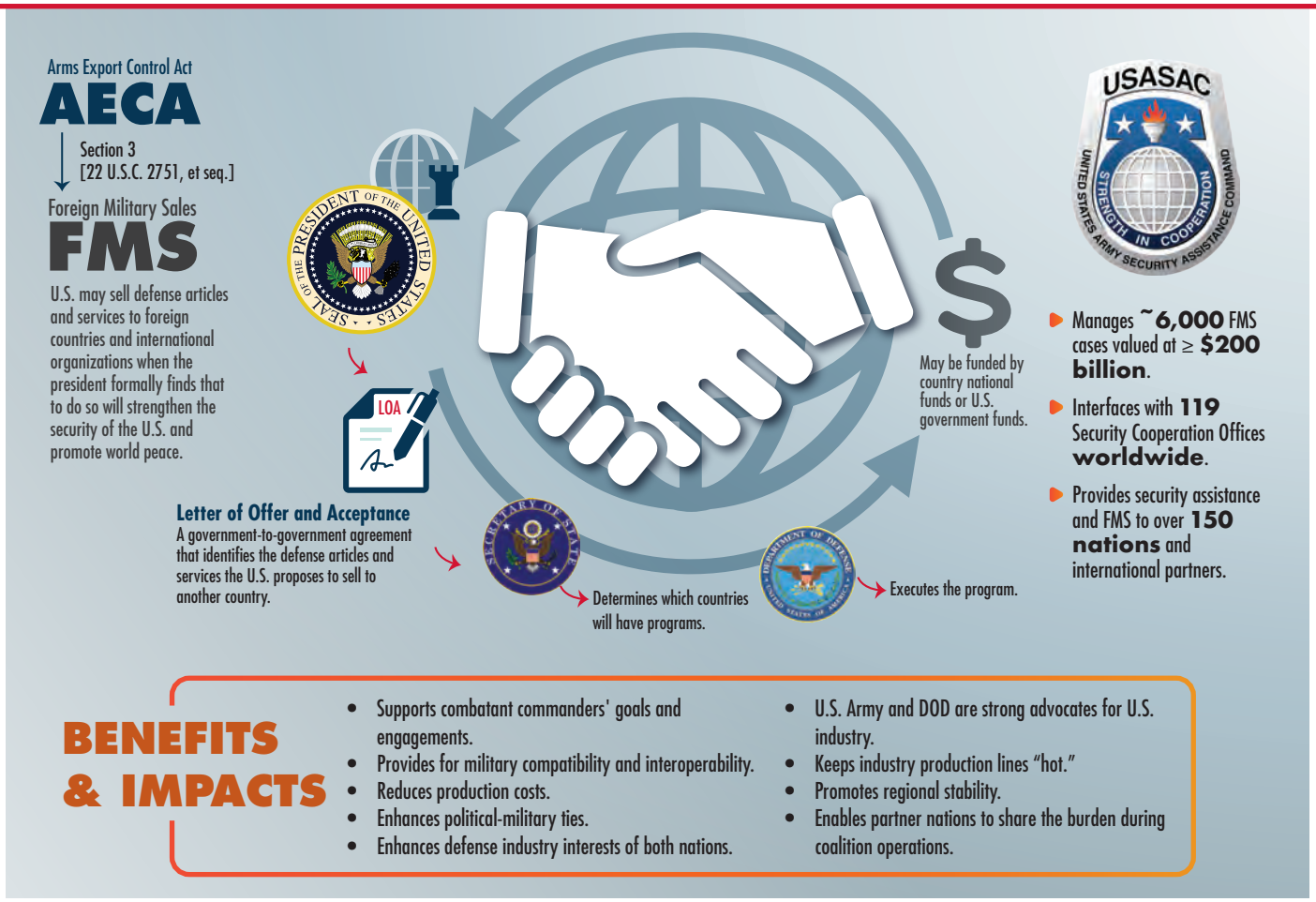
A small procurement office manned by three employees in New Cumberland, Pennsylvania, ensures that even these hard-to-acquire items are not out of an FMS customer's reach.

"We have, for example, countries that have purchased materiel from us 20 or



STRENGTH IN NUMBERS

As multidomain operations take hold, FMS sales remain strong, helping to boost U.S. readiness and aiding U.S. allies. (Image courtesy of USASAC)



FORCE MULTIPLIER

USASAC manages roughly 6,000 FMS cases valued at more than $200 billion, providing U.S. partners and allies with equipment and training. USASAC's total package approach includes not just the weapon system but also the parts, maintenance and logistics support to keep the system operational. (Image by USASAC and the U.S. Army Acquisition Support Center)

30 years ago," said Decker. "It may be an item that is no longer in the Army inventory, an older, obsolete model, or it may lack a national stock number, but the customer still needs the item to continue their mission." Decker said simply not having an item in stock is not an answer, no matter how difficult it is to find.

It is the Acquisition Support Branch's job to locate (via exhaustive internet research and industry engagement) and provide the nonstandard items to keep FMS customers up and running. The Acquisition Support Branch focuses predominantly on items to outfit troops—boots, gloves, body armor, helmets, tents, targets and Meals Ready to Eat. It also provides training and commercial repair and return capability (from calibration to rebuild) for equipment that cannot be repaired at Army depots.

The Services and Products Division has multiple tools at its disposal to acquire items, said Decker—primarily blanket purchase agreements, but also one-time competitive or sole-source contracts. Low-dollar, high-volume materiel and services procured through the division total approximately $200 million annually, with commercial return and repair tallying $35 million annually.

"We work extremely hard to ensure our partners have what they need to be successful, to contribute to coalition operations and regional stability, because when they win, we win," said Decker.

NONSTANDARD STANDARDS

While the Services and Products Division concentrates on Soldier support items, USASAC's Simplified Nonstandard Acquisition Program obtains smaller quantity, low-dollar spare parts for FMS customers. Also housed in New Cumberland, the program office specializes in off-the-shelf spare parts—anything from nuts and bolts to tread for a tank—that

can be obtained faster, easier and less expensively than acquisition through the Services and Products Division.

Using the Simplified Acquisition Procedures outlined under the Federal Acquisition Regulation Part 13, the Simplified Nonstandard Acquisition Program is able to acquire items quickly and efficiently through direct and frequent communication with vendors.

"We can buy parts as small as a nut or bolt, to [larger components like] transmissions, engines or tread for a tank; it just has to be under the $250,000 threshold," said Selina Fansler, a process manager with the program.

And as in the Services and Products Division, the speed at which the items are obtained depends on the item, specifically whether the items have to be manufactured or if the vendor has surplus sitting on the shelf. It can take anywhere from 30 days to a year, said Fansler. Currently, the turnaround time averages 180 days. "Not bad, considering these are nonstandard items," Fansler said, "but we're still looking to improve."

By late March, USASAC plans to field an enhanced Simplified Nonstandard Acquisition Program database and procurement system to help reduce turnaround time, Fansler explained. The new dashboard will allow buyers to see the most urgent needs immediately and introduce an improved vendor portal and tool to manage workload.

"Nonstandard equipment is critical to the military livelihood of our FMS partners," Fansler explained. "There are customers who are modernizing their armed forces, and this gives them the ability to protect their borders and contribute to regional stability. But just as importantly, they are able to answer the call when coalition operations take place and they are required to not only have the right equipment, but also the interoperable skill sets to conduct missions alongside our forces. And they have those skills because they have trained with us, on the same equipment, as part of the FMS total package."

RULES AND REGS

While conducting its unique mission, USASAC team members pay close attention to the U.S. Army's supply chain. "Army Regulation 725-50, Requisition, Receipt and Issue System," defines how Army demand planners and item managers should manage procurement and release of recurring and one-time FMS demands. Following the regulation ensures that FMS demands have no impact on stock availability and Army readiness. Further insurance against supply impacts includes:

- The creation of readiness driver and supply availability national stock numbers (NSNs) that identify items with the highest potential to impact the readiness of the system they support, and that are already in limited stock and require intensive stock management.
- FMS-required delivery date tags, added to NSNs to provide better tracking mechanisms.
- The Readiness Crosswalk Dashboard, a system that maps scheduled FMS deliveries to the NSNs.

"We have several checks and balances in place to ensure we are not competing with the Army supply chain," said Fansler. "Any item that is centrally managed, stocked and issued by the DOD will be rejected" and would not be available to be obtained for a potential FMS supply. "That's one of many insurance policies we have in place to prevent this process from negatively impacting our armed forces."

STUCK IN THE SAND

Providing sustainment support for FMS weapon systems is critical. Without it, the system becomes a very expensive paperweight. (Image by Tim Hanson, USASAC)

CONCLUSION

FMS plays an important part in building coalitions and protecting U.S. national security interests. With the growing emphasis on multidomain battles and near-peer adversaries, the FMS system will continue to be a vital force multiplier. "And that's what it's really about," Fansler added, "helping our partners and bolstering U.S. military readiness."

For more information about FMS or USASAC, go to ***https://www.army.mil/info/organization/usasac****.*

ADRIANE ELLIOT is a public affairs specialist with USASAC at Redstone Arsenal. She served as an Army photojournalist from 1996 to 2005 and has worked in military public affairs for 23 years. Before joining the military workforce, she worked for a daily newspaper in eastern North Carolina, the New Bern Sun Journal, where she wrote news and feature articles and eventually authored a weekly column. Her formal training in journalism, photography and military public affairs took place at the Department of Defense Information School at Fort Meade, Maryland.

STAFF SGT. DAWIT GEBREYESUS

COMMAND/ORGANIZATION: 921st Contracting Battalion, 413th Contracting Support Brigade, U.S. Army Contracting Command

TITLE: Contracting noncommissioned officer (NCO)

YEARS OF SERVICE IN WORKFORCE: 10 months

YEARS OF MILITARY SERVICE: 7.5 active duty; 2.5 U.S. Army Reserve

DAWIA CERTIFICATIONS: Level I in DOD financial management; educational requirements for Level II certification in contracting and in project management

EDUCATION: MBA and B.S. in business, Mount St. Mary's University; Army Acquisition Professionals Course Honor Graduate; associate degree in business administration, Frederick Community College; associate degree in health science, George Washington University

AWARDS: Army Commendation Medal, Army Achievement Medal (two oak leaf clusters), Army Superior Unit Award, Army Good Conduct Medal (2), Driver and Mechanic Badge, NCO Professional Development Ribbon, National Defense Service Medal, Global War on Terrorism Service Medal, Army Service Ribbon

EDUCATION NEVER DEPRECIATES

The average person could get tired just reading about everything that Staff Sgt. Dawit Gebreyesus has accomplished in the past several years to achieve his goal of joining the acquisition workforce as a contracting noncommissioned officer (NCO).

"I went to school full time while working full time," said Gebreyesus, who at the time was a medical laboratory technician stationed at Fort Detrick, Maryland. "I did PT [physical training] with my unit in the morning, worked all day, and went to school in the evening, for three and a half years," during which time he earned bachelor's and master's degrees. "After my master's degree, I went back to school and got a graduate certificate in government contracting."

His determination to get into Army acquisition was sparked by a conversation with a co-worker while at Fort Detrick. "The acquisition career field serves each and every warfighter's needs—subsistence, weapons, equipment, computers, etc. That was very appealing to me," he said. "Contracting is a promising and ever-evolving career field. It has great opportunities within the Army and on the civilian side after service."

He transitioned from active duty to the Army Reserve nearly three years ago, and joined the Army Acquisition Workforce in 2018. He graduated from 51C school in December 2018. His Army Reserve assignment puts him with the 921st Contracting Support Battalion, in a yearlong program that provides Army Reserve Soldiers with the year of experience required to obtain Level I certification. "Most Soldiers in the Reserve do not work in the contracting field as civilians," said Gebreyesus, who will complete the program in February 2020. "So this program is a great way for us to get the certification and pursue the career field. Without it, it would have been difficult for me to get my certification, so I am grateful I had the opportunity."

As a member of the 921st Contracting Support Battalion, Gebreyesus is part of a team that provides contractual support to all units in the U.S. Army Pacific. The team also supports the Theater Security Cooperation Program, disaster relief evacuation

exercises and the Pacific Pathways program. "Since all these missions are overseas, they are a good opportunity to learn more about contingency contracting," Gebreyesus said.

In his civilian capacity, Gebreyesus is a budget analyst for the U.S. Army Reserve 364th Expeditionary Sustainment Command. Before joining the Army, he was an accountant in the private sector. "My position as a budget analyst and my experience as an accountant make it easier for me to understand how the contracts are funded; what account the money is coming from, the restrictions each account has in terms of expiration and availability of funds, etc.," he said. "I am also familiar with tools like GFEBS [the General Fund Enterprise Business System] and the Defense Travel System, and most requirements and purchase requests we receive are created on GFEBS. Therefore, my experience as a budget analyst for an Army G-8 shop is an additional advantage for me in mastering contracting."

Given the breadth of the acquisition career field, his experience comes in handy. "On any given day, you could get requirements for computers, or medical equipment, for example, or weapons," said Gebreyesus. "Therefore, it requires a little bit of knowledge about everything. Every day is a new day in acquisition. It never gets boring, and I'm always learning something new and valuable. That dynamic nature is what makes it interesting."

With much of his schooling behind him, Gebreyesus is looking to repay those who've helped him get where he is. "The Army has done a lot for me, and I have benefited in many ways. I completed all my undergraduate and graduate classes through the GI Bill with no debt. For me to be able to deploy and contribute in satisfying the warfighter's requirements is one way of paying it forward."

Another way he pays it forward is mentoring and advising younger Soldiers. "Acquisition is a promising and growing career field, within and outside of the Army, and I try to encourage Soldiers to join the workforce whenever I get the chance," he said. He recently talked to an Army Reserve Soldier who was interested in reclassifying to 51C, answering his questions and offering to review his application. "He had some concerns about the board requirements and if he would be able to make it. I encouraged him to apply and see what happens," Gebreyesus said. "The selection process depends on the level of completions in a particular board. The Soldier I spoke with fulfills all the minimum requirements, so he has a good chance of being selected."

With just a year of experience under his belt, Gebreyesus noted that his work as a contracting NCO "is exceeding my expectations. I always wanted to have a career where I can learn every day. Acquisition and contracting is that field. Every day is different, and every requirement is different. Now that I am here, I am enjoying every minute and learning as much as I can."

And learning, he added, is vitally important. "The only property that never depreciates in value is education. If you're willing to learn, every day has a lesson to teach us. Learning is especially important in the acquisition career field—if we don't learn, we will be left behind. Technology is changing every day, and we have to keep up and continue to evolve."

—SUSAN L. FOLLETT

AN ACCOMPLISHED AAW MEMBER

Gebreyesus completed his bachelor's and master's degree studies while working full time as a lab technician at Fort Detrick. (Photo by Sgt. 1st Class Reginald Alexander, 413th Contracting Support Battalion)

SOLID CORNERSTONE

New OTA seeks to speed capabilities to warfighters while also developing the U.S. industrial base.

by Kyle Thalmann and Tara Sarruda

Using the relatively new Cornerstone Other-Transaction Authority (OTA) provided the Project Manager for Combat Ammunition Systems (PM CAS) with two big gains: development of the vital XM1128 artillery projectile moved more quickly, and the industrial base received a welcome boost.

The XM1128, a 155 mm high-explosive extended-range unitary cannon projectile, has been identified as an important munition for Army modernization under the Long Range Precision Fires Cross-Functional Team. Long-range precision fires is the Army's top modernization priority. Currently, the Army has requirements to deliver 155 mm ammunition that extends range from 22 kilometers to 30 kilometers, and the XM1128 projectile can meet that objective. However, the process of ramping up availability of the XM1128 posed challenges for PM CAS, part of the Joint Program Executive Office for Armaments and Ammunition at Picatinny Arsenal, New Jersey.

There is a critical need for the capability to load, assemble and pack the XM1128, but there is no current capability in the industrial base to perform those tasks. Similar 155 mm projectiles—such as the M864 extended-range cluster munition and M549A1 high-explosive, rocket-assisted projectile—have been out of production for decades. Against that backdrop, the use of the Cornerstone

BUILT FOR SPEED

Cornerstone OTA fast-tracks research, development, prototyping, demonstration, qualification and integration of manufacturing capabilities and capacities, across 19 technical sectors. Sectors can be added or removed by the government as needed. (Graphic courtesy of Adele Ratcliff, Industrial Base Analysis and Sustainment Program director)

OTA was an opportunity to accelerate achievement of a critical objective within an acquisition system that is often beset with procedural headwinds.

Lengthy Federal Acquisition Regulation (FAR) acquisition timelines can delay capabilities from reaching warfighters in the time they're needed. However, OTAs under the Title 10 U.S.C. 2371b provide DOD the flexibility to adopt and incorporate business practices that reflect commercial industry standards and best practices; and to reduce acquisition timelines from years to months. In parallel, DOD leaders want to improve the U.S. industrial base in order to be prepared for conflicts today and in the future.

The solution to both of these problems is the Cornerstone OTA, a government-managed vehicle supported by the U.S. Army Combat Capabilities Development Command's Chemical Biological Center (CBC) and awarded by the U.S. Army Contracting Command – Rock Island (ACC-RI). Under the Cornerstone OTA, the acquisition timeline for execution is reduced to 55-100 business days, depending on which of three standardized solicitation processes are used. Additionally, the Cornerstone OTA fast-tracks research, development, prototyping, demonstration, qualification and integration of manufacturing capabilities and capacities into the U.S. industrial base by using several industry sectors, which a standard OTA does not provide.

The Cornerstone OTA differs from other OTAs as there is no third party involved and it is strictly government-managed. The CBC manages the Cornerstone consortium and works with program offices to develop the acquisition approach, while ACC-RI handles contracting responsibilities, including pricing, negotiations and award. This approach allows for

reduced acquisition timelines while keeping costs low.

A FLEXIBLE MECHANISM

Cornerstone was established by the Office of Industrial Policy through the Office of the Undersecretary of Defense for Acquisition and Sustainment. It was launched in February 2018 under the Title 10 U.S.C 2508 Industrial Base Analysis Sustainment Program.

Cornerstone creates a flexible mechanism for a public-private partnership across a range of industrial base sectors in order to strengthen the U.S. industrial base and improve U.S. competitiveness in support of DOD. It provides a way to bring together industry and government stakeholders through a structured engagement forum. Cornerstone consists of multilevel consortiums, and consortium members are encouraged to collaborate within their selected sector, across sectors and with other approved interested parties.

Cornerstone's aim is to bring together industry and government stakeholders in the diverse and currently fragmented sectors to ensure industrial base resiliency and a robust manufacturing innovation ecosystem. Cornerstone OTAs can be used in 19 technical sectors, ranging from munitions and missiles to space. Sectors can be added or removed by the government, when there are requirements that are not categorized in one of the established sectors. Cornerstone is available to all DOD military services that require OTA assistance to strengthen the industrial base for their production needs.

For PM CAS, use of the Cornerstone OTA enables an efficient and streamlined award process that will allow for the production of the extended-range projectile. It will help mitigate range and effectiveness gaps for the Army in both legacy and future cannon artillery systems, while maturing a much-needed, modernized production capability that has not been available domestically for decades.

ELIGIBILITY, SCHEDULE

Companies that support the industrial base under Cornerstone apply to become members of the Cornerstone Consortium, and are then eligible to bid on Cornerstone OTA initiatives. Cornerstone agreements can include cost-type, firm fixed-price and indefinite-delivery, indefinite-quantity agreements, as well as base agreements and options agreements.

Unlike a FAR-based contract, the Cornerstone OTA can reduce award timelines to as little as 55 business days, once an agreements officer approves the documentation package.

The three standardized solicitation processes under Cornerstone are:

- Open one-step solicitation (default process)—The target is 80-100 business days. Competitive request for full proposals is open to all consortium members.
- Open two-step solicitation—The target is 90-100 business days. There is a competitive request for white papers, followed by a down-select and the request for full proposals from selected candidates.
- Closed solicitation (sole source)—The target is 55 business days. The solicitation is directed to a single offeror. It requires justification for why this approach is necessary.

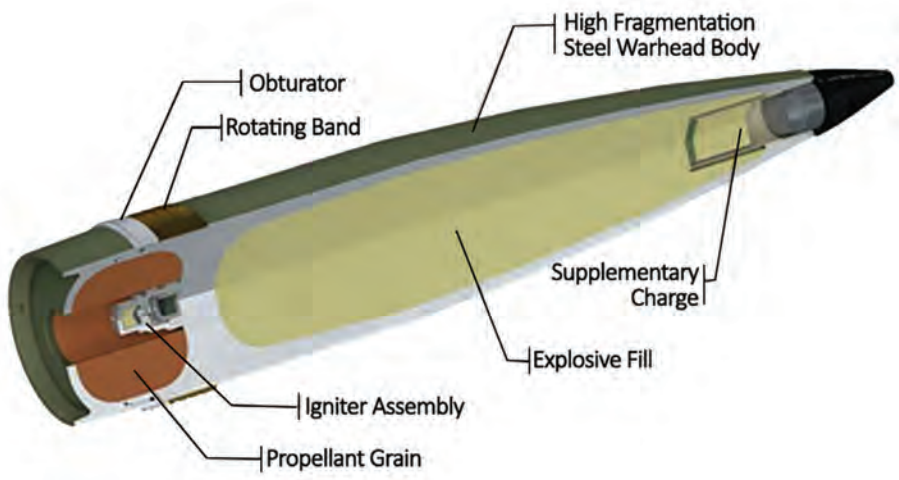
THE IMPORTANCE OF COMMUNICATION

"Communication is key" is a common phrase among top program management officials. With that principle in mind, PM CAS reached out to the Cornerstone team at ACC-RI in order to use its OTA. Although the Cornerstone OTA was new to both Picatinny Arsenal and PM CAS, the information provided by the ACC-RI team helped PM CAS better define and understand the requirements in order to see how this OTA could be used with the XM1128 project.

TAKING THE LONG WAY
The 155 mm XM1128, shown here before testing, has an expected range of more than 30 kilometers. (Photo courtesy of JPEO A&A)

DEVELOPED TO GO LONG

Among the components of the XM1128 is propellant grain, which reduces drag and allows the projectile to travel longer distances. Before issuing the Cornerstone OTA, the industrial base lacked the capacity to load, assemble and pack projectiles with that feature. (Graphic courtesy of the authors)



Cornerstone OTA was an opportunity to accelerate achievement of a critical objective within an acquisition system that is often beset by procedural headwinds.

PM CAS' integrated product team, which included stakeholders from PM CAS, ACC-RI and CBC, proactively initiated meetings to understand the process and documentation requirements for the Cornerstone OTA. The team kept communication lines open throughout the OTA award process, whether it was PM CAS asking questions regarding the Cornerstone OTA process or ACC-RI requesting information from PM CAS on the technical requirements for the XM1128 load, assemble and pack effort.

All integrated product team members worked toward a common goal and held each other accountable by professionally closing out action items within the planned timelines, which culminated in an accelerated award of the load, assemble and pack for the new prototyped XM1128 projectile.

The OTA was awarded July 31 to American Ordnance LLC, located at the Iowa Army Ammunition Plant. The work will help strengthen the industrial base as this projectile will include propellant grains, which provide drag reduction to achieve the extended ranges for the XM1128. Currently, no capability exists in the industrial base to perform load, assembly and packing of a 155 mm artillery projectile with propellant grains.

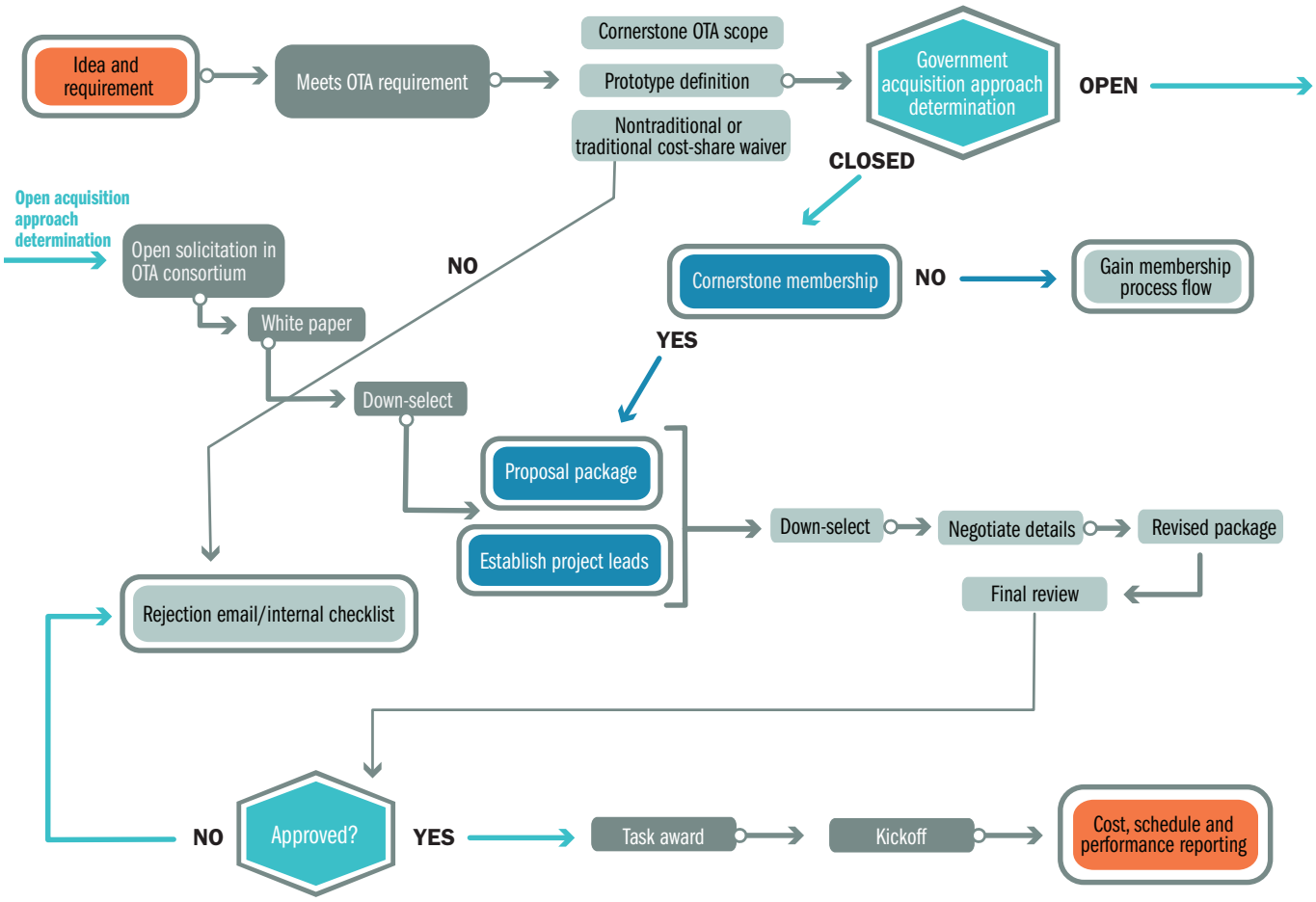
With the help of the Cornerstone OTA team and the communications it had with PM CAS, PM CAS's initiative for the XM1128 load, assemble and pack was Picatinny Arsenal's first award under the Cornerstone OTA and took only 75 business days—from late March through the end of July 2019. That time compression helped to give impetus to the eventual goal of providing an extended-range projectile.

CONCLUSION

Compared to the FAR process, the Cornerstone OTA is flexible, facilitated a shorter acquisition time to award the contract for XM1128 loading, assembly and packing, and enabled industrial base development.

With the successful use of the Cornerstone OTA for the XM1128 effort, PM CAS plans to use it to improve both artillery and mortar industrial base capabilities.

Industrial base capabilities are more than setting up factories and production lines.



SHORT PATHS IN ALL DIRECTIONS

The Cornerstone OTA streamlines the acquisition process, using one of three solicitation approaches that keep the award process as short as 55 business days. (Graphic courtesy of the Industrial Base Analysis and Sustainment Program)

They include new technologies, new processes, materials, prototypes and other technologies to increase the capabilities of the U.S. industrial base to ensure modernization of production capabilities. The Cornerstone OTA is unique in that its setup allows it to streamline the acquisition process to address critical industrial base issues across a multitude of industry sectors. With DOD and program managers needing to modernize existing weapons and create prototypes for new complex requirements to fight future conflicts, the Cornerstone OTA is the future of OTAs.

For more information on the Cornerstone OTA, go to ***https://ibasp-public.ria.army.mil/cornerstone/****.*

KYLE THALMANN is an acquisition analyst for Artillery and Mortar Programs, including the XM1128 Program, for PM CAS' Business Management Division. He holds an MBA from Florida Institute of Technology and a B.A. in accounting with a minor in international business from Penn State University. He is Level III certified in contracting and Level I certified in program management, and is a member of the Army Acquisition Corps.

TARA SARRUDA works for the Cannon Artillery Division at the U.S. Army Combat Capabilities Development Command Armaments Center, and serves as the project officer for the XM1128. She holds an M.S. in mechanical engineering manufacturing systems from Stevens Institute of Technology and a B.S. in mechanical engineering from Lafayette College. She is Level III certified in systems engineering.

MORE THAN A COMPETITION

From prize money to mentorship and collaboration, the xTechSearch competition is growing into something of an incubator for promising new defense and dual-use technologies.

by Jess Stillman

WINNING COMBINATION
Members of Lumineye Inc., winner of the grand prize in xTechSearch 2.0, are congratulated by Dr. Bruce D. Jette, ASA(ALT) and the Army acquisition executive, in October at the AUSA Annual Meeting in Washington. Lumineye developed a 3D-printed device that uses signal analysis software to help first responders identify people through walls. (All photos by the xTechSearch team)

It began as a challenge to accelerate acquisition and attract nontraditional small businesses to work with the Army. But the Expeditionary Technology Search (xTechSearch) competition has succeeded in bringing into the acquisition pipeline remarkable technologies—one a solid propellant that's 40 percent more efficient than existing rocket fuel; another, a way to see through walls. And those are just the first two winners of the competition.

Determined to tackle the current modernization challenges, the Army is seeking out new and innovative technology concepts through the xTechSearch competition. Small businesses nationwide have leveraged this opportunity to discuss how their technology concept can improve, enhance and further support the Army's top priorities.

The competition is designed to be more than just winning a prize during each phase: It's about making the right connections, growing small businesses and providing warfighters with the next-generation technology they need.

XTechSearch launched its fourth iteration in October 2019 at the Association of the United States Army's (AUSA) Annual Meeting and Exposition, and is expanding to add program elements to increase education and engagement with the Army. Not only is xTechSearch a competition that provides small businesses with a platform to showcase their technologies to Army experts through various stages of development, it also now offers an accelerator program, increased collaboration opportunities, education sessions and opportunities for small businesses to engage with the program on social media. The continuous efforts are geared toward assisting small businesses and providing them with insights on how to do business with the Army.

TACKLING MODERNIZATION, ONE GAP AT A TIME

During each of the four phases of the competition, small businesses show how their technology concept can help the Army tackle its modernization challenges. The small businesses receive feedback and guidance from panels of expert Army judges on how to further develop their technologies so that they can meet the needs of the warfighter. Judging panels include representatives from across the Army enterprise, including laboratory scientists and engineers, program managers, acquisition portfolio managers and the users of the technology themselves—Soldiers. The constant feedback helps small businesses "discover how they can fit in and help the military. We're trying to give an opportunity to dialogue with people in the Army to help understand what their needs are and what opportunities there are and the applications that we are rewarding and the Army will be able to fund," explained Dr. Bruce D. Jette, assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), speaking at the AUSA Annual Meeting in October.

To date, the competitions have awarded more than $6 million in cash prizes to more than 235 small businesses, 36 of which have received more than $125,000 each to further advance their concepts. Two grand prize winners have received more than $325,000 each. (The monetary structure of the prizes has changed since the first iteration.) These cash prizes are non-dilutive capital—funding that doesn't require giving up any equity in the company—transferred directly to the company's bank account with no contracts or intellectual property concessions. The money is intended to help the businesses bring their technologies to fruition and open opportunities for the Army and other DOD organizations to invest in their products.

XTechSearch is working to break down the real and perceived barriers for small businesses to work with the Army and is enticing nontraditional innovators to come forward and communicate directly with Army stakeholders.

STRONGER CONNECTIONS, MORE OPPORTUNITIES

The technology search has become more than just a competition; the program aims to uncover novel science and technology concepts while providing ongoing support and mentorships to gain insight and an understanding of how to do business with the Army while navigating its complexity—something that many small businesses need to successfully transition technologies into the Army. The program has sought out various initiatives to support the participating small businesses and connect them with

EYES FRONT

Representatives from AKHAN Semiconductor Inc., xTechSearch 2.0 finalists, speak with judges during their proof-of-concept demonstration during the AUSA Annual Meeting in October. Small businesses across the U.S. have used xTechSearch to explore ways in which their capabilities can support the Army's top priorities.

Army leaders, DOD, other government agencies, industry and academia partners.

In October 2019, during AUSA, xTechSearch launched the xTech Accelerator. "The goal of the accelerator program is to integrate small businesses into the science and technology community in a more formal way and provide another set of tools to accomplish their task," Jette said during the event. XTechSearch is partnering with FedTech and the Virginia Tech Applied Research Corp. to run the program, which provides all competitors with various levels of support, including education, community building, goal setting, connections to future opportunities and mentorships.

One of the top initiatives of the accelerator program is to provide mentorship to small businesses. "Small businesses will be able to get a bit of mentoring, networking and make connections to turn your idea into a fielded product," Jette said. The mentorship program provides access to the FedTech mentor network, which consists of Army leaders, industry executives, veteran business builders, experts and defense innovators across the nation.

The accelerator also provides a Slack channel (Slack is an online collaboration tool that includes messaging) to enable small businesses to collaborate with one another during and after each competition, and share opportunities within the cohort. Small businesses can also learn about product development, business development, customer discovery, interviewing and more through access to online learning platforms.

The xTechSearch competition partners with the National Security Innovation Network (NSIN) to develop a platform that allows small business participants to create a profile that shows an overview of their business and their technology concepts through the Defense Innovation Network. NSIN's Defense Innovation Network provides an opportunity for the small businesses to connect with one another, see problems and solve problems, showcase their current technologies and receive additional resources that can be helpful in growing their business.

This centralized repository, accessible to anyone, allows the xTechSearch program to share information about the small businesses with other interested stakeholders from industry, DOD and other government agencies. NSIN and its programs serve to develop a new alliance of defense, academia and venture communities. These NSIN initiatives and the xTechSearch program attack future defense problems by getting students interested at an early age in defense problems and careers, providing education and resources to foster startup businesses in the defense

The xTechSearch competition has succeeded in bringing into the acquisition pipeline remarkable technologies.

MAKING CONNECTIONS

Jette speaks at the xTechSearch Innovators' Corner during the AUSA Annual Meeting in October. "Small businesses will be able to get a bit of mentoring, networking and make connections to turn your idea into a fielded product," he said at the event.

sector, and helping network and mentor businesses seeking to solve the current and future needs of DOD.

INCREASING THE ODDS

XTechSearch continues to seek out additional resources and partnerships to bring the highest value to small businesses across the nation. The competition is designed to be more than just winning a prize during each phase: It's about making the right connections, growing small businesses and providing warfighters with the next-generation technology they need.

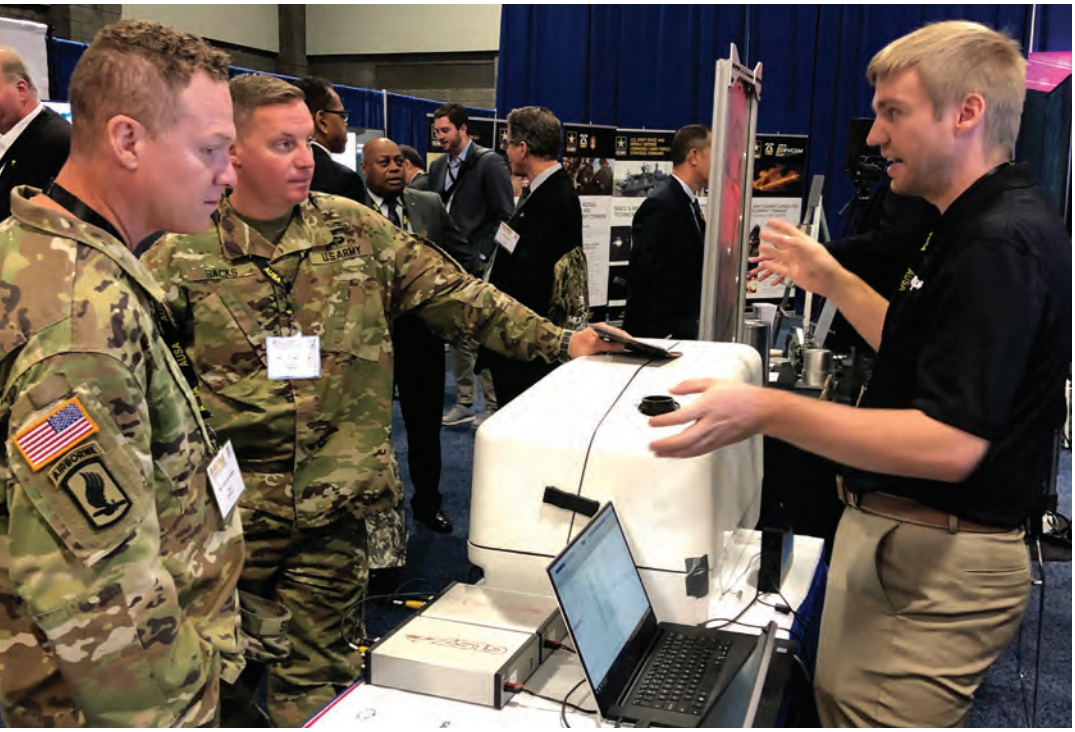
The xTechSearch-sponsored Army Small Business Innovation Research (SBIR) topic, "Expeditionary Technology Search (xTechSearch) Dual-Use Technologies to Solve Challenging Army Problems," is an additional opportunity for small businesses to receive funding and formal contracts to further develop their technologies. Agencies within the federal government can advertise their needs with "topics," or see a possibility to fill their needs with innovative technology. SBIR provides small businesses with an opportunity to understand their technologies' potential impact on the Army by publishing topics of interest that they can respond to.

Responding to the 19.2 SBIR topic, 10 small businesses were selected by a panel of judges and awarded a contract of up to $120,000 over a period of six months to continue the federal research and development efforts that were initiated in Phase I, showing the technical merit, feasibility and commercial potential for their technology. Eight of the 10 awardees were companies that had previously participated in the xTechSearch competition.

The SBIR program gives small businesses the opportunity to deliver innovative research and development solutions to key Army requirements. But xTechSearch has taken a new approach to the program and expanded the horizons to allow for groundbreaking technologies through the SBIR topics. The xTechSearch SBIR topic consists of three phases, which are roughly similar to the xTechSearch competition. The SBIR program benefits the Army and small businesses by:

- Providing the Army and DOD with an understanding of how the technologies' advantage compares with similar commercial products, along with how the technology can be applied to Army modernization priority areas.
- Showcasing the prototype solutions and providing a technology transition and commercialization plan.
- Maturing technology to Technology Readiness Level 6-7 (where it is working in an operationally relevant environment), and producing prototypes for further development and commercialization in both the Army and the commercial realm.
- Opening the topic to multiple domains and areas of interest and enabling the Army to see additional technologies and capabilities that may be available to assist in solving some of the most critical challenges it faces.

The xTechSearch SBIR topic is providing a pipeline for small businesses discovered through the xTechSearch program to enter into



GETTING THE WORD OUT
Employees of Great Lakes Sound and Vibration Inc. demonstrate their technology concept to service members at AUSA in October. The company was a finalist in xTechSearch 2.0, which provides small businesses with a platform to showcase their technologies to Army experts and now offers an accelerator program, increased collaboration opportunities and opportunities for small businesses to engage on social media.

a contractual agreement with the Army to further develop and transition their technologies, the ultimate goal for many of the small businesses entering the xTechSearch competition. The xTechSearch SBIR application is shorter than typical Army SBIR topics, streamlining the process for small businesses and reducing the barrier to conduct business with the Army.

CONCLUSION

The xTechSearch program works to provide small businesses with the opportunity to become integrated into the Army's ecosystem. As the Army continues to promote long-lasting engagement with traditional and nontraditional defense partners through xTechSearch, the Army is recognizing similar programs and outlets that allow new and innovative technology solutions to be seen and heard.

Since the beginning of xTechSearch 2.0, competitions have overlapped. The Army announced the winner of xTechSearch 1.0 in March 2019, and 2.0 during AUSA in October 2019. It also announced the Phase IV proof-of-concept demonstration competitors at that event. In March, during the AUSA Global Force Symposium and Exposition in Huntsville, Alabama, those Phase IV companies will demonstrate their proofs of concept at the event's Innovators' Corner. Additionally, xTechSearch 5.0 will be launched.

Meanwhile, xTechSearch 4.0 is ongoing. The 12 small businesses selected to move on to Phase IV of xTechSearch 3.0 are:

- Anti-Rotational Technologies Inc.
- Cayuga Biotech Inc.
- ElectroNucleics Inc.
- GhostWave Inc.
- Knight Technical Solutions LLC
- LiquidPiston
- Merciless Motors
- SIGINT Systems LLC
- Syncopated Engineering
- TexPower Inc.
- TRX Systems
- XO-NANO Smartfoam

These small businesses are preparing for the final phase of xTechSearch 3.0 and will present their proofs of concept during the AUSA Global Force event.

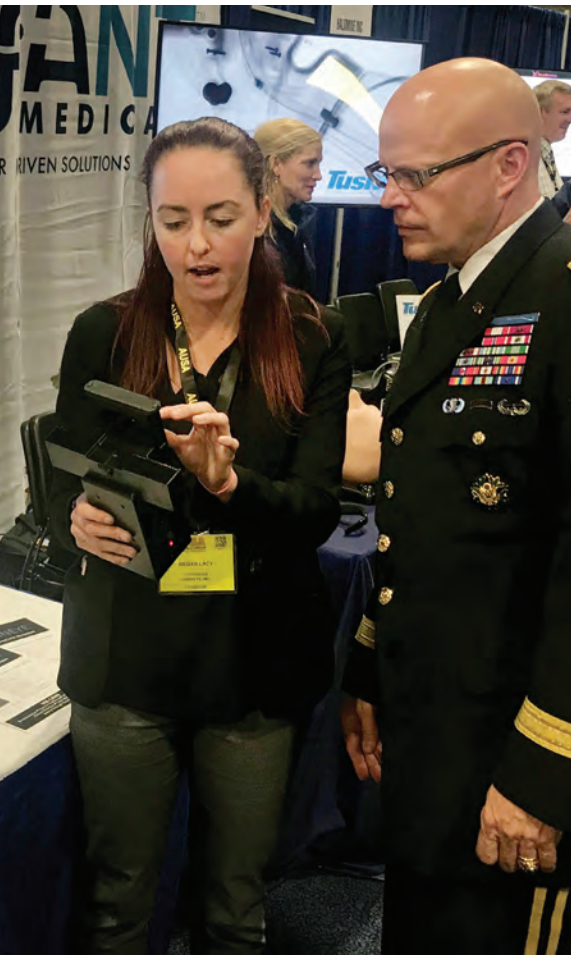
The grand prize winner of xTechSearch 2.0 was Lumineye Inc., which demonstrated its man-portable wall-penetrating radar. After participating in xTechSearch 1.0 but only progressing to the second phase of the competition, Lumineye came back to compete again, having made improvements to its technology using the feedback it had received from xTechSearch 1.0.

For more information about xTechSearch and to see the various opportunities available, go to ***www.xTechSearch.army.mil*** *or follow them on Facebook and Twitter* ***@xTechSearch****.*

JESS STILLMAN is a senior consultant with Booz Allen Hamilton providing contract support to xTechSearch at the U.S. Army Combat Capabilities Development Command's Army Research Laboratory. She has a B.S. in health science from South University.

SEEING *THROUGH* WALLS

Hacking for Defense alums Lumineye win xTechSearch.



CUSTOMER CONNECTION
Megan Lacy, chief design officer for Lumineye, discusses her company's technology with Maj. Gen. John A. George, commanding general of the U.S. Army Combat Capabilities Development Command, during the AUSA Annual Meeting in October in Washington. (Photo by xTechSearch team)

It all started with the desire to create an innovative solution to a DOD problem. Lumineye Inc., the grand prize winner of xTechSearch 2.0, began as a group of classmates at Boise State University participating in the Hacking for Defense (H4D) program, where students were challenged to find a solution to identify humans through radio frequencies. Through their work in solving the challenge, the students started Lumineye, a small business with a device that can solve one of the DOD's most critical challenges—providing "through-wall sensing" for first responders and warfighters. Lumineye's device is lightweight and compact, with the ability to detect moving and still people from more than 10 meters away.

H4D is a program of the National Security Innovation Network and powered by BMNT Inc. and the Common Mission Project, bringing students together from different disciplines to curate and solve national defense problems.

Created by Pete Newell, Steve Blank and Joe Felter, H4D is a national academic program currently offered at 24 universities. (See "Hacking for Defense," Army AL&T January-March 2017, Page 98.) It teaches students how to use modern entrepreneurial tools such as the Lean Startup methodology and problem-curation techniques to address national security challenges at startup speed. Newell, CEO of BMNT Inc., is a retired Army colonel whose last command was the Rapid Equipping Force, where he sped off-the-shelf solutions to Soldiers on the ground in Afghanistan. He started BMNT, a consulting company in Palo Alto, California, with Felter, formerly a colonel in the Army Special Operations Forces and former deputy assistant secretary of defense for South and Southeast Asia.

DON'T WAIT FOR OPPORTUNITY, GRAB IT

When Corbin Hennen, now CEO of Lumineye, heard about H4D, he knew he wanted in. He proposed the H4D program to Boise State's Venture College, and received approval to move forward with the program. In addition to being a student in the H4D class, Hennen assisted in running the first cohort at the university.

X-RAY TECH

The Lumineye Lux uses wall-penetrating radar to help first responders detect people and objects 14.2 feet away on the other side of a wall. (Photo by Jordan Vandegrift, Lumineye)

Megan Lacy, who is now chief design officer for Lumineye, was recruited by Hennen. Lacy was working on her master's degree at Boise State and had a background in design thinking. She applied what she'd learned to the solution they developed in H4D. Before becoming a part of the program, Lacy had a different plan for her future. "I thought I was going to work in consumer goods. This was a total pivot for me," she said in a November phone interview. Lacy became a part of the team to provide a solution because she knew that you can "actually impact someone's life by solving these DOD problems."

As the team members progressed through the H4D program, they interviewed more than 120 potential users, including Soldiers and Marines; special operations personnel; local, state and federal law enforcement officials; firefighters; and search-and-rescue workers. Based on the feedback and information they received, they realized they were going to do more than just solve the problem within the program.

"In Hacking for Defense, the point isn't just to create a company, you just need to solve the problem. But we were talking to users, and the current devices weren't really meeting their needs for the tactical applications, so we decided we were going to solve this problem," explained Lacy. They formed Lumineye shortly after completing the H4D program in April 2017.

NEVER GIVE UP

When xTechSearch launched its first iteration in 2018, it received more than 340 proposals, including one from Lumineye. During xTechSearch 1.0, the company made it to Phase II and was invited to conduct a live technology pitch to a judging panel of Army experts. That panel did not select Lumineye to advance further in the competition.

Instead of giving up, Lumineye used the feedback from the judges and applied for xTechSearch 2.0 with an improved pitch and a prototype it created with the funds it received from xTechSearch 1.0. "We knew immediately when we got done with 1.0 that we were going to apply for 2.0 again," said Lacy.

When Lumineye entered xTechSearch 2.0, the team members incorporated improvements to their technology concept and took a different approach during their pitch events, explaining how they learned where their technology could fit within larger Army systems and integrate with other fielded products. They impressed the judges during each phase of the competition, and received valuable feedback and contact information to connect with collaborators and stakeholders to continue developing their product. They also participated in the Y Combinator program, which gave them additional funding opportunities as well as the ability to further develop their technology concept to be presented during Phase IV.

At the conclusion of xTechSearch 2.0, Lumineye was awarded the grand prize of $250,000, bringing its xTechSearch winnings to $385,000, all of which will be used to help create a product that can solve one of the Army's most critical challenges and provide a safer solution for warfighters.

In addition to xTechSearch, Lumineye also participated in the Army SBIR 19.2 "Expeditionary Technology (xTechSearch) Dual-Use Technologies Applicable to Army Modernization Priority Areas," and was selected as a winner in Phase I. The company will receive $110,000 over a six-month period to continue the research and development into the technical merit, feasibility and commercial potential for its technology.

Lumineye team members are now actively looking for additional opportunities to receive feedback and funding for their technology concept. They have been speaking and meeting with Army leaders who are interested in using their technology, and xTechSearch maintains contact with Lumineye to ensure that they are able to make the right connections within the Army. The company is looking to get to a point over the next five to 10 years where its product is available to all first responders and warfighters.

—JESS STILLMAN

Novel Technologies Demonstrated by xTechSearch 2.0 Finalists

The xTechSearch competition kicked off its second iteration in the fall of 2018. The competition, sponsored by the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), consists of four phases:

- Phase I: Concept white paper.
- Phase II: Technology pitch.
- Phase III: Innovators' Corner.
- Phase IV: Proof-of-concept demonstration.

During Phase I of xTechSearch 2.0, more than 170 small businesses submitted white papers describing novel and innovative technologies that would benefit the Army. A panel of Army experts reviewed and scored each white paper and, as a result, selected 60 small businesses to move on to Phase II.

Between February and March 2019, the selected small businesses pitched their technology concepts to a panel of Army judges with high-level technology and acquisition knowledge at one of the various pitch locations across the United States. Some of the pitch locations were at extended sites of the U.S. Army Combat Capabilities Development Command's Army Research Laboratory (CCDC-ARL) to also provide small businesses the opportunity to network with CCDC-ARL personnel. At the conclusion of Phase II, another panel of Army judges selected the top 25 small businesses to compete in Phase III, at the Association of the United States Army (AUSA) Global Force Symposium and Exhibition, held in Huntsville, Alabama, in March 2019.

On the final day of the conference, 12 winners were selected to move on to compete in Phase IV. At the Phase IV competition, held during the 2019 AUSA Annual Meeting and Exposition in Washington in October, each of the 12 small businesses presented a live, proof-of-concept demonstration to a panel of judges and showed how their technologies can impact the Army.

Dr. Bruce D. Jette, the Army acquisition executive and the ASA(ALT), announced the grand prize winner of xTechSearch 2.0, Lumineye Inc., during the final day of the conference. Lumineye impressed the judges and convinced them that its technology concept was a significant benefit to first responders and the warfighter; the company won the grand prize of $250,000. (For more information on Lumineye, see "Seeing Through Walls," Page 99.)

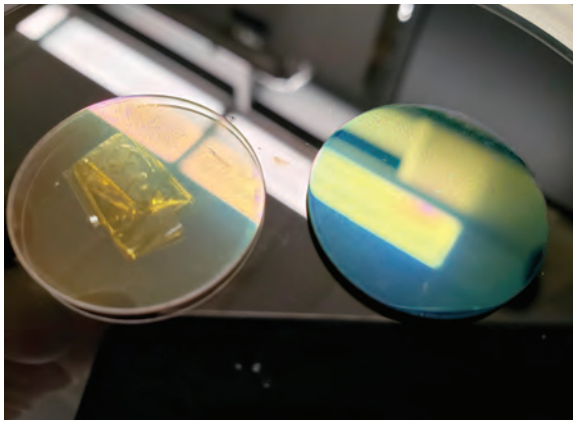
NO LOSERS

Despite not winning the grand prize, the other 11 finalists also demonstrated novel technology concepts that drew the attention of program executive officers, Army scientists and industry partners from across the nation. Indeed, a major goal of xTechSearch is to provide small businesses with the opportunity to make connections within the Army, DOD and industry throughout the competition.

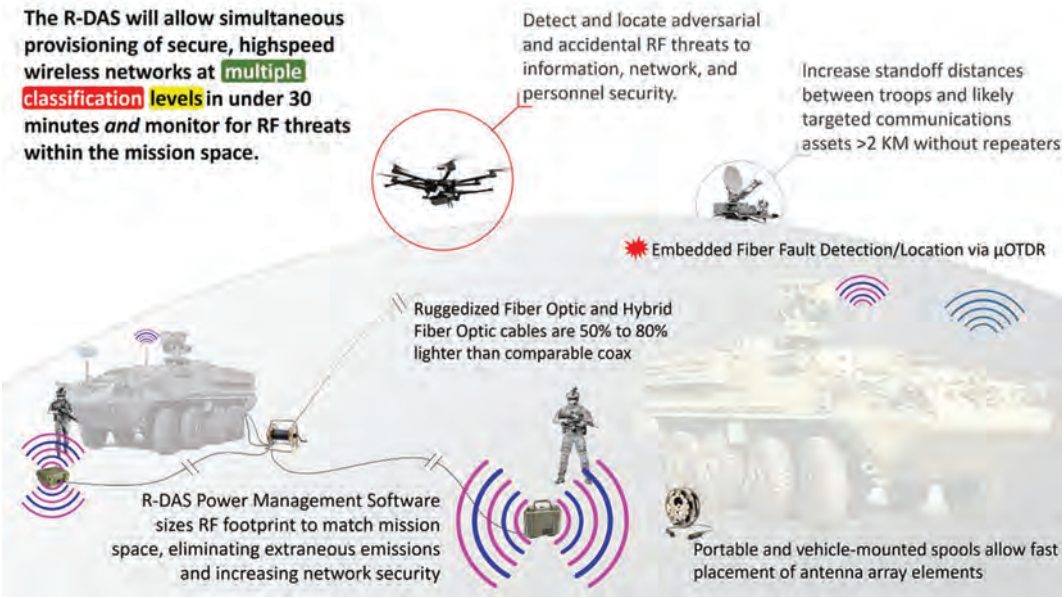
All the technologies that were presented during xTechSearch Phase IV bring value to both the Army and the commercial sector.

These are the xTechSearch 2.0 competition finalists:

AKHAN SEMICONDUCTOR INC.



AKHAN is a lab-grown, diamond-based semiconductor technology company specializing in the production of optical and electronic device solutions for applications in consumer electronics, military, aerospace, telecommunications, automotive and the broader electronics market. AKHAN has developed its Miraj Diamond technology for protective coatings intended for directed energy and electromagnetic weaponry applications, addressing the Army's Future Vertical Lift modernization priority. Diamond's multilayered materials can be applied to protect optically transparent and opaque surfaces on aircraft canopies, sensor windows and other sensitive structures. (Image courtesy of AKHAN Semiconductor Inc.)

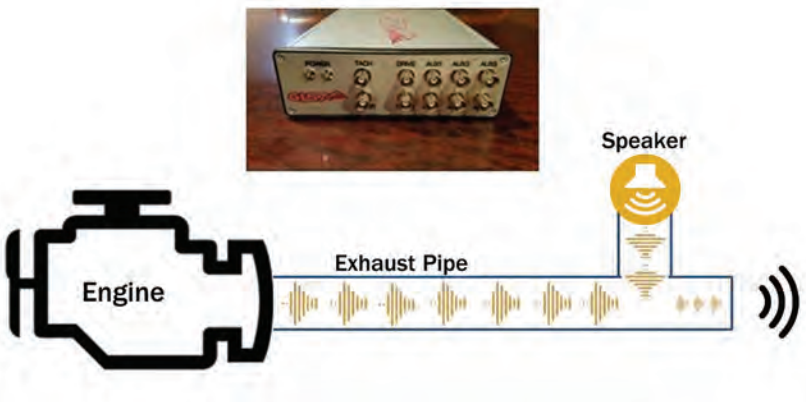


COGITARI INC.

Cogitari provides high-security wireless communication infrastructures that enhance the safety and productivity of government, military and private organizations. By balancing technical knowledge of radio frequency (RF) threat detection with decades of operational experience in complex environments, Cogitari's solutions improve the availability and resilience of critical communications. The company's R-DAS antenna system delivers secure wireless communications while detecting and locating threats to network and data security. (Image courtesy of Cogitari Inc.)

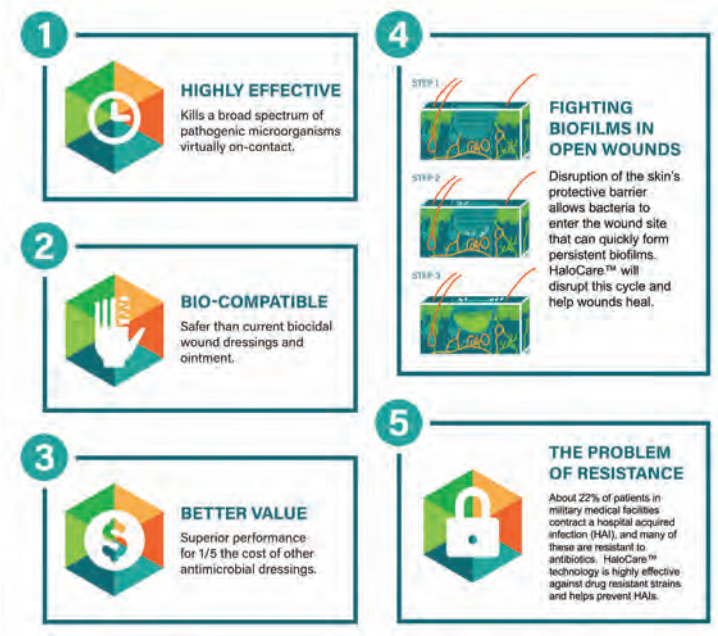
GREAT LAKES SOUND AND VIBRATION INC.

Great Lakes Sound and Vibration Inc. was established in 1996 to solve acoustic, shock and vibration problems. It developed an active noise-cancellation system that provides noise-reduction capabilities in military ground vehicles beyond the current state of the art. The noise-cancellation system has been developed as an add-on feature, providing the unique ability to treat noise issues late in the vehicle development cycle, which is a critical asset to new vehicle programs. (Image courtesy of Great Lakes Sound and Vibration Inc.)



HALOMINE INC.

Halomine Inc. was founded in 2018 to commercialize novel antimicrobial technology developed at Cornell University and Auburn University. Its mission is to help people by solving problems associated with microbial growth. One of Halomine's products is a next-generation wound dressing that incorporates potent and safe antimicrobial agents that prevent the formation of biofilm, a collection of microorganisms, such as bacteria, that grows on surfaces, and kill drug-resistant bacteria; hemostatic properties that stop bleeding quickly; and advanced material properties that promote faster and better wound healing. (Image courtesy of Halomine Inc.)



LUMINEYE INC.

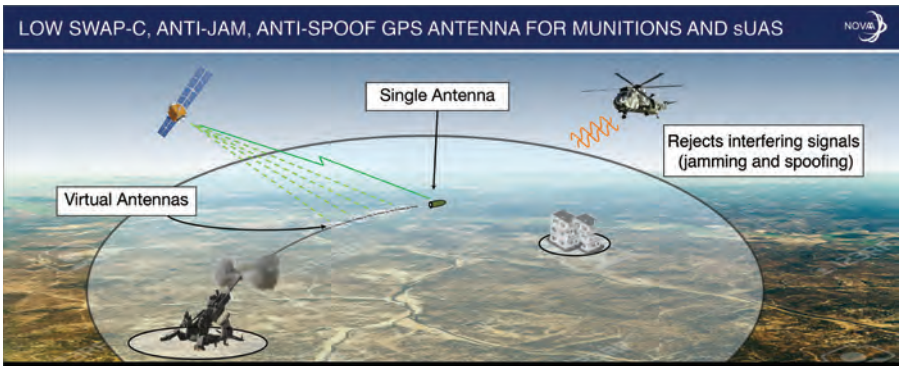
Lumineye Inc. was spun out of the Hacking for Defense program in 2017. Lumineye produces a wall-penetrating radar to help Soldiers, law enforcement personnel and first responders identify people and threats through walls. Its radar device, Lux, uses pulse radar paired with an analysis app on a handheld device. Lux weighs less than 1.5 pounds and takes up less space than a hardcover book, detects still and moving people, and can distinguish people from objects. The range varies depending on wall material and thickness, but with minimal material obstruction, detection is possible at distances of 49 feet. (Image courtesy of Lumineye Inc.)

MELD MANUFACTURING CORP.

MELD is a woman-owned, additive-manufacturing technology small business that sells melted metal deposition additive manufacturing machines and services. MELD offers significant benefits in the production of components and vehicle armor, as well as the capability to perform battlefield repair of Next Generation Combat Vehicles. The company holds 13 patents on the MELD process, which has won numerous awards, including one for most disruptive new technology in R&D World Magazine's R&D 100 Awards in 2018. The MELD machine's open atmosphere, safety and low-power requirements allow for the repair or building of metal structures anywhere. MELD makes wrought, fully dense material. It is the only metal additive process that can use practically any metal, in solid bar or powder form. (Image courtesy of MELD Manufacturing Corp.)

NOVAA LTD.

Novaa is a graduate of the Air Force Research Lab's Catalyst Accelerator, and is now advancing wireless radio frequency technology. Novaa is led by Dr. Markus Novak, a former NASA fellow with a doctorate in electrical engineering who is a recognized expert on ultrawide-band antenna systems and other radio frequency innovations. The company's advances include technologies in wireless communications, sensing and navigation. (Image courtesy of Novaa Ltd.)



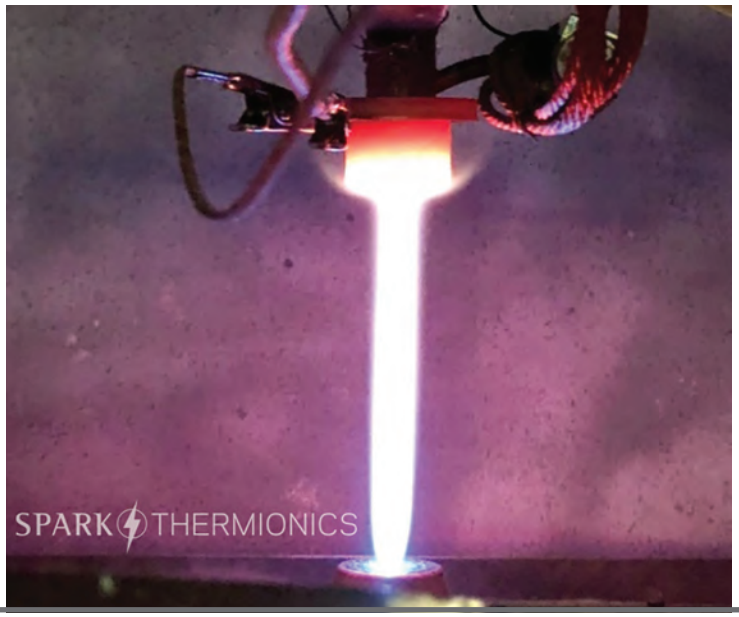
Key: **SUAS** – Small unmanned aerial system
SWAP-C – Size, weight, power and cooling

OLIFANT MEDICAL

Olifant Medical knows that securing the airway can be one of the most stressful and time-critical procedures for medical providers. Olifant's mission is to create innovative airway management solutions for medical professionals and ensure better patient and provider experiences through 100 percent first-pass airway intubation success. Olifant Medical has identified the anatomic and ergonomic factors that interfere with successful tracheal intubation, and has designed a stylet technology that overcomes these barriers. (Image courtesy of Olifant Medical)

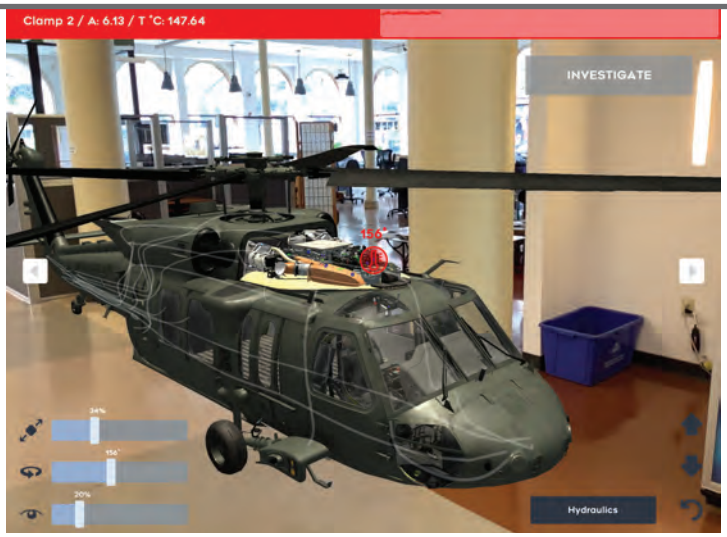
SPARK THERMIONICS INC.

Spark Thermionics Inc. develops transformative silent generators based on thermionic energy conversion in which electrons evaporate from a hot material and are collected by a cooler material. This 300-plus-watt multifuel generator can achieve up to a fivefold weight reduction in the power source carried by the warfighter, easing transportation requirements and improving mobility. These devices directly convert heat to electricity for true fuel flexibility, relying on modern materials to leapfrog over competing approaches and enable novel capabilities. (Image courtesy of Spark Thermionics Inc.)

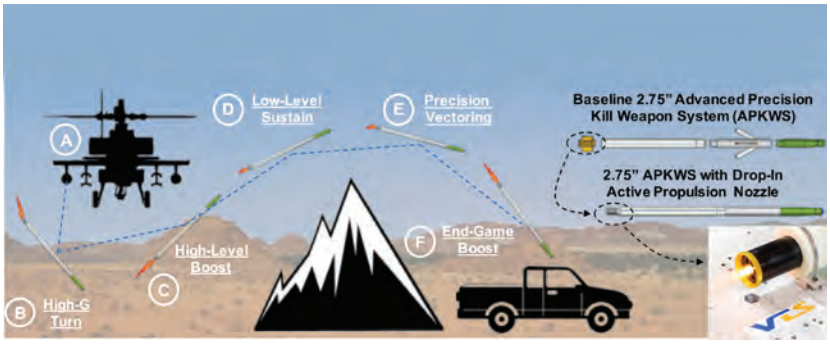


UNITED AIRCRAFT TECHNOLOGIES INC.

United Aircraft Technologies Inc. has developed a smart aircraft clamp solution with an augmented-reality monitoring system for aircraft wiring. This lightweight clamp improves fuel economy through overall weight reduction of the aircraft, which also reduces the environmental impact of carbon dioxide emissions. The 3D fault location and visualization capabilities reduce time spent on aviation and aerospace maintenance and decrease the occurrence of repetitive-strain injuries among the workforce. (Image courtesy of United Aircraft Technologies Inc.)



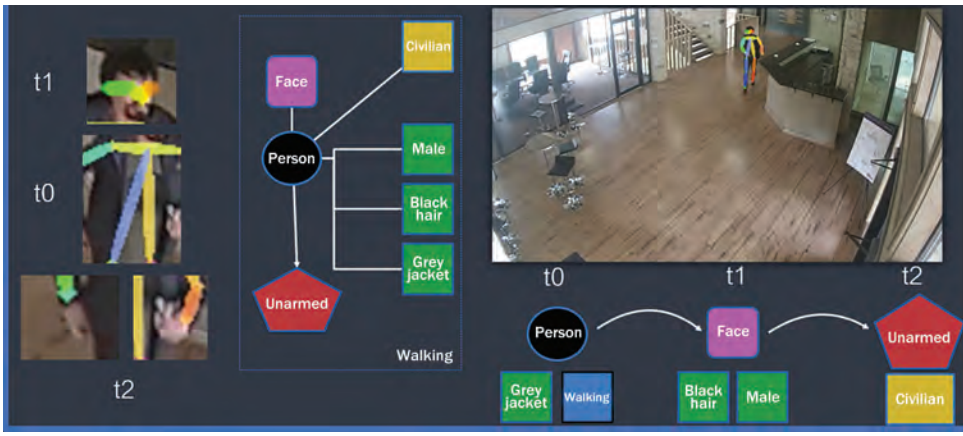
VALLEY TECH SYSTEMS INC. (VTS)



VTS is an aerospace engineering company that specializes in rocket propulsion systems with command, control, communications, computers, intelligence, surveillance and reconnaissance systems and services. VTS's active nozzle concept applies controllable solid propulsion technology to modernizing Army rockets. This all-in-one axial propulsion system with integral thrust vectoring controls the flight and can extend the flight range, improve precision and reduce cost. Initial trade studies for a sample application indicate a 53 percent increase in lethal range and a 70 percent decrease in turning radius. (Image courtesy of Valley Tech Systems Inc.)

VIDROVR INC.

Vidrovr Inc. builds video understanding systems—machine learning and computer vision capabilities applied to video and images to gather information. Vidrovr developed a system to detect and link valuable intelligence from online, broadcast and other sources of publicly available information and full motion video. This system creates a knowledge graph—visual data represented in graphical form that is also searchable. The company is also developing video-processing capabilities for force protection, airborne and ground platforms leveraging full-motion video. (Image courtesy of Vidrovr Inc.)



—DR. TOMOKO SANO

Dr. Tomoko Sano is special projects lead in the Office of Strategy Management at CCDC-ARL. She holds a Ph.D., an M.S. and a B.S. in materials science and engineering from Carnegie Mellon University. She is also currently a visiting scholar at the Johns Hopkins University's Hopkins Extreme Materials Institute.

IDENTIFYING THE NEXT TARGET

A Soldier navigates through the augmented reality lab at the Center for Applied Brain and Cognitive Sciences, a cooperative research initiative between Tufts University School of Engineering and CCDC's Soldier Center. The center conducts applied research on measuring, predicting and enhancing cognitive capabilities and human system interactions for individuals and teams working in high-stakes environments. (Photo by David Kamm, CCDC Soldier Center)

CCDC's ROAD MAP TO MODERNIZING THE ARMY: SOLDIER LETHALITY

Sixth in a series of articles on how the Combat Capabilities Development Command is supporting the Army's "six plus two" modernization priorities.

by Maj. Gen. John A. George

Maj. Gen. John A. George assumed command of the U.S. Army Combat Capabilities Development Command on Nov. 1, 2019. He continues this series of articles on the Army's modernization priorities.

Today's Soldiers require advanced capabilities to be effective on future battlefields. Advances in technology have produced better weapon optics, imaging devices and body armor, as well as many other types of specialized protective and offensive gear. Body armor that could protect Soldiers against rifle fire, for example, was not available during World War II, the Korean War or Operation Desert Storm. Today's Soldiers have body armor that includes front, rear and side ballistic plates to protect them against small-arms fire, as well as flexible groin and collar panels that provide protection against shrapnel and debris. While the body armor provides an added lifesaving layer of protection for Soldiers, it weighs 30 pounds.

On average, a Soldier carries at least 60 pounds of gear, but that weight often doubles depending on the length of the mission and the Soldier's job. A 72-hour mission in Afghanistan, for example, requires an Airborne Soldier to carry seven types of batteries that collectively weigh 16 pounds to power optics, flashlights, night vision devices, GPS and a radio. In addition to the base uniform, a Soldier wears protective gloves, boots and glasses, as well as body armor and a helmet.

Reducing the amount of weight Soldiers wear and carry, while also keeping them safe, is critical to the Army. As part of the future force modernization enterprise, the U.S. Army Combat Capabilities Development Command (CCDC) supports this mission, which is key to the Soldier lethality modernization priority as well as other efforts to ensure that Soldiers can survive and operate in any environment. While the CCDC Soldier Center leads the Soldier lethality modernization effort for the command, other CCDC centers, including Aviation and Missile; Data and Analysis; Armaments; and Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR), round out the team.

CCDC relies heavily on academia, industry and international partners to develop and demonstrate new technologies that will increase protection, lethality, agility and mission flexibility. The command works closely with small businesses by communicating its strategic direction in support of the Soldier lethality modernization priority and investing in emerging commercial technologies. CCDC also works closely

with the cross-functional teams on research and innovation projects that support the Army's modernization priorities. These collaborations drive innovation and strengthen the Soldiers' performance, increasing readiness to meet the Army's critical thresholds—a force capable of multidomain operations by 2028 and 2035.

CCDC is developing technologies that support Soldier lethality, including a host of capabilities that enable a Soldier to shoot, move, communicate, protect, sustain and train. In treating the Soldier as a weapon system, each technology must work with the others to enable the Soldier to perform tasks and reach a destination faster and with greater lethality and efficiency. To avoid the historical norm of adding each new piece of equipment to the Soldier's gear and increasing weight, we are leveraging multifunctional materials and capability integration in our portfolio planning.

FUELING SOLDIERS

Food is the "fuel" of the Soldier weapon system. Just as reducing the weight of a vehicle can increase its fuel economy, we are increasing the nutritional density of the food Soldiers eat, and that high-octane fuel will increase the Soldiers' lethality. The CCDC Soldier Center Combat Feeding Directorate is developing the Close Combat Assault Ration, a lightweight ration that's energy- and nutrient-dense and designed to sustain small units in remote sites up to seven days without resupply. The logistical footprint of the Close Combat Assault Ration is compatible with the service's autonomous aerial and ground delivery of food and supplies for expeditionary operations.

The Soldier Center uses emerging food processing technologies, including vacuum microwave drying and ultrasonic agglomeration, to reduce the weight and volume of military rations. Vacuum microwave drying uniformly removes water with both vacuum and microwave techniques, and can result in physically compressed food that remains moist. Ultrasonic agglomeration uses vibration to instantly compress food without fillers or binders, reducing the meal by 30 to 50 percent of its original size with the same ingredients and nutrition. The Soldier Center targets a reduction in weight for a seven-day supply of food from 18 to 12 pounds. It plans to deliver final specifications for the Close Combat Assault Ration by 2022.

Keeping Soldiers safe without increasing the weight they wear or carry is an ongoing challenge for the Army.

As part of the combat rations development process, our researchers worked with Soldiers and Marines in the 10th Special Forces Group, Fort Carson, Colorado; 2nd Reconnaissance Battalion, 2nd Marine Division, Camp Lejeune, North Carolina; and the 3rd Squadron, 71st Cavalry Regiment, 10th Mountain Division, Fort Drum, New York, to gather feedback to refine technical and operational information, evaluate prototypes and determine trade-off analysis.

We rely heavily on input from Soldier touch points, training and testing events where Soldiers test technology and provide feedback. One touch point that we use on a continuous basis is the Human Research Volunteer Program, located at the CCDC Soldier Center in Natick, Massachusetts. The Soldier Center recruits 30 to 40 Soldiers for approximately 120 days to serve as a baseline model for human research and provide user feedback on tests, studies and evaluations.

A cadre of experienced Soldiers, including a company commander, first sergeant and several noncommissioned officers in the infantry military occupational specialty, are part of the program. These Soldiers provide valuable insight and serve as in-house tactical experts for science and technology research at the Soldier Center.

The program recently completed several rounds of data collection with Soldiers that will be used to transition the next generation of combat boots.

POWERING UP WITH STRONGER BATTERIES

As the Army modernizes the current force and prepares for multidomain operations, the quantity and capabilities of Soldier-worn technologies are expected to increase significantly, and Soldiers will need more power and energy sources to operate them. CCDC's Soldier Center and the C5ISR Center are increasing Soldier lethality and survivability by researching and developing batteries that are lighter and have more power and extended runtimes.

Researchers at the C5ISR Center are exploring improvements in silicon-anode technologies to support lightweight batteries, including the Conformal Wearable Battery, a thin, flexible, lightweight battery that can be worn on a Soldier's vest to power electronics. Silicon-anode technologies can double the performance and duration of currently fielded batteries for dismounted Soldiers. Early prototypes of the updated silicon-anode battery

OPINIONS WANTED

CCDC's Human Research Volunteer program recruits Soldiers to spend approximately four months testing technology and providing feedback. This group helped with combat rations development and included Soldiers and Marines from a variety of military occupational specialties, such as wheeled vehicle mechanic, automated logistical specialist and land combat electronic missile system repairer. (Photo by David Kamm, CCDC Soldier Center)

delivered the same amount of energy with a 29 percent reduction in volume and weight.

Our researchers are integrating the silicon-anode battery with the Army's Integrated Visual Augmentation System (IVAS), a high-priority battlefield heads-up display that uses augmented reality to help Soldiers train. The C5ISR Center plans to use 200 silicon-anode battery prototypes during an IVAS Soldier touch point exercise in July 2020, which will be the first operational demonstration to showcase the battery.

The C5ISR Center is developing a centralized power source for small-arms weapons for the Army's Next Generation Squad Weapon program. The new weapon will have increased capabilities and as a result will require more power than the current baseline system. A power and data rail will enable Soldiers to power any weapon-mounted device, similar to a cellphone charging pad. Electricity will run along the rail and enable power to go to standardized contacts, eliminating the need for Soldiers to manage or carry multiple power sources. Currently, separate batteries are required for each device, including scopes, range finders and thermal sights; with a power and data rail, Soldiers will not have to manage battery swaps since one battery will provide the necessary power for any device.

DELIVERING SOLDIER LETHALITY

The CCDC Armaments Center is the center for lethality in munitions, systems to deliver the munitions and fire control. The center's main projects are aimed at increasing Soldier lethality by reducing load and decision-making while increasing capability in a multidomain environment. Together, these projects prove what is within the realm of possible in science and technology for Soldier overmatch on the battlefield.

The Next Generation Squad Weapon project consolidates ammunition and weapons as well as a power and data rail for integration of next-generation fire control systems. The overall system, which was designed to show advanced technologies and

PUTTING THE PIECES TOGETHER

The Next Generation Squad Weapon Science and Technology prototype consolidates both ammunition and weapons, as well as a power and data rail for integration of next-generation fire-control systems. The overall system was designed to show what was in the realm of possible to replace the M249 Squad Automatic Weapon and is much lighter and more lethal. (Photo by Daniel Cler, CCDC Armaments Center)

serve as a replacement for the M249 Squad Automatic Weapon, provides a lightweight cased and telescoped cartridge with greater lethality than the current, fielded squad automatic weapons and at a much lighter weight than the M249 Squad Automatic Weapon. The 6.8 mm bullet, designed in-house, provides greater lethality and range than the Army's current 5.56 mm bullets. This technology was transitioned to the Project Manager (PM) for Soldier Lethality (formerly the Project Manager for Soldier Weapons) within the Program Executive Office for Soldier in fiscal year 2019.

The Armaments Center will continue to design follow-on bullet types in direct support of Soldier operations in its Next Generation Family of Ammunition project, which has multiple technology transitions through fiscal year 2023.

The Squad Combat Optic Performance Enhancement science and technology project is the Armaments Center's solution for a next-generation primary optic and fire control, similar in capability to a targeting system on a combat vehicle but at a fraction of the size. The system consists of a direct-view optic with an augmented reality overlay, a steerable laser range finder, a daylight and thermal digital weapons camera, and a controller designed to reduce aim error and increase probability of hit. The Armaments Center will use data collected from various Soldier touch points to influence follow-on designs with industry. This technology is slated to transfer to PM Soldier Lethality in mid-fiscal year 2020.

ROBOTICS AND AI FOR SOLDIER PROTECTION

The Soldier Center's Protection and Survivability Directorate is developing directed energy protective ensembles, head-borne integration platforms and concealment. Together, these will enable Soldiers to operate and dominate in any climate or location by remaining undetected from enemy eyes and sensors, and provide protection from battlefield threats if engaged. Directed energy, which is microwave energy, is an emerging battlefield threat that may be used for anti-access and area denial. Head-borne integration will bring together the protection, sensors and information displays that Soldiers need for multidomain operations into a helmet-based system that will reduce weight and complexity while enabling enhanced lethality.

At the dismounted squad level, CCDC Soldier Center is looking at robotics and autonomous systems to increase situational awareness during combat operations. Small unmanned aerial systems, such as the Soldier Borne Sensor or Short Range Reconnaissance platforms, will provide dismounted squads and platoons remote reconnaissance for improved standoff protection and improved situational understanding of the environment.

KEEPING IT VIRTUAL

Early synthetic prototyping uses virtual modeling and simulation to test best ideas and concepts from Soldiers and industry for rapid capability development and force modernization. Early synthetic prototyping uses a government-owned software platform: a virtual sandbox developed by the Systems Simulation, Software and Integration Directorate's Army Game Studio, within CCDC's Aviation and Missile Center, that leverages modular commercial game technology; Army-owned assets, such as 3D models, sounds and sound effects; and other features to create and test concepts in a virtual operational environment and thereby produce data-driven capability requirements.

Early synthetic prototyping experiments allow Soldiers to virtually conduct mission rehearsals using future equipment, doctrine and force structure in a simulated future operational environment against a future enemy. During a squad (up to future company) exercise, Soldiers control simulated systems and use the

same operational decision-making they would use on tactical equipment and combat platforms, including mobility, fires, sensors, communications, obscurants and electronic warfare.

The Ground Vehicle Soldier Center Design Studio held a four-day virtual experiment demonstration using early synthetic prototyping in September. Thirty Soldiers from 2nd Infantry Brigade Combat Team, 4th Infantry Division participated in the demonstration and provided feedback on the Robotic Combat Vehicle's crew configuration, formations, vehicle capabilities, enabling technologies and networked capabilities. During testing, Soldiers used the Robotic Combat Vehicle as a mobile shield in urban terrain and noted that they preferred the higher level of protection from the heavier robotic combat vehicle over the maneuverability of its lighter counterpart. These types of events will continue throughout fiscal year 2020, with each virtual experiment increasing in capability and fidelity.

The Measuring and Advancing Soldier Tactical Readiness and Effectiveness program, which is led by the Soldier Center, will enable the Army to objectively and holistically measure Soldier and squad performance. The program, a collaborative effort with experts in human science research, sensor development, and data acquisition and analysis, will monitor, predict and enhance performance in close combat.

ANALYZING TECHNOLOGY FOR BETTER PERFORMANCE

As the Army's largest in-house analytical capability, the CCDC Data and Analysis Center supports the Soldier lethality modernization priority by providing lethality analysis, modeling and simulation, cyber and electronic warfare, and vulnerability and weapon prototype testing for the Next Generation Squad Weapon. The Data and Analysis Center also performs electronic warfare and electronic-optical, electronic-infrared vulnerability analysis and assessment for IVAS and the Enhanced Night Vision Goggle-Binoculars.

Cybersecurity analysts at the Data and Analysis Center work alongside Microsoft

WHAT'S ON THE MENU?
Meals Ready to Eat, First Strike Rations and prototype Close Combat Assault Rations vary in volume. The smallest footprint belongs to the Close Combat Assault Ration, which will sustain a squad up to seven days without resupply.
(Photo by David Kamm, CCDC Soldier Center)

BEST RATION, BAR NONE
The CCDC Soldier Center's Combat Feeding Directorate developed this Close Combat Assault Ration, a lightweight, energy- and nutrient-dense assault ration for Soldiers. (Photo by David Kamm, CCDC Soldier Center)

experts to set up a development environment suitable for the robust operations of IVAS, which is planned for fielding in fiscal year 2021. CCDC also provides modeling and simulation tools to predict and assess degradation of Soldier performance because of battlefield injuries.

The Data and Analysis Center is also working on the Soldier and squad trade space analysis framework (SSTAF), an architecture for evaluating the positive and negative effects of Soldier equipment on individual Soldier performance. The framework, which treats the Soldier as a unified system, will integrate several human performance models and simulations into one system. This will allow the Army to gather the necessary data to perform trade analysis for Soldier equipment and help inform Army leadership on acquisition decisions. A trade analysis compares different options, such as cost, effectiveness, weight, power, lethality and survivability, and then uses the information to make recommendations to senior leaders so they can make informed decisions. The first SSTAF prototype was completed at the end of fiscal year 2019, with additional capabilities to be added in 2020. It will provide timely, affordable trade analysis at the squad level for Army leaders who make investment decisions.

BUILDING BETTER POWER OPTIONS
Mechanical engineer Dr. Nathan Sharpes demonstrates a power and data rail for the Army's Next Generation Squad Weapon at Aberdeen Proving Ground, Maryland. The C5ISR Center is developing a centralized power source for targeting technologies on the weapon, which currently requires separate batteries for scopes, range finders and thermal sights. (Photo by Dan Lafontaine, CCDC C5ISR Center Public Affairs)

CONCLUSION

CCDC works with academia, industry and international partners to improve Soldier lethality modernization efforts. The Soldier Center partners with the University of Massachusetts Lowell, Tufts University, the University of Massachusetts Amherst and Worcester Polytechnic Institute on various projects. We steer research to relevant military technologies through our membership with the Center for Advanced Research in Drying, which includes academic and industry partners.

We also participate in and lead communities of practice with partners in Army science and technology, industry and academia. Since 2010, CCDC Soldier Center's Soldier Protection and Survivability Directorate has used the community of practice model successfully for individual ballistic and blast protection projects. The teams meet regularly to set research goals and monitor progress. The directorate recently added two communities of practice—one for Soldier camouflage and concealment and one for Soldier hydration and protection from environmental conditions.

We also work closely with small businesses by investing in emerging technologies and reaching out to military industrial bases to ensure that the technologies can be produced to supply military rations. Typically, more than 20 percent of the Army's contracting budget is awarded to small businesses.

Keeping Soldiers safe without increasing the weight they wear or carry is an ongoing challenge for the Army. CCDC works closely with academia, industry and international partners to discover and develop the best technology to support this mission. Using information gathered from continuous experimentation and Soldier touch points, CCDC refines technology and focuses on research and engineering projects that will make Soldiers more lethal and increase combat readiness.

For more information, go to ***www.army.mil/ccdc****.*

MAJ. GEN. JOHN A. GEORGE is the commanding general of CCDC. He most recently served as the deputy director and chief of staff of the U.S. Army Futures Command Futures and Concepts Center. He graduated from the United States Military Academy at West Point, and was commissioned into the Army in 1988. He has an M.S. in social psychology from Pennsylvania State University and an M.S. in national resource strategy from the Industrial College of the Armed Forces.

ALWAYS THE SKEPTIC

Introducing new technology like robotic process automation to the workforce can be challenging, but a pilot program can reduce employee skepticism, eliminating the barrier to the adoption of the technology. (Image by sorbetto/ Getty Images)

by Elizabeth Chirico and John Burchill

DASA(P) joins forces with GSA to get federal agencies to share solutions to similar strategic acquisition challenges.

INNOVATION THROUGH TECHNOLOGY

Over the past year, within both government and industry, there has been a great deal of buzz surrounding new and emerging technologies that have the power to speed up business processes and give valuable time back to professional workforces. Key benefits include, in addition to streamlined processes, improved data transparency, security and accuracy; reduction in workforce time spent on administrative tasks; fewer administrative errors and a resulting increase in compliance; lower operating costs; and quicker access to accurate, timely information.

In fiscal year 2019, Stuart Hazlett, deputy assistant secretary of the Army for procurement (DASA(P)) reorganized the Office of the DASA(P) (ODASA (P)), into several reform initiative teams to better support top Army and DOD priorities—lethality, readiness and modernization. The charter of one of those initiatives, Acquisition Innovation through Technology, explores new and emerging technology capabilities that will shift focus from lower-value administrative work to higher-value work requiring critical thinking that will help contracting professionals save time and make better-informed decisions.

In support of the Acquisition Innovation through Technology mission, Becky Weirick, executive services director of ODASA(P), partnered with the U.S. General Services Administration (GSA) and brought together DOD and federal government leaders on Aug. 15 to collaborate and discuss current technology innovations in acquisition. GSA's mission—to improve the way that federal agencies buy, build and use technology—dovetailed perfectly with Weirick's vision. Weirick was seeking to bring acquisition and technical experts together from across the federal government to look for ways to drive innovation through technology in business processes and to leverage each other's tools, strategies and best practices.

Many federal agencies face similar acquisition challenges, such as various procurement systems producing unstructured data, and require similar solutions. Instead of operating in stovepipes, Weirick wanted to bring agencies together at the inception of deploying new and emerging technologies in acquisition. This inclusive, collaborative vision enables federal agencies to leverage each other's resources and to communicate more effectively.

Elizabeth Chirico, ODASA(P) acquisition innovation lead, along with Jannine Wilkinson and John Burchill, GSA's Army national account managers, coordinated and facilitated the meeting at GSA headquarters in Washington, providing a forum for sharing acquisition technology ideas, progress and resources. (Chirico and Burchill are co-authors of this article.) Federal government leaders from a variety of technical backgrounds participated, including data scientists, acquisition policy chiefs, senior procurement executives, contracting chiefs, chief technology officers, chief information officers and resource management leads. Several federal agencies, including the Internal Revenue Service, the U.S. Department of Health and Human Services, the Defense Logistics Agency and GSA, are exploring and piloting a variety of technologies in the acquisition process, including robotic process automation, to improve acquisition business processes. Group members discussed current and future initiatives designed to enhance and streamline the acquisition process by reducing redundancy, saving time and taxpayer dollars, eliminating administrative tasks from the contracting process and freeing up valuable contracting resources to perform critical analysis.

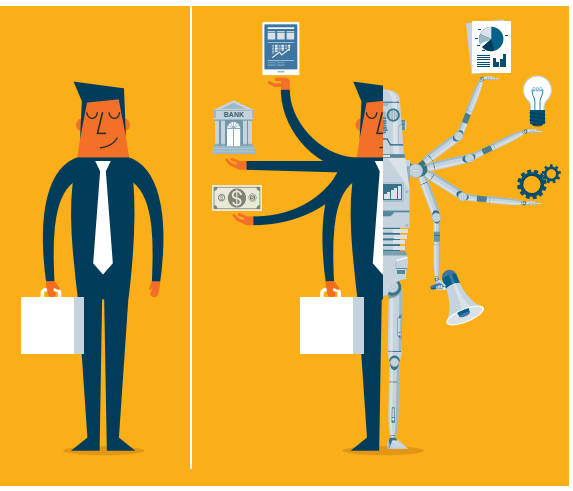
MODERNIZATION THROUGH COLLABORATION

If technology enables us to deliver capability faster, collaboration allows us to increase our collective impact. DASA(P) leadership, in conjunction with GSA, led the charge to partner across federal agencies to leverage technology solutions that one or two agencies individually piloted in order to exponentially increase our collective impact to every federal workforce member. Since robotic process automation is a fairly mature technology, it is particularly interesting to the Army and other members of the group.

Robotic process automation has the power to easily automate straightforward, repeatable processes traditionally executed by a human and ultimately to streamline processes, increase compliance and save time and resources. Robotic automation solutions may differ slightly, but since each federal agency shares key common denominators—the use of the same or similar acquisition systems and processes—the success of one pilot or proof of concept sends ripples across the entire federal space and enables all to accelerate change.

SHIFTING THE CULTURE

One of the most challenging parts of introducing new technology is combating a resistance to change in the workplace. Often, professionals are skeptical of how new technology processes work, or whether they really will produce accurate results and ultimately be helpful. Sometimes, professionals even see the benefit of a new technology or process but are still resistant to using it, because it is outside of their normal process and feels unfamiliar to them. Often, the best way to prove to professionals that a technology like robotic process automation really works is to make sure that they are actively involved in the change process.



AUTOMATING SUCCESS

Robotic process automation can easily automate a straightforward, repeatable process, thus increasing compliance and saving time and resources. (Image by Yuichiro Chino/Getty Images)

A pilot or proof-of-concept of the new technology allows the workforce to see firsthand how the technology works. The true benefit of a pilot program is to allow the technology's capability to speak for itself. That way, the workforce has the opportunity to experience how the technology saves them time and improves accuracy. Once the technology demonstrates value—even if just in a few targeted locations—word will spread about the benefits, and then others will clamor to adopt the technology, too. As with all things, adapting to even small or incremental changes takes time.

Two civilian agencies have individually piloted similar "contractor responsibility determination" solutions using robotic process automation. This robotic process automation—or "bot" for short—is able to pull information from public websites such as the System for Award Management (SAM) and the Federal Awardee Performance and Integrity Information System (FAPIIS) just like a human would—except much faster.

In order for a bot to work effectively, a bot technician simply enters, or records, the exact process that a contracting professional would ordinarily take, right down to mouse clicks, typing of data, screenshots and pulling of reports. In this case, the process entails navigating to the SAM.gov and FAPIIS.gov websites, typing in a unique vendor number, also known as a Data Universal Numbering System (DUNS) number, and checking each website's database for results and information indicating whether the contractor is registered in each system in order to do business with the federal government, does not have any active exclusions (such as suspension or debarment) and is otherwise capable of receiving a federal contract award.

To launch this process with the bot, a contracting professional provides the bot with a DUNS number for each contractor (via email or other electronic means), then the bot takes over the task from there: It enters each DUNS number into both the SAM and FAPIIS websites, creates screenshot reports from the information listed in the sites, populates a document with the results for each vendor that it finds, and sends the results to a contracting specialist—in no more than four minutes.

In September, the Army awarded a contract to procure a "contractor responsibility determination" bot to enable contracting professionals to shift their focus from low-value administrative tasks like checking SAM.gov for a given contractor's registration, to high-value, critical-thinking areas of their work such as negotiations and cost analysis. Once the Army demonstrates success of the bot, it plans to extend use of it to other DOD and federal agencies. That way, multiple federal agencies will have the opportunity to leverage and share in the Army's success of a streamlined process. Federal agencies are banding together to divide and conquer other aspects of acquisition ripe for automation, such as searching government systems for contractors' past performance information, or auto-populating required Federal Acquisition Regulation clauses for specific types of requirements.

SAVE THE SPECIALISTS AND DELIVER CAPABILITY

Contract specialists and contracting officers often manage critical and diverse portfolios of contract requirements for various customers, stakeholders and requiring activities. Usually, each requiring activity and stakeholder views the contracting aspect of the acquisition process as the final speed bump to delivering capability or completing the mission. Delivering capability in the Army means delivering lethality and readiness to our Soldiers.

Most contracting professionals are used to an urgent, high-tempo work environment. Robotic process automation has the power to dramatically cut time and reduce unnecessary stress in an often cumbersome acquisition process. In this case, robotic process automation enables contracting professionals to be more productive with their time by allowing them to use their critical-thinking skills on complex cost analysis for procuring weapon systems or conducting multifaceted negotiations, rather than spending time waiting for multiple websites to load or re-entering the same information into several forms or systems.

For example, it usually takes a contracting professional up to an hour to complete a contractor responsibility determination process. This tedious task is a required part of the acquisition process that a

contracting professional must complete multiple times throughout the course of awarding a new contract. This check is required during three stages of an acquisition:

- The market research stage: When the acquisition team is looking for contractors that will be able to perform the type of work that they are looking for.
- The competitive range stage: Once the team requests and receives contractors' proposals, in order to determine if the top contractors, or "competitive range," that submitted proposals are capable of receiving a federal award.
- At the time of final award: To make sure that the selected contractor is still capable of receiving an award from the federal government (no suspensions, debarments or violations of federal law have taken place since the last check).

As you can imagine, over the course of a year, contracting professionals perform many responsibility determination checks. A DASA(P) internal report showed that on average, the Army issues approximately 250,000 contract actions per year, requiring contracting professionals to determine whether a contractor is responsible in each stage of the action. Based on initial estimates, using an Army bot in the contractor responsibility determination process will save up to 13 days of time annually for each contracting professional (over 7,000 total) across the Army. Thirteen days saved per contracting professional would drastically help to reduce procurement administrative lead time across the board for all acquisitions, just by speeding up one small administrative task. Imagine if we applied robotic process automation solutions to other areas of the acquisition process: We could deliver capability to our Soldiers much faster.

CONCLUSION

DASA(P) led the charge in acquisition modernization efforts by strategically collaborating with other federal agencies using technology enablers in the acquisition arena, piloting a contractor responsibility determination bot across the Army contracting enterprise, and by extending the bot capability and success of the pilot to other DOD and federal agencies to use.

By leveraging these new and emerging technologies, we can drive productivity, increase quality and save time—and everyone wants the ability to work more efficiently. Every generation of new technology enables new business processes, often improving quality of life in ways once unimaginable. Automation in acquisition is no different. Leveraging emerging technology and innovation within the federal space aligns with the President's Management Agenda as well as the National Defense Strategy. Both documents highlight the critical need for government agencies and DOD to enhance mission effectiveness through the modernization of systems, processes and capabilities.

Federal acquisition leaders should continue to coordinate and collaborate, sharing successes and thinking of creative ways to use rapidly evolving technology to streamline acquisition and business processes. Together, we can change the shape of acquisition by employing technology to better enable the federal workforce to deliver capability more efficiently and effectively.

For more information, go to the Office of the DASA(P) website: ***https://spcs3.kc.army.mil/asaalt/procurement/SitePages/PAMHome****; or contact Liz Chirico at* ***elizabeth.a.chirico.civ@mail.mil****, or John Burchill at* ***john.burchill@gsa.gov****.*

ELIZABETH CHIRICO is the acquisition innovation lead in the ODASA(P). She holds an M.S. in acquisition and contract management from the Florida Institute of Technology and a B.A. in English from the University of Mary Washington. She is Level III certified in contracting and is a member of the Army Acquisition Corps.

JOHN BURCHILL is the Army national account manager at the GSA. He holds an MBA from Binghamton University and a B.S. in marketing and management from Ithaca College. He has Level II Federal Acquisition Certification for Contracting Officer's Representatives, an ITIL Foundations Certification and a master's certificate in federal project management.

WE WANT YOU TO JOIN US!

Is there an area of the contracting process that is a rote or repeatable process that you think is ripe for automation? Is your command, office or agency currently piloting or interested in piloting a new or emerging technology to streamline the contracting process? We would like to hear from you! We invite interested federal government agency leaders to provide information or demonstrations on acquisition innovation technologies that they are currently using. Please reach out to Liz Chirico, acquisition innovation lead at ODASA(P) at **elizabeth.a.chirico.civ@mail.mil**, or John Burchill, national account manager at GSA, at **john.burchill@gsa.gov**, to be included in future meetings and information sharing.

REDEFINING THE NETWORK

Software-defined networking could get Army's data moving faster.

by John Shotwell and Amy Walker

As part of its tactical network modernization strategy, the Army has begun development, integration and Soldier-driven assessments to determine whether integrating commercial off-the-shelf solutions could support the potential use of software-defined networking in tactical military environments. Similar to the way cloud computing improves capability by moving data storage from a device to a centralized data storage facility, software-defined networking is a network modernization approach that relocates and centralizes local network routing control functions at a secure remote location.

The Army's software-defined networking goals include:

- Reducing complexity for the tactical user while simplifying network management for communications officers.
- Achieving the ability to rapidly provision (load software) and re-provision network nodes based on mission to prepare them for operational use on the network.
- Improving network resilience, including an automated primary, alternate, contingency and emergency routing plan.
- Increasing network security.

A software-defined networking architecture is a more dynamic design that could make network management, administration and signal prioritization easier, more flexible and effective.

WHAT IS SOFTWARE DEFINED NETWORKING?

As part of the basic networking, before information is transmitted, it is broken up into smaller digital data packets. The network then chooses the best path, or route, to send each data packet and, once packets reach their destination, the network reassembles them. The network performs two basic processes on the data packets—one process focuses on forwarding the packets to their destination and is referred to as the "data plane," and the other focuses on routing the packets and is referred to as the "control plane." In the Army's current, traditional network, these two process planes are located and implemented together at a local level by a tactical network node's hardware and proprietary networking operating

UPGRADE
In late September, supported by the 1st Armored Brigade Combat Team, 3rd Infantry Division, the Army assessed prototype software-defined networking and software-defined wide area network software loaded onto the unit's new hardware. Results from this experimentation effort will help inform software-defined networking design decisions and potential uses. (U.S. Army photos by Amy Walker, PM Tactical Network/PEO C3T Public Affairs)

systems. On the other hand, in a software-defined networking design, these two process planes are separated. The forwarding functions (the data plane) remain with the local network device, but the routing control functions (the control plane) are extracted, turned into more dynamic software, and centralized at a network operations facility, or in a campus network environment, where they can be managed collectively by experienced signal Soldiers.

The remote routing controller knows all of the nodes that it can manage, and it can sense when there is congestion in the network or when there are dropped data packets, due to things like bad satellite connections or enemy jamming. Through metrics embedded in the software, this intelligent controller can sense the most efficient path available and tell the nodes in the network to route around the issues. The Army's current software-defined networking efforts are setting the stage to optimize routing even further by leveraging machine learning when the required technology becomes available.

RAPID TASK REORGANIZATION AND CYBER OPERATIONS

To accomplish certain missions in today's fight, commanders may need to reassign certain units, such as moving a company to a different battalion. Unfortunately, such a move requires signal Soldiers to re-provision the unit's vast number of network systems with new data and software, including new applications,

firewall configurations and initialization data products. These products are assigned to each unit before deployment or training events, to enable the systems to run on the network. When a unit is reassigned, new data products are needed to support the new assignment. These products include unique identifiers, roles and Internet Protocol addresses, taking into account a unit's specific mission, personnel footprint and mix of networked mission command systems. The Army refers to this process as unit task reorganization.

In the face of potential peer and near-peer threats, the Army needs dynamic and flexible network re-provisioning capabilities to reflect changes in mission and assigned units. In the past, signal Soldiers manually conducted the provisioning and re-provisioning process one device at a time, with physical cables connecting each node to the network, which took many weeks, depending on the equipment and size of the unit. More recently, new Army capabilities are enabling over-the-air provisioning and security patching, which could, for example, speed the time it takes to provision a brigade's worth of on-the-move, network-equipped vehicles from two weeks to three days, without having to take the entire system offline in the process. The implementation of an Army software-defined networking design could speed that process even further, cutting the time down to hours.

The Army understands that to receive better, more tailored solutions from industry, it needs to share open application programming interfaces and use cases in areas that could potentially be supported by commercial off-the-shelf products.

The Army is also looking to leverage software-defined networking to increase security in the tactical network by enabling rapid response through centralized changes to security policy, patching and configurations in support of offensive and defensive cyber operations. This would enable the Army to defend itself against enemy cyber threats across the network and push security updates to units all over the world, simultaneously, from the remote centralized network operations center.

OVERCOMING A DEGRADED NETWORK ENVIRONMENT

A software-defined networking design could enhance system and network simplicity for tactical users, since it moves some of that network complexity to a centralized network operations center. However, the Army will have to leave enough of the routing control functions locally, within the tactical device, to get through network challenges found in degraded signal environments. These degraded network challenges include network transport environments that are highly latent (slow), disconnected, intermittent and with low bandwidth, which the Army refers to as DIL environments.

The tactical network is an interconnected mesh design, with different-sized line-of-sight and beyond-line-of-sight systems that exchange data over different frequencies and multiple transmission paths. Together these unified systems enable secure network connectivity and data exchange across the force, from a large command post down to the Soldier on the ground with a handheld device. Unfortunately, degraded network challenges are inherent in the Army's tactical network, and not just because of its size, breadth and complexity. Connectivity issues can also be caused by topography like mountains or buildings that block signals; on-the-move communications; or, increasingly, enemy jamming.

In recent pilot efforts with operational units, the Army has been experimenting with both software-defined networking and software-defined wide area networking. These laboratory experiments and operational unit pilots are underscoring the need for solutions to detect and route around network interference and congestion, and to load-balance flows across multiple transmission paths, to increase network speed, performance and reliability.

If the Army switches to a software-defined wide area network design, the remote centralized network controller will need to include software that implements a strong and automated primary, alternate, contingency and emergency routing plan, so that it can automatically route and reroute signals over multiple transmission paths, choosing the strongest available paths for optimal connectivity and resilience. The Army wants to ensure continuity of operations, to enable network routing to be seamless and transparent to the tactical user, so Soldiers can focus on the mission and not the network.

In the face of potential peer and near-peer threats, the Army needs dynamic and flexible network re-provisioning capabilities to reflect changes in mission and assigned units.

Additionally, the network will need to have a fallback to compensate for degraded network emergencies, when the tactical network systems on the battlefield can't "talk" to the remote network routing controller. To offset these scenarios, software-defined networking solutions will need to incorporate capabilities such as initialization data products and basic router configurations that reside locally, which the tactical network system can leverage until stronger network connections to the remote intelligent routing controller are restored.

THE SEARCH FOR TAILORED SOLUTIONS

Under an other-transaction authority rapid acquisition process, which leverages Soldier feedback, experimentation and prototyping, the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T) is experimenting with commercial software-defined networking technologies at its integration facilities at Aberdeen Proving Ground, Maryland. Additionally, in late September, supported by the 1st Armored Brigade Combat Team, 3rd Infantry, the Army assessed prototype software-defined networking and software-defined wide area networking software loaded onto the unit's new at-the-halt tactical network hardware (fifth-generation technical insertion prototypes that the unit is currently piloting), at Fort Stewart, Georgia. Results from this experimentation effort are helping to inform software-defined networking design decisions and use cases—a set of possible sequences reflecting how users will employ the capabilities.

As the efforts evolve, PEO C3T plans to leverage an open-standard design for easy integration—and to avoid proprietary designs or commitment to particular vendors—to spur innovation while keeping costs down through increased competition. System developers from the Army acquisition and research communities are working closely with industry to ensure that they understand the degraded signal challenges in the Army's network, which are much greater than in commercial networks, as well as other specific objectives so that they can provide us with more tailored solutions. These objectives include:

- **Assisting the Army in rapidly provisioning tactical network nodes.** Software-defined networking experimentation has shown decreased provisioning time, especially when paired with virtualization and containerization, which further reduces the overall data size and speed of provisioning.

- **Supporting rapid unit task reorganization.** The Army needs dynamic, flexible re-provisioning to reflect changes in mission and assigned units. This functional gap extends beyond the traditional software-defined networking capabilities and needs to allow for the tailoring of each tactical network device.

- **Optimizing routing in the tactical network.** There is a need for software-defined networking to behave opportunistically. Because of the Army's degraded network challenges, software-defined wide area networking solutions must enhance the network when the remote network controller is available, and enable nodes to operate independently when it is not available.

- **Simplifying network management.** Experimentation reveals that centralizing and automating network configuration changes makes it easier for the network node operators on the ground. However, network management, including configuration changes, can still be quite complex for the centralized signal Soldier team to execute. There is opportunity to automate many of these functions.

- **Increasing security in the tactical network.** The Army is looking at software-defined networking to assist in rapid cyber response through centralizing the ability to conduct changes to security policy, patching and configurations to support defensive cyber operations. This would enable Soldiers at the remote centralized controller location to send out patches or updates throughout the entire network.

The Army understands that to receive better, more tailored solutions from industry, it needs to share open application programming interfaces and use cases in areas that could potentially be supported by commercial off-the-shelf products. These include interfaces for accessing initialization data; integrating to

PROTOTYPE TRAINING
Soldiers from the 1st Armored Brigade Combat Team, 3rd Infantry Division undergo new equipment training of prototype at-the-halt tactical network transport upgrade equipment in September at Fort Stewart, Georgia.

network operations tools; accessing network health information; application-aware routing that allows applications to respond to the network's availability; and application self-provisioning.

CONCLUSION

PEO C3T is educating industry whenever possible on the tactical network environment and its challenges, as well as software-defined networking business opportunities. Working together with modular, open-system architectures and application programming interfaces, the Army and industry partners have the potential to make a real impact in network modernization, reducing complexity for users at the tactical edge and arming them with the network capabilities they need to defeat increasingly advanced adversaries.

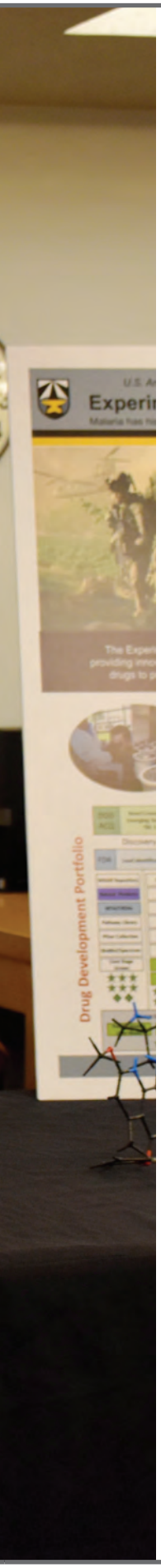
For more information, go to the PEO C3T website at ***http://peoc3t.army.mil/c3t/*** *or contact the PEO C3T Public Affairs Office at 443-395-6489 or* ***usarmy.APG.peo-c3t.mbx.pao-peoc3t@mail.mil****.*

JOHN SHOTWELL is director of technology management and chief engineer for PEO C3T. Since 2003, he has supported PEO C3T in various engineering capacities as an expert in Army tactical networks, and has served as lead systems engineer for multiple projects. He graduated from the Naval Postgraduate School with an M.S. in systems engineering and the New Jersey Institute of Technology with a B.S. in mechanical engineering. He is a member of the Army Acquisition Corps and is Level III certified in engineering.

AMY WALKER has been the public affairs lead at the Project Manager (PM) for Tactical Network for the last nine years, and was the public affairs lead at PEO C3T for the previous two. She has covered a majority of the Army's major tactical network transport modernization efforts, 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. She is a frequent contributor to Army AL&T. Her last article appeared in the Summer 2019 edition.

CHARTING PROGRAM SUCCESS

Maj. Victor Zottig, project manager for USAMMDA's Warfighter Protection and Acute Care Project Management Office, discusses the life cycle and impact of tafenoquine during an October presentation at Fort Detrick, Maryland. Tafenoquine is the first new FDA-approved antimalarial drug in 18 years, and its development yielded lessons that USAMMDA is applying to its current efforts. (Photo by Carey Phillips, USAMMDA Public Affairs)



SOLUTION EVOLUTION

USAMRDC's technology landscape-mapping workshops seek to find the right medicines and devices with input from an integrated stakeholder team.

by Ramin A. Khalili

If anybody knows how it all fits together, it's Dr. Lawrence Lightner. As a retired, 23-year veteran of the Army and current project manager at the U.S. Army Medical Materiel Development Activity (USAMMDA), Lightner knows almost everything under the sun about current initiatives, previous product efforts and, not least of all, the necessary U.S. Food and Drug Administration (FDA) process that occasionally accompanies the U.S. Army Medical Research and Development Command's (USAMRDC) acquisition process.

"We have learned how the process works and how to adapt to it," said Lightner, whose official title is project manager for warfighter protection and acute care.

And yet times are changing. While the organization-wide desire to both identify and develop solutions in warfighter care as fast as possible remains constant, the acquisition process for developing those technologies is now evolving, too, for the sake of increased efficiency. For Lightner and his team, a group that has ushered a wide variety of products through the acquisition process over the past two-plus decades, it's a sign that continued success is just around the corner.

TLM: EVOLUTION OF A SOLUTION

At USAMRDC headquarters at Fort Detrick, Maryland, Dr. Mark Dertzbaugh, acting deputy principal assistant for research and technology, marks up the whiteboard in his first-floor office like a football coach drawing up plays during practice, charting a potential product's timeline with both purpose and ease. For him, this is ground zero—the place where solutions are born.

"The idea is to develop a common vision among all key stakeholders," he said, "a vision where we on the science and technology [S&T] side can work in parallel in some places with our acquisition program managers [PMs] to help compress the timeline to product fielding."

That vision starts with a process called a technology landscape mapping (TLM) workshop, which is, in short, a method for determining which technologies may best address a given capability gap before the financial investments begin. This kind of effort starts with the targeting of a specific need, and then begins in earnest with a combination of brainstorming efforts, research reviews and briefs on both current and off-the-shelf products that may help fill that need. According to Dertzbaugh, TLMs accomplish this goal by pulling together key stakeholders, including requirements personnel, S&T staffers and PMs, to determine what the needs of the user are and which technology solutions best fit the bill.

Said Dertzbaugh, "Before we crack any test tubes, we do this paper exercise [TLM] to identify the best technology, and then determine how the S&T aligns with the acquisition program that will ultimately receive [those recommendations]. We're always trying to make sure we share a common vision of where we're going as an enterprise, in order to be as efficient as possible."

One of the key debates in that regard concerns maturity versus fit—or rather, which option increases overall lethality for the warfighter: a product that's further along in the developmental process (which feasibly could get to the warfighter faster), or a product that expressly fits the warfighter's specific needs (which may take longer to develop and, ultimately, field). Because of the potential for fluctuation on either end, the guiding document that comes out of the TLM must constantly (and necessarily) be revised.

"It's an evolving document," said Dertzbaugh. "There's always the chance there could be some disruptive technology which appears out there that we just don't know about yet."

The TLM concept is essentially a more structured approach to technology scouting, and is the process currently guiding the USAMRDC's investment in medical technologies needed to support the Army's modernization strategy. The ultimate desire, of course, is to develop products that save lives and improve Soldier lethality.

"We're trying to improve our shots on goal," said Dertzbaugh, using his best coach-speak, of this more forward-thinking approach. "It's all about securing and developing the best technology and trying to get it to the people who need it faster."

COOPERATIVE R&D

USAMRDC staff display an experimental type of freeze-dried plasma (FDP) before a presentation at Fort Detrick in August 2016. Teleflex Inc. manufactures FDP in the U.S., and contributes in-kind resources for manufacturing, licensure and commercialization, while USAMMDA funds and manages the clinical trials needed for FDA approval. (Photo by USAMMDA Public Affairs)

STATION TO STATION: THE NEXT STEP

From Dertzbaugh's office, the process moves to the next step: the second-floor office of Dawn Rosarius, USAMRDC principal assistant for acquisition.

EXPLORING ALL OPTIONS
USAMRDC staff display an experimental type of freeze-dried plasma during an event at Fort Detrick in August 2016. To better support its mission to identify and develop solutions in warfighter care as fast as possible, the organization is using a technology scouting approach to guide investment in medical technologies needed to support the Army's modernization strategy. (Photo by USAMMDA Public Affairs)

"It's a collaboration from the beginning between S&T and program management, so we are more prepared when the solution is transitioned to us," said Rosarius of this next step. "We want to see the value when we take any product from the science and technology side of the house."

As such, and as part of the designated product pathway, Rosarius' team grabs the ball passed by Dertzbaugh's team and USAMRDC laboratories and then makes the requisite—and critical—decisions specific to that product's potential future.

"It depends on how advanced the product is," said Rosarius of how, exactly, her team chooses which products move forward and in what particular capacity. "Pharmaceuticals, such as those that Dr. Lightner oversees, have a lot of risk. Medical devices may as well; however, we want to transition those as early as possible to address issues such as sustainability, cyber and usability."

REALIZATION AND COMMERCIALIZATION

Back at the USAMMDA project management offices, in the veteran hands of Lightner and his team, the pieces processed through Dertzbaugh and Rosarius take on their final shapes before heading out the door.

"We're relatively unique within DOD as to how we develop products and what we need," said Lightner. "Our products are all commercialized, which means they're meant to be used not just on the battlefield by our warfighters, but during peacetime as well—as our target population is somewhat unique in the pharmaceutical industry. While most companies are targeting pediatric and geriatric populations, we need products for younger, 18- to 40-year-olds."

A good example of the latter is the vaccine used to prevent dengue, a mosquito-borne viral infection and a leading cause of hospital admissions in military units operating in the tropics. USAMMDA partners with a company that is keen to target the vaccine for use across a pediatric population. In exchange for DOD conducting part of the company's worldwide clinical trial at two DOD sites, the company has agreed to accelerate its license application for an adult indication as well. Additionally, the partnership gives USAMMDA a seat at the table at the company's product strategy meetings, which allows the organization to make informed decisions on the potential DOD use of the product. USAMMDA has several other similar partnerships in its portfolio.

According to Lightner, this type of grand commercialization requires robust backing from industry partners during the acquisition process, an effort that can be described more succinctly as an attempt to split the total cost of the licensing and production bills.

A prime example of this kind of partnership is USAMRDC's work with

Technology landscape mapping is a method for determining which technologies may best address a given capability gap before the financial investments begin.

Pennsylvania-based Teleflex Inc., the manufacturer of a freeze-dried plasma (FDP) product called EZPlaz. Following the FDA's emergency-use approval in 2018 of a similar product developed in France (referred to as "French FDP"), EZPlaz is under development to be the domestically produced version of French FDP, which Lightner said will ultimately be available for use wherever fresh, Frozen plasma is not available. Under a cooperative research and development agreement with USAMRDC, Teleflex contributes millions of dollars for manufacturing, licensure and commercialization of the product, while USAMMDA funds and manages the clinical trials required to support FDA licensure.

"We need our [industry partners] to share the cost of development because we don't have the sufficient funding to simply contract with a company for the whole effort," said Lightner. "So we need to have a commercial partnership to obtain licensure with the FDA, work with DOD on behalf of our unique population, and sustain the products post-licensure. Without that kind of partnering, we would probably be able to fund only a couple of development efforts instead of the 20 or so that we currently have in our portfolio."

He added, "This maximizes our ability to move products out to the warfighter."

DOD's role in shepherding tafenoquine (tradename Arakoda) through this same acquisition process is, in many respects, a testament to the idea that the entire acquisition framework is evolving. Approved by the FDA in 2018 for the prevention of malaria in adults 18 years and older, tafenoquine—which tested as more than 99 percent effective in clinical trials against all species of malaria and all stages of the parasite—was in the product pipeline for nearly 30 years. The lengthy nature of its gestation was largely the result of understandable difficulties with conducting clinical trials in malaria-endemic areas (as required by the FDA) and finding a reliable and suitable industry partner.

Large pharmaceutical companies are generally not interested in malaria prevention drugs because they don't have a large commercial market: Malaria prevention via pharmaceutical intervention is not practical yet in endemic countries because of the cost, especially for long-term use. Additionally, there is no large market for travelers who need the vaccine. DOD is the largest U.S. consumer of malaria prophylactics, so USAMRDC's in-house program is critical in maintaining effective drugs to use in malaria prevention.

As a result, it was left to DOD to lead those development efforts. Following an extensive search of potential partners, 60° Pharmaceuticals was selected to partner with USAMMDA in vaccine development. The company is now boosting production of tafenoquine to meet global needs. The result will be the availability of the first new FDA-approved antimalarial drug in 18 years—one that is effective against all species and stages of malaria. The worldwide impact, according to Lightner, will be significant. "Tafenoquine taught us a number of lessons in both what to do and what not to do when developing products that we are applying on a daily basis in our current efforts," he said.

CONCLUSION

In the end, perhaps the evolution of the USAMRDC acquisition process—and DOD acquisition reforms in general—will create an even smoother process for Lightner and his team; a method even cleaner and more fluid than the ones before. How ironic, then—or just good timing—that all the lessons learned though decades of development, revision and modification have ultimately resulted in a more aerodynamic process where time and desire push each other forward in symbiotic fashion.

For more information, go to ***https://mrdc.amedd.army.mil/*** *or* ***https://www.usammda.army.mil/****.*

RAMIN A. KHALILI is a writer with the USAMRDC Public Affairs Office. Before assuming his current role, he spent several years as the knowledge manager for the command's Combat Casualty Care Research Program. During his previous decade-plus career as a broadcast journalist, he earned an Associated Press Award for his work in Phoenix, Arizona, before serving as Chief NASA Correspondent for CBS in Orlando, Florida. He holds a B.A. in communications from Penn State University.

MOVING ACQUISITION

Transportability engineering is vital in an accelerated acquisition process.

by Michael Bartosiak

Efficient and rapid deployment of the Army is crucial to the National Defense Strategy. The DOD acquisition community has a key role in obtaining materiel, equipment and weapon systems that fulfill Soldier requirements. The acquisition community is evolving by accelerating or streamlining systems acquisition to meet those needs in a timelier manner. Using a commercial off-the shelf (COTS) acquisition strategy to acquire military systems can reduce initial production costs as well as fielding times. However, those benefits could come at the price of transportability issues that impact deployability and work against some of the aims of the National Defense Strategy.

The military has a unique requirement to transport large and heavy systems by rail, ship, air or highway regularly during deployments. Commercial items do not have the same transportability and deployability requirements and therefore are not designed for frequent shipment. Military systems are required to have special provisions that enable rapid lifting and tie-down. Large or heavy military systems, referred to as transportability problem items, have requirements that define very specific transportability criteria. As the design of military systems approaches the limits of the certain transportation assets, meeting the transportability requirements becomes critical.

ADDRESS TRANSPORTABILITY EARLY

James N. Mattis, the 26th secretary of defense, once stated, "If you cannot move, you are not lethal." Therefore, transportability engineering is an essential part of the acquisition process. Requirement writers, materiel developers and program offices need to consider how units will deploy once the systems they develop are integrated into the formation. Designing transportable systems enables the force to be agile and deployable.

It is important to consider transportability requirements early and throughout the acquisition process. When they are considered only later in the process, issues can occur—a redesign after a system is in production can hinder system performance and effectiveness.

For example, a commonly proposed solution for addressing transportability of large or heavy systems after production is to create a transport configuration—how systems reduce for movement on a mode of transport, like a train—by removing parts from the system. While this may be a viable solution as it has less effect on initial cost and schedule, removing parts could result in slower deployment times and be an operational burden to the unit using the system. The removed parts must be packaged and shipped with the system, and those packaged

DEFENSE TRANSPORTATION SYSTEM

The defense transportation system consists of rail, air, highway and sealift transport methods. Transportability plays a major role in the effectiveness of Army capabilities.

BY AIR

Soldiers with the 75th Field Artillery Brigade, III Corps drive a High Mobility Artillery Rocket System vehicle out of a U.S. Air Force C-17 Globemaster in April 2018 at Al Minhad Air Base, United Arab Emirates. (U.S. Army photo by Sgt. 1st Class Doug Roles, Task Force Spartan)

BY ROAD

Wagonmaster Soldiers with the 1st Cavalry Division Sustainment Brigade ready Heavy Equipment Transporter Systems in March during port-to-fort operations at the Port of Beaumont, Texas. (U.S. Army photo by Spc. Calab Franklin, 1st Cavalry Division Sustainment Brigade)

parts require containers or other means of transport. This adds time to the deployment process because the systems need to be configured and reconfigured. In some cases, the process of reducing the system to a transport configuration is beyond the capabilities of the crew or organization. This adds another burden on the unit and complicates reception, staging, onward movement and integration in theater.

Once deployed, planners have to establish a staging or assembly area where the system will be returned to combat configuration—meaning fully assembled and operational. Once combat-configured, the systems may be too big or heavy to move on theater transportation assets, thus inhibiting theater mobility. If an intratheater move is needed, the unit using the system must again remove, package, transport and return all the equipment to the combat configuration. The time and manpower to deal with configuring and reconfiguring systems become a burden to the units, reducing operational effectiveness. Thus, transportability plays a huge role in the effectiveness of Army capabilities.

TRANSPORTABILITY IN A COTS STRATEGY

A COTS strategy increases the potential of encountering transportability issues. In a COTS strategy, there is limited preliminary testing before the commercial alternative enters low-rate initial production. This often results in transportability issues, as commercial systems are not usually designed with unique military features that support transportability. To alleviate these issues, transportability engineering should be part of the selection criteria. In most cases, transportability testing should occur before the acquisition decision. If some developmental tests are done, redesign for better transportability can occur before production.

If transportability issues arise later during production and fielding, the range of design solutions is limited to those that can be retrofitted to the existing systems. Existing systems often receive a retrofit solution when a redesign occurs during production. This creates multiple system configurations that negatively affect supportability.

Deciding to trade or waive transportability can have serious impacts. Considering transportability early in the process and before production and fielding leads to desired system performance and improved transportability. Transportability engineering is a military-unique requirement that is normally addressed in the engineering and manufacturing phase. A brief engineering and manufacturing phase in a COTS acquisition allows developers to modify mature commercial designs for better transportability before a fielding decision and production.

BY SEA

Spec. Timothy Burns, U.S. Army Alaska, secures U.S. Marine Corps bulk fuel supplies and equipment from the USS Comstock in Seward, Alaska, in September for transport to Joint Base Elmendorf–Richardson, Alaska. (U.S. Air Force photo by Justin Connaher, Joint Base Elmendorf–Richardson Public Affairs)

BY RAIL

Military vehicles and equipment belonging to the 829th Engineer Company are loaded on rail cars in September at Fort McCoy, Wisconsin, to be shipped for an overseas deployment later in the year. (U.S. Army photo by Scott T. Sturkol, Fort McCoy Public Affairs)

With a shortened engineering and manufacturing phase, the materiel developer can generate a transportability report, which outlines how their design will transport quickly and efficiently. Transportability engineers can review this report and recommend any adjustments, if needed, before the materiel developer finalizes the design. Key system performance parameters could be verified, along with transportability, with a streamlined series of development tests. This avoids addressing performance or transportability issues after the system is in production.

A KEY RELATIONSHIP

Developing a relationship with the Surface Deployment Distribution Command Transportation Engineering Agency (SDDCTEA) can ensure that transportability is considered throughout the acquisition process. The agency's Transportability Engineering Branch can advise the acquisition community about proposed transportability requirements and testing. It can review preliminary or concept system designs and make sure transportability is adequately covered before it becomes very costly and time-consuming to change the design.

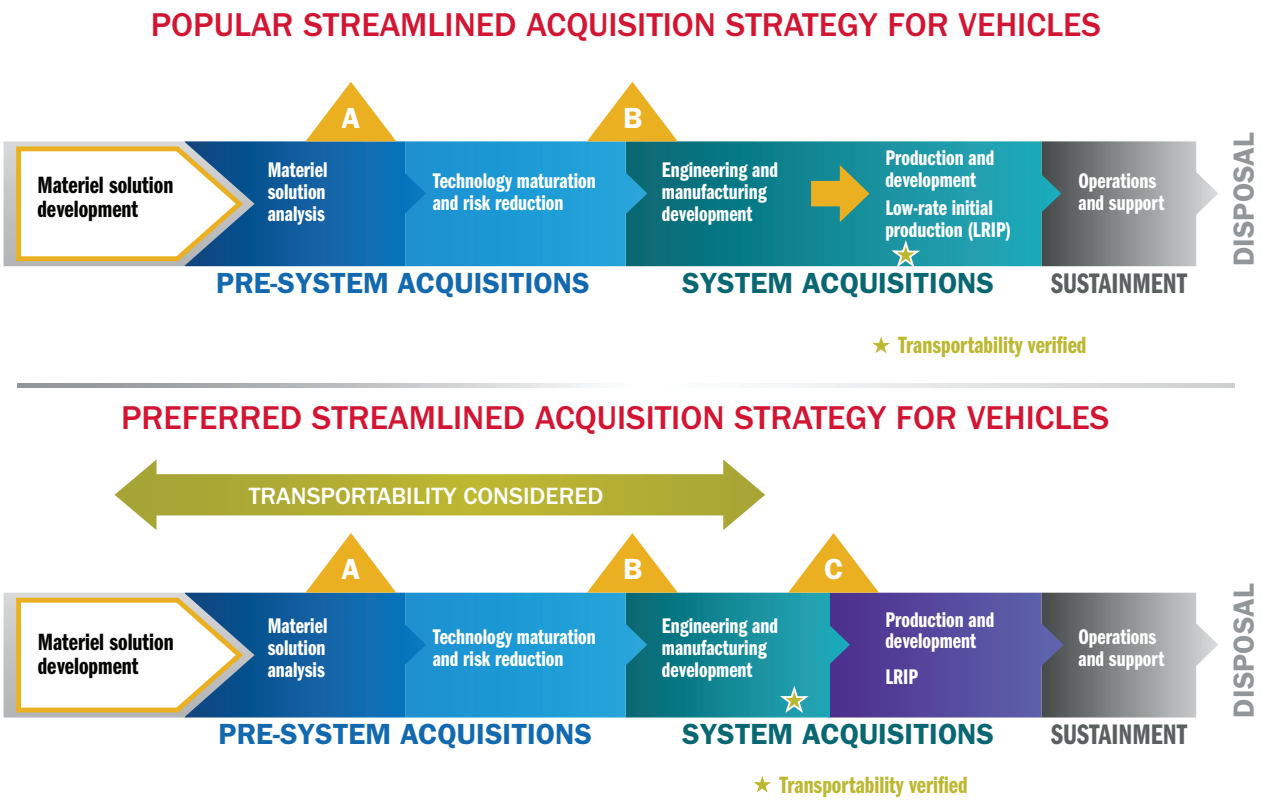
The Transportability Engineering Branch can coordinate with other transportability partners for system requirements beyond surface transportation modes—such as airlift certifications, helicopter sling lift certifications, etc. The agency also develops and provides free modal instructions that can be carried and referenced on-site—at a railhead, port or airfield—to make sure systems are properly handled for transport.

Involving SDDCTEA early in the acquisition process can pay major dividends in developing effective systems that are efficiently transported and fielded on time and within budget. Improved transportability is so critical that SDDCTEA does not charge for the services the Transportability Engineering Branch provides. Anyone in DOD can contact SDDCTEA for assistance with transportability engineering at **usarmy.scott.sdd.mbx.tea-dpe@mail.mil** or 618-220-5271.

CONCLUSION

Developing military systems that are capable and ready to support strategic mobility and rapid deployment means involving transportability early in the design process and meeting those transportability requirements.

Program managers can field transportable systems by choosing streamlined acquisition strategies with a reduced engineering and manufacturing development phase. The key to success is incorporating transportability early in system development and verifying transportability requirements before the production



TRANSPORT OPTIONS

Considering the transportability of a system early in the acquisition process and verifying transportability during the engineering and manufacturing development (EMD) phase better supports the Army's strategic mobility and rapid deployment. Program managers can field transportable systems by choosing streamlined acquisition strategies with a reduced EMD phase. (Graphic courtesy of the author)

and development phase and fielding. Using this preferred acquisition strategy:

- Allows the consideration of a full array of potential design solutions.
- Limits the risk and cost of design changes.
- Minimizes system fielding delays.
- Avoids increasing lifetime transportation costs.
- Increases transportation throughput.
- Increases the likelihood that the desired number of systems are fielded.

Incorporating transportability earlier in the design process and meeting the transportability requirements results in military systems that are capable and ready to deploy to support strategic mobility and rapid deployment.

For more information on the Engineering for Transportability Program, go to ***https://www.sddc.army.mil/sites/TEA/Functions/Deployability/TransportabilityEngineering/Pages/default.aspx****.*

MICHAEL BARTOSIAK is a mechanical engineer with SDDCTEA at Scott Air Force Base, Illinois. He interfaces with program offices developing transportability problem items and evaluates whether the items meet transportability requirements. He holds a B.S. in mechanical engineering from the University of Florida.

THE LONG POLES IN THE ACQUISITION TENT

The Next Generation Load Device – Small program used an innovative, tailored acquisition approach to rapidly deliver capability to Soldiers of the U.S. Army Special Operations Command.

by Wayne Rush and Robin Schumacher

CAPABILITY BRIEF

The Tactical Key Loader that PEO C3T acquired creates a modern, reliable and secure system to handle the generation and use of encryption keys. The device makes it so that the key to an encrypted system does not have to be sent over the network, where it could be stolen. (Images courtesy of L3Harris Technologies Inc.)

Those familiar with the Army acquisition world know firsthand the challenges and complexities in quickly fulfilling Soldier needs. It is an uphill battle that has been put in the spotlight in recent years with the Army Tactical Network Modernization Strategy and the establishment of organizations like the U.S. Army Futures Command. Developing compatible systems and products that use modern technology and can easily and rapidly integrate into the tactical field network is as important as the speed at which we can deliver capability to the field.

Therefore, when the U.S. Army Special Operations Command identified a requirement for a modern, small, lightweight and easy-to-operate device to load encryption keys onto equipment—a key fill device—the Product Lead for Communications Security (COMSEC), part of the Project Lead for Network Enablers, used innovative acquisition methods and collaborative partnerships to fulfill the requirement in record time with a solution that will provide interoperability across services and with coalition systems.

So, how did we do it? Essentially, we attacked the four longest "tent poles" of the Army acquisition process—funding, requirements, contracting and testing. These components are critical, but traditionally involve lengthy processes. To save time and money, we used allocated program resources for staffing and procurement and achieved an Acquisition Category (ACAT) IV program of record with full-rate production in less than six months.

THE REQUIREMENT

In 2013, a capability production document was developed for the Next Generation Load Device (NGLD) – Small in support of urgent special operations missions. This required a simple, small and light device that could be used in the field to load encryption keys onto equipment. Loading encryption keys onto equipment is how the Army ensures that the communication being transmitted

through the equipment is secure—a critical need for us to remain vigilant against our adversaries.

Two products were identified by HQDA G-3/5/7 as potential materiel solutions; however, those devices did not meet all of the requirements specified in the capability production document. One major feature that was missing was the ability to use the new Key Management Infrastructure (KMI)—a National Security Agency (NSA)-developed program that provides a modern, reliable and secure system to handle the generation and use of encryption keys. KMI allows Soldiers to obtain encryption keys over the internet, which limits the requirement for physical products and manual delivery to maintain secure communications.

As an interim solution, Army Special Operations Command used the Really Simple Key Loader, a handheld device for securely receiving, storing and transferring data between equipment, provided by the Project Lead for Network Enablers. However, a replacement capability with more modern technology was still urgently needed.

Fast forward to today. The Army completed the transition to KMI in late fiscal year 2018, which means the technology now exists to validate the requirement in the capability production document for an NSA-certified device that can use KMI. With the technology available, Product Lead COMSEC began looking at government off-the-shelf equipment and researching what the other services were using to meet the need for the Army.

This approach makes achieving interoperability with other systems easier, and it eliminates the legwork and reduces the time and resources needed to develop and test new technology.

WORK IN PROGRESS
A Soldier uses the KIK-11 Tactical Key Loader, which PEO C3T chose as the materiel solution to fulfill the Next Generation Load Device – Small requirement for the Army. Finding products that can be quickly integrated into the Army's tactical network—even as that network and its capabilities evolve rapidly—is a challenge that's not easy to solve within the confines of the traditional acquisition system.

JOINT EFFORT FOR RAPID RESULTS

In early FY19, Product Lead COMSEC researched devices that could fit the requirement for the NGLD-Small, particularly devices that were already fielded to other services. Ultimately, we selected the Tactical Key Loader as the materiel solution for the NGLD-Small. The small, NSA-certified, modern key fill device had been fielded to the U.S. Air Force, the U.S. Navy and the U.S. Marine Corps since 2013. Even better, the Tactical Key Loader was already available through an Air Force production contract awarded by the Air Education and Training Command in the fourth quarter of fiscal year 2018, further shortening the acquisition timeline.

The acquisition process was a united team effort. Product Lead COMSEC, part of the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T), was able to combine multiple documents into a simplified acquisition management plan, leveraging existing documentation, and working with stakeholders at PEO C3T, the U.S. Army Communications-Electronics Command and the U.S. Army Training and Doctrine Command capability manager to quickly solidify program milestones and criteria and then formulate documentation, conduct peer reviews and adjudicate comments in preparation for PEO approvals.

Using the simplified acquisition management plan and the existing production

contract between the Air Force and Harris Corp. to procure the NGLD-Small (Tactical Key Loader), we were able to significantly accelerate the program.

TEST TO FIELD

Another long pole in acquisition is the testing that is required for capabilities to be fielded. Typically, this can take 12 to 18 months just to schedule. However, the Tactical Key Loader was NSA-certified Type 1 non-developmental cryptographic materiel, which does not require full operational testing. As a result, the U.S. Army Test and Evaluation Command agreed that a command, control, computers, communications, cyber, intelligence, surveillance and reconnaissance (C5ISR) evaluation report could be used in lieu of an operational milestone assessment report from Test and Evaluation Command.

Collaborative partnerships, mentioned earlier, were just as valuable in this acquisition approach as innovation. Most importantly, all parties had to concur on the approach itself—developing the simplified acquisition management plan and performing the testing outside of traditional means. From the start, we shared a vision to get modern technology into Army special operations units in a few short months. Once everyone caught the vision, we were able to streamline the acquisition process to work on behalf of the Soldier.

Product Lead COMSEC took advantage of our relationship with the C5ISR Center Cryptographic Modernization Branch at Aberdeen Proving Ground, Maryland, to perform the evaluation on the Tactical Key Loader. Program officials included the C5ISR Center at the front of the acquisition plan, allowing better understanding of the uniqueness of this effort and the evolution of the requirements that we needed to test against. One of the added benefits of conducting the evaluation in-house and having existing relationships between the C5ISR Center and industry was that we were able to easily and quickly modify the devices to be safe, suitable and effective upgrades for what was being used in the field.

CONCLUSION

While the long poles are often the most important, they can also take the longest time to put up, and can prevent a program from moving forward. However, the Product Lead COMSEC team's diligence in working the long poles led them to success. On July 31, 2019, PEO C3T approved the materiel development decision for the NGLD-Small, designated the program as an ACAT IV and authorized full-rate production. According to an internal PEO C3T report from August 2019, Product Lead COMSEC has procured 5,000 NGLD-Smalls, and in September the first batch of 200 was delivered to the Tobyhanna Army Depot in Pennsylvania. The acquisition strategy for the NGLD-Small program executed by the Product Lead COMSEC team could be used as an example for future programs looking to expedite the process. As the Army looks to modernize, delivering more rapid, innovative and tailored approaches for getting capabilities into the hands of Soldiers is essential.

For more information, go to the Project Lead Network Enablers website at ***https://peoc3t.army.mil/nete/****.*

A JOINT OFF-THE-SHELF SOLUTION

The Tactical Key Loader is a minimized, lightweight replacement for legacy devices that delivers next-generation capabilities—including the ability to connect and load keys in seconds.

WAYNE RUSH is the assistant program manager for Product Lead COMSEC. He holds an M.S. in systems engineering from Johns Hopkins University, and an M.A. in military history and a B.S. in economics from Norwich University. He is Level III certified in life cycle logistics and Level II certified in program management. He is a member of the Army Acquisition Corps.

ROBIN SCHUMACHER is a lead associate with Booz Allen Hamilton providing strategic communications support to Project Lead Network Enablers. She holds a B.A. in English from York College of Pennsylvania.

BUILDING IN MORALE

Kyle Esannano-Olano, a contract specialist with the MICC – Fort Hood contracting office, inspects a facility in August at Fort Hood, Texas. Through the implementation of category management, services contracting processes and supporting data analytics have improved, saving the Army time, money and manpower. (U.S. Army photo)

THE POWER OF THE PURCHASE

Stop chasing personality-driven solutions: Category management instills a think-bigger approach to buying for enterprise-level efficiencies.

by Brig. Gen. Christine A. Beeler

Leveraging the disciplined buying power of the Army enterprise in lieu of fractured or decentralized one-off solutions offers a smarter, more creative approach to delivering strategic readiness and results in higher-value outcomes for Soldiers and more resources for Army priorities such as infrastructure, barracks and support services.

Legislation outlined in the National Defense Authorization Act (NDAA) for Fiscal Year 2016 launched far-reaching measures to streamline requirements development, acquisition and budget processes. Follow-on legislation from 2016 to 2019, along with the President's Management Agenda, sought to make smarter use of common contract solutions and drive a transition from incohesive practices by the government to a disciplined managed approach. Category management entails the business practice of buying common goods and services at an enterprise level to eliminate redundancies, use industry standards, increase efficiency and deliver more value and savings to government.

One of the 11 cross-agency priority goals of the President's Management Agenda calls for the use of category management as a means for making better buying decisions, developing common levels of support and reducing the number of contracts, resulting in savings, both in terms of resources and costs. Agencies across the federal government award contracts for similar requirements in a fragmented manner. Buying common goods and services in an enterprise approach allows those agencies to leverage common contracts and quality standards at the best value for the taxpayer while reducing redundancies and personality-based performance requirements.

The Department of the Army directed the implementation of category management in April 2019 to improve its services contracting processes and supporting data analytics, and to enable the Army to save time, money and manpower for higher priorities.

INSPECTING PROGRESS
Sgt. 1st Class Kevin McClatchey conducts a site visit with members of the Department of Public Works in September at Fort Bragg, North Carolina, in preparation for a contract award for minor construction. A MICC pilot project related to base operations contracts reduced procurement action lead time from 250 days to approximately 130 days. (Photo by Capt. Steve Voglezon, MICC)

The Army directive names the commanding general of the U.S. Army Materiel Command (AMC) as the co-category manager for logistics and facilities. The commander, Gen. Gustave F. Perna, has designated his G-8 as the lead for category management responsibilities. The AMC G-8 is working closely with the subordinate U.S. Army Contracting Command and its Category Management and Strategic Sources cell to manage data analysis, provide visualization and track the milestones associated with the initiative.

PORTFOLIO APPROACH

Efforts over the last 18 months place the Contracting Operations Directorate of the U.S. Army Mission and Installation Contracting Command (MICC), a subordinate command to Army Contracting Command, on the front lines of category management. Team MICC, in lockstep with Army Contracting Command and AMC, is analyzing the buying environment, the totality of common services and the delivery methods to reduce cost drivers, highlight redundancies and provide commanders with options to implement this critical initiative. Contract standardization efforts by MICC and its mission partners to buy services as a portfolio were developed in concert with the 2016 NDAA, ahead of category management initiatives announced by the Army. The command's efforts to standardize similar contracts at an enterprise level using a portfolio concept parallel category management efforts at the local level. Rather than awarding similar, recurring services as one-of-a-kind efforts at the local installation, the portfolio approach pulls a whole portfolio to an enterprise buying center with standardized levels of performance, pricing and contract award execution processes to foster efficiencies in the acquisition process, meet performance expectations and drive contract savings.

Among Army commands with whom MICC has partnered on category management initiatives are the U.S. Army Installation Management Command and U.S. Army Sustainment Command. They represent two of MICC's largest supported mission partners for contract dollars awarded. Of the $5.4 billion in contracts executed by MICC across the Army in fiscal year 2019, more than $2.4 billion was in support of these two commands.

MICC contracts are responsible for feeding more than 200,000 Soldiers every day. The command took steps in 2017 to standardize full food service contracts following a pilot for Fort Lee, Virginia, that yielded increased competition from industry and government savings of approximately $16 million over five years. Historically, MICC received two proposals on average for full food services contracts. Including the Fort Lee pilot, an average of five proposals have been received for similar contracts, according to MICC data. This process involved standardizing performance work statements, contract type, contract line item number

structure necessary for reporting and billing purposes, source selection approach and quality assurance. In addition to the standardizing processes, MICC established a functional center at Joint Base San Antonio-Fort Sam Houston, Texas, to execute all pre-award actions for food services. Following award, JBSA-Fort Sam Houston transfers administration of the requirement to one of MICC's 30 field offices for the duration of the contract's period of performance. Not including the Fort Lee pilot, MICC has awarded eight contracts to date, saving the government 16.8 percent or $5.8 million annually.

WAY AHEAD

Leveraging these successes, MICC developed a similar approach for base operations contracts, one of the command's largest categories of spending. Base operations contracts support many of the Army's installation services, and include facilities and grounds maintenance, pavement clearance, heating and cooling services, and unaccompanied furnishings management. The base operations requirements for Fort Belvoir, Virginia, were selected as the pilot test. In September 2018, MICC acquisition members at the headquarters and Fort Belvoir teamed with the Installation Management Command and industry representatives to award the contract. The standardized enterprise approach was first used for base operations at Fort Bliss, Texas, with award in November 2019. Together, the pilot at Fort Belvoir and award of the Fort Bliss base operations requirements are projected to save the Army 19.2 percent or $15.2 million annually.

SUPPORTING THE FORCE

Contracting specialist Shannon Baker works at her desk at MICC – Fort McCoy, Wisconsin. MICC continues to implement comprehensive category management initiatives and synchronize its efforts with the U.S. Army Materiel Command, maximizing savings for the Army. (U.S. Army photo by Scott T. Sturkol, Fort McCoy Public Affairs)

This pilot realized additional savings for the government by reducing the time it takes to execute a contract from initial planning to award. The standardized approach greatly reduced the procurement action lead time, a critical element in the delivery of mission-essential requirements, from 250 days to approximately 130 days for the Fort Belvoir pilot contract award.

Analysis underway seeks to expand the food service functional center to include base operations requirements and evolve the organization into the premier installation acquisition readiness center. The analysis process is considering a similar standardization approach with contracts in support of Soldier and family readiness and institutional training in support of Army major commands.

Category management entails the business practice of buying common goods and services at an enterprise level to eliminate redundancies, use industry standards, increase efficiency and deliver more value and savings to government.

CONCLUSION

Changing the way we do business to deliver better performance outcomes, gain efficiencies in the acquisition process and maximize the value of every dollar

STANDARDIZED SERVICE
MICC took steps to standardize food service contracts after a successful pilot program in Virginia that led to savings for the government and increased competition from industry. (U.S. Army photo by Scott T. Sturkol, Fort McCoy Public Affairs)

entrusted to us is the principle underlying the Army's acquisition transformation and reform efforts. Actions in support of these efforts are well underway, from the service's highest echelons to contracting organizations working hand in hand with mission partners at the installation level to develop and deliver essential requirements.

We need to evolve our industrial age local acquisition processes to harness the power of the information age and the collaborative virtual workspace. As MICC continues to implement comprehensive category management initiatives and synchronize its efforts with AMC, it will continue to develop its process and research further opportunities across common services and supply requirements to maximize savings for the Army.

For more information, go to ***www.army.mil/micc****.*

BRIG. GEN. CHRISTINE A. BEELER is the commanding general of MICC, headquartered at Joint Base San Antonio-Fort Sam Houston, Texas. She graduated from the Army ROTC program at Boston University as a distinguished military graduate and was commissioned in the Ordnance Corps in 1991. She holds an M.S. in strategic studies from the U.S. Army War College, an MBA from Webster University, a Master of Public Administration in environmental management from Jacksonville State University, an M.A. in administration and management from Bowie State University and a B.S. in business administration and management from Boston University. She is also a graduate of the U.S. Army Command and General Staff College. Beeler entered the Army Acquisition Corps in 1998 and is Level III certified in contracting and in program management.

Investing in the FUTURE

Army modernization strategy informs equipping of new position, navigation and timing system.

by John Higgins and Caitlin O'Neill

Fortification is key for the military. Fortification ensures not only mission success, but even more critically, that Soldiers come home. For that reason, vehicles are armored, walls are reinforced and surveillance equipment is deployed. Navigation systems get fortified, too: GPS, which can be the cornerstone of navigation during military operations, has been an important tool in a Soldier's toolkit for nearly 20 years, and is fortified through assured position, navigation and timing (APNT). A new suite of equipment that provides APNT was shepherded to Germany by members of the Project Manager for Positioning, Navigation and Timing (PM PNT) in early September.

Part of the Program Executive Office for Intelligence, Electronic Warfare and Sensors, PM PNT's mission was to outfit Soldier vehicles with the latest PNT equipment in cooperation with several stakeholders: U.S. Army Europe; the Project Manager for Stryker Brigade Combat Team within the Program Executive Office for Ground Combat Systems; the chain of command for the 2nd Cavalry Regiment; the APNT Cross-Functional Team; the U.S. Army Training and Doctrine Command (TRADOC) Capability Manager for Tactical Radios; and the mechanics in the Rose Barracks motor pool in Germany. The team's objective was to outfit the Strykers with the Mounted Assured PNT System Generation 1 (MAPS GEN I), a new tool that allows Soldiers to navigate in locations where GPS capabilities are challenged by such factors as adversarial interference, terrain or weather.

HANDS-ON TEST

A Soldier with 2nd Squadron, 2nd Cavalry Regiment works with a newly installed component of MAPS GEN I at Rose Barracks, Germany. Members of PM PNT worked with a team of stakeholders to install the new system on Stryker vehicles so that Soldiers could use and provide feedback on the equipment. (U.S. Army photos by John Higgins, Program Executive Office for Intelligence, Electronic Warfare and Sensors)

WITH ALL SPEED

The Army Modernization Strategy charges the APNT Cross-Functional Team and the U.S. Army Futures Command to reduce the time it takes to deliver new weapon systems, which includes a significant reduction of the requirements development process to 12 months or less.

The directed requirement for MAPS was approved in January 2019. "There were numerous challenges in developing the MAPS requirement," said Willie Nelson, director of the APNT Cross-Functional Team. "Because almost all combat and combat support systems require GPS in some way, developing a requirements document that would encompass them, while staying affordable, posed its challenges."

The initial requirement "took a systems-of-systems approach, which was difficult to get through the Army Requirements Oversight Council and Joint Requirements Oversight Council process," Nelson said. "That process requires a more 'big picture' approach that was cumbersome. Instead, the [cross-functional team] made the decision to break up the large requirement into smaller, focused requirements, and to condense the requirement document to only seven pages in length."

Breaking down the larger assured-PNT requirement into separate requirements—one requirement for a mounted system, and a separate requirement for the dismounted system—made them more manageable and agile. "This makes it much easier to understand, and it took only three months to get the MAPS directed requirement approved, which was a big win for the [cross-functional team], the Army and, most importantly, the Soldier," Nelson said. Assured PNT has broad functionality, but rather than have all stakeholders design an entire system, its development was divided into "apps" that each focused on one aspect. Mounted and dismounted functions required different "apps" to meet different user needs and size, weight, power and cost standards, as well as access to different kinds of data.

"The key to the rapid development of the mounted APNT requirement was focusing our documents to bring the most pertinent information forward to decision-makers and users," said Col. Daniel Kuntz, TRADOC capability manager for tactical radios. "We tightly worked with tactical units, materiel developers and testers, coupling technological innovation and operational feedback in order to give our Soldiers the best equipment available."

OTA PAVES THE WAY

"Accelerating the process of developing and fielding the latest PNT capabilities to the Soldier is essential to preserving America's interests and reassuring our allies throughout the globe," said Col. Nick Kioutas, project manager for PNT. His organization is using other-transaction authority (OTA) agreements to rapidly develop assured navigation solutions like MAPS GEN I.

Rapid solutions are what OTA agreements are designed for, as they are independent of the Federal Acquisition Regulation—with other more specific which at least one-third of the cost of the project comes from nonfederal sources. As such, they open the door regulations in place—and thus have a greater degree of flexibility. OTAs require at least one nontraditional defense contractor

participating to a significant extent in the project or a cost-sharing arrangement under to smaller companies with greater specialization and focus on certain areas that will enhance military materiel and products without sacrificing on scale.

Each military service has authority to execute OTAs up to $500 million with authorization by their service acquisition executive. There are no limits on how many OTAs may be executed by the services or the cumulative value of such awards.

Army senior leadership was supportive of the APNT Cross-Functional Team's nontraditional approach. "Getting this requirement written and approved was truly a team effort," said Nelson. "Throughout the development and approval process, our priority was to ensure that our Soldiers get the capabilities and systems they need to operate successfully on the battlefield. I'm encouraged by the support we've received from our counterparts and senior leaders."

That support allowed the APNT Cross-Functional Team and PM PNT to incorporate Soldiers and their feedback early on in the requirement development process to ensure operational capability and system functionality that met the needs of the warfighter, provided an advantage to future formations and, most importantly, would inform the training that PM PNT would provide to Soldiers in Germany.

ON THE GROUND TO GET THE JOB DONE

Jim Spofford, assistant product manager for PM PNT, and part of his team spent September overseeing the installation of and training for the components that make up MAPS GEN I. Working out of the motor pool on Rose Barracks, they ensured that technicians had a clear picture of how to install the hardware and the connecting cables and that the hardware was functioning properly.

MAPS simplifies the mounted PNT capability by distributing PNT data to multiple systems directly via a network, eliminating the need for multiple GPS devices on a single platform while allowing multiple users to access a GPS signal from one central point in a Stryker vehicle.

"This is the first time this type of mounted system with APNT has been equipped on these vehicles, giving our warfighters better anti-spoof and anti-jam capabilities than ever before," said Lt. Col. Alexander "Raz" Rasmussen, product manager for Mounted PNT within PM PNT. "When paired with an AJAS [Anti-Jam Antenna System], it allows our mounted Soldiers to operate in denied environments."

He added, "This is the first equipping that has been executed under an Army Futures Command-mandated requirement with a cross-functional team. Through our partnership, we have been able to produce this capability with unprecedented speed." Part of that speed was driven by the team on the ground: Each day, the motor pool became more adept at the installation process. When installations started in September, it took four days to install one system on one vehicle; by the end of the month, the MAPS hardware system install would be completed the same day it was started, with multiple vehicles completing installation in the same day, in some cases.

The team also gathered information directly from Soldiers about the equipment once it was installed. "We have learned a lot by way of the 2nd Cavalry Regiment's Soldier touch points," said Rasmussen. "From the privates to officers,

ASSURING NAVIGATION

Dan Sweet, a trainer with PM PNT, instructs a Soldier with 2nd Squadron, 2nd Cavalry Regiment at Rose Barracks on how to use MAPS GEN I, which allows users to navigate in areas where GPS is degraded or denied.

SINGLE SIGNAL, SEVEN GPS USERS
A key component of MAPS GEN I is the Enhanced DAGR Distributed Device, which can host up to seven GPS clients from one central point in a Stryker vehicle. Previous systems could host just one.

the feedback on the technology will help shape mounted APNT solutions for years to come."

Some of the feedback came from interviews with Soldiers during the PNT Assessment Exercise (PNTAX) held in August at White Sands Missile Range, New Mexico. Sponsored by the APNT Cross-Functional Team, the exercise gave Army programs of record, science and technology labs, other government agencies and industry partners the opportunity to participate in live, virtual and constructive prototype demonstrations, using mission threat scenarios to support system and capability analysis and requirements development.

"What makes PNTAX unique is that anyone can participate," Nelson said. "Military, other government agencies, industry, academia—it doesn't matter. If you have a technology and you want to assess its ability to operate in a live-sky, GPS-challenged environment, come to PNTAX," Nelson said.

"We're getting exposed to stuff that we didn't ever know existed," said Staff Sgt. Gregory Lowell, a fire support Soldier who took part in PNTAX. "It's very cool to see the new threats that we may be experiencing in combat, while at the same time we can provide a lot of feedback to the engineers about details they might not have realized, having not used it in an operational environment."

Feedback from Soldiers like Lowell was compiled by the Army Futures Command and the U.S. Army Combat Capabilities Development Command in a comprehensive human systems integration report detailing Soldiers' impressions of early MAPS GEN I prototypes. The report included a system usability scale that compiled Soldiers' numerical ratings of the equipment and

"This is the first equipping that has been executed under an Army Futures Command-mandated requirement with a cross-functional team."

direct suggestions regarding usability and functionality. The goal was to ensure that the hardware didn't merely accomplish the task, but was able to do so in a way that was "Joe proof"—that it worked in a way that was compatible with how Soldiers are trained to approach problems and use equipment.

SOLDIER FEEDBACK INFORMS TRAINING

Training that implemented extensive Soldier feedback reinforced the lessons learned during installation.

Every day in September, other members of PM PNT, with assistance from the U.S. Army Space and Missile Defense Command, provided extensive new equipment training to two squads or half a platoon of Soldiers. The team's goal was to train roughly a company's worth of Soldiers before the team left Germany in early October.

Joan Rousseau, chief of the command's Army Space Training Program Integration, provided a primer on signal power and effects, and Dan Sweet and Ray Johnson, trainers with PM PNT, explained how MAPS provides protection and bolsters capability in denied or degraded environments. Classroom sessions were followed by hands-on experience and troubleshooting with installed MAPS systems.

"This new system is … more flexible than the older DAGR [Defense Advanced GPS Receiver] system," said Spc. Connor Anderson, an infantryman who took the MAPS GEN I familiarization training. "The old DAGR was only able to serve one client system. MAPS can serve up to seven."

CONCLUSION

Kioutas and PM PNT are already preparing for the future of MAPS. GEN II "upselect"—or advancing a contract to the next stage of development—has just been awarded via an OTA, Kioutas said, and will improve the availability and integrity of the system, including signal availability and reliable cross-reference information such as atmospherics and elevation.

The APNT Cross-Functional Team also continues to work on the project, Nelson said, and is leading a modeling and simulation effort that will simulate dynamic GPS scenarios to assess current and emerging APNT, space and navigation warfare technologies. "The primary focus is to baseline how GPS is used for mission thread analyses [complete analyses of an aspect of a mission from start to finish] and assist the Army in determining where complementary PNT sensors will enhance mission effectiveness," he explained. "This will enable GPS-challenged environments to be transitioned into meaningful mission-effectiveness models that can inform commanders, the requirements community and acquisition managers." Such models explore how a piece of equipment functions to complete a mission, where it can be improved and what doesn't need to change.

The information and lessons that the PM PNT team gathered from this equipping mission will be applied for years to come. By ensuring that mechanics and technicians can implement the hardware installation quickly, as well as ensuring the functionality of and training on that equipment, MAPS GEN I will lay the foundation for hardware upgrades for generations of MAPS systems.

For more information, go to ***https://www.pmpnt.army.mil/****,* ***https://www.army.mil/futures*** *or* ***https://www.army.mil/futures#org-about****.*

JOHN HIGGINS is a public affairs officer with the Program Executive Office for Intelligence, Electronic Warfare and Sensors. He is an Iraq War veteran and former public affairs Soldier. He holds a B.A. in film production from Towson University. He is a frequent contributor to Army AL&T and his last article, "The Making of a Packard," appeared in the Spring 2019 edition.

CAITLIN O'NEILL is director for strategic communications and public affairs for the APNT Cross-Functional Team and previously served as the public affairs officer for PM PNT. She has a Master of Public Administration from George Mason University and a B.S. in criminal justice from Virginia Commonwealth University.

SEAN BRANDT

COMMAND/ORGANIZATION: Project Director for Joint Bombs, Joint Program Executive Office for Armaments and Ammunition

TITLE: Project management officer

YEARS OF SERVICE IN WORKFORCE: 12

DAWIA CERTIFICATIONS: Level III in program management and engineering; Level I in production, quality and manufacturing; logistics; and test and evaluation

EDUCATION: Master's of engineering in mechanical engineering, Stevens Institute of Technology; MBA, Florida Institute of Technology; B.S. in mechanical engineering, Penn State University

TAKING CHARGE OF THE NARRATIVE

When he's not at work, you're likely to find Sean Brandt at a martial arts gym in northern New Jersey. The project management officer has trained in martial arts since childhood, and got started in Sayoc Kali, a Filipino martial art known as "the art of the blade," in 2004.

"The blade is a powerful teaching tool: every movement you make, no matter how small, matters; there is no margin for error," said Brandt, who's assigned to the Project Director for Joint Bombs within the Joint Program Executive Office for Armaments and Ammunition (JPEO A&A). "Steady pressure at the razor's edge drives incremental growth. I bring this same mindset to my job: I believe that everything matters, so I strive to do the best I can in every moment, and to be better today than I was yesterday."

When knife or sword drills are performed in Sayoc Kali, one participant—the feeder—controls the action. "The creator of Sayoc Kali, Tuhon Christopher Sayoc Sr., said, 'Be the feeder,' " Brandt said. "Being the feeder means to be the author; to be the one who writes the story, who controls the narrative. In the office, it's my duty to take ownership and lead the stakeholders to a successful outcome. I work tirelessly to make sure my programs are successful. When my programs have failed, I look at what caused us to miss the target, and adjust fire on the next program. My goal is write the story of delivering good-quality ammunition to the warfighter on time, while being mindful of our government's resources."

Brandt leads a team that acquires conventional ammunition for the Army, Navy and Air Force. "Ensuring that joint warfighters have quality product, when they need it, is our duty," he said. "But everything has a cost, and it is taxpayers who ultimately foot the bill. So the other part of our work is to be a good steward of taxpayer dollars."

Acquiring weapons for all three services "means that we work with three different chains of command, as well as foreign military sales customers," he explained. "The biggest challenge I face is coordinating those chains of command—knowing who to talk to in order to get a certain task accomplished."

TEAM EFFORT

Brandt and the team he worked with on the Tritonal Bombs Project: From left are John Curran, Mike Grant, Brandt, Mike DeMaria, Kathy McGinley, James Vanatta, John Swift and Jon Irizarry. (Photo courtesy of Picatinny Photographic Services)

Brandt worked in the private sector after graduating from college, first with Intel Corp. and then with Analytical Graphics Inc. (AGI), which sells software to federal agencies. "Working with AGI gave me the opportunity to see how the government operates and how they were using the systems we were selling, and I decided I wanted to be part of that," said Brandt, whose grandfathers served in the Army. "I wanted to support the military mission in a direct and pure way, one not clouded by corporate profit motives."

His first federal position was as an artillery weapons engineer with U.S. Army Armament Research, Development and Engineering Center, now the U.S. Army Combat Capability Development Command's (CCDC) Armaments Center. "Guns and ammo are not covered in any depth in standard engineering curriculum, so the nature of the work, as technically unique, was intriguing," he said. "Plus, when you become part of the Army as a civilian, you learn about military culture and history, like the fact that artillery is known as the 'the King of Battle,' because historically it has caused the most casualties. As I took on different positions, I got to work on ammunition and other related products. I realized that every weapon and ammunition commodity has its own story, its own history and its own importance on the battlefield."

Brandt noted that some of his most memorable training experiences were in "greening" classes about the Army and Army leadership led by Col. Kurt McNeely (USA, Ret.), chief of Warfighter Central at Picatinny Arsenal. "The classes give civilians a look into the Soldier's world. [McNeely] introduced us to rudimentary land navigation, marching, core concepts like chain of command, etc.," said Brandt. "But, perhaps most memorably, he personally narrated—based on firsthand knowledge—while we watched 'Black Hawk Down,' " which details the U.S. military raid in Mogadishu in 1993 in which 19 warfighters were killed. "That gave me a visceral connection to the warfighter."

Brandt joined JPEO A&A in 2014, and his arrival marked his transition from engineering to program management—"a substantial change," he said. "As an engineer, you are primarily concerned with technical details and quality. As a program manager, you have a broader scope of concern, because now you are responsible and accountable for cost, schedule and performance. It's quite a balancing act."

He noted that he's grateful for the support he has received from John Curran, acting deputy JPEO. "Oddly enough, after all the Army-centric leadership training I've done, it's this man—who retired from the Marine Corps—who is the best example of an Army civilian leader who has been my direct supervisor," Brandt said. "He embodies the warrior ethos, lives the military values, and is a consummate professional. I haven't always agreed with him, but through those disagreements I have had the opportunity to learn how a senior leader thinks."

Over the course of his acquisition career, Brandt has availed himself of opportunities to earn advanced degrees in business and thermal sciences. He credits Dr. Donald Carlucci, senior research scientist at the CCDC Armaments Center, with helping him in those endeavors. "In an environment that sometimes felt like a degree factory, Dr. Carlucci made me earn my degree. He expected the best of us and held us accountable, and he sometimes failed people in his classes, which I respected, because something was actually at stake," Brandt said. "Dr. Carlucci is one of the smartest people I've ever met, yet he's incredibly humble. He's a role model for engineers and a devoted civil servant—someone I strive to emulate."

SHARPENING HIS SKILLS
Brandt, right, trains with Matt Campbell in Sayoc Kali, a Filipino martial art known as "the art of the blade." (Photo by Jacqueline Sayoc)

His advice to newcomers? "Do your DAWIA training to get your career field certification and do your mandatory training. All of this takes time, but it is just part of being an acquisition workforce member. There are boxes that need to get checked, so check them," he said. "Beyond that, don't be afraid to try something new, make a move. There's always an unknown when you change positions, but that's where growth happens."

—SUSAN L. FOLLETT

ENEMIES LIST

Army Test and Evaluation Command and Maneuver Center of Excellence experts identify five missteps in requirements development that can slow or halt a program in testing.

Supportability and sustainment considerations must be built into the engineering process at the start to streamline development and minimize future risks.

by Joshua R. Barker and Don Sando

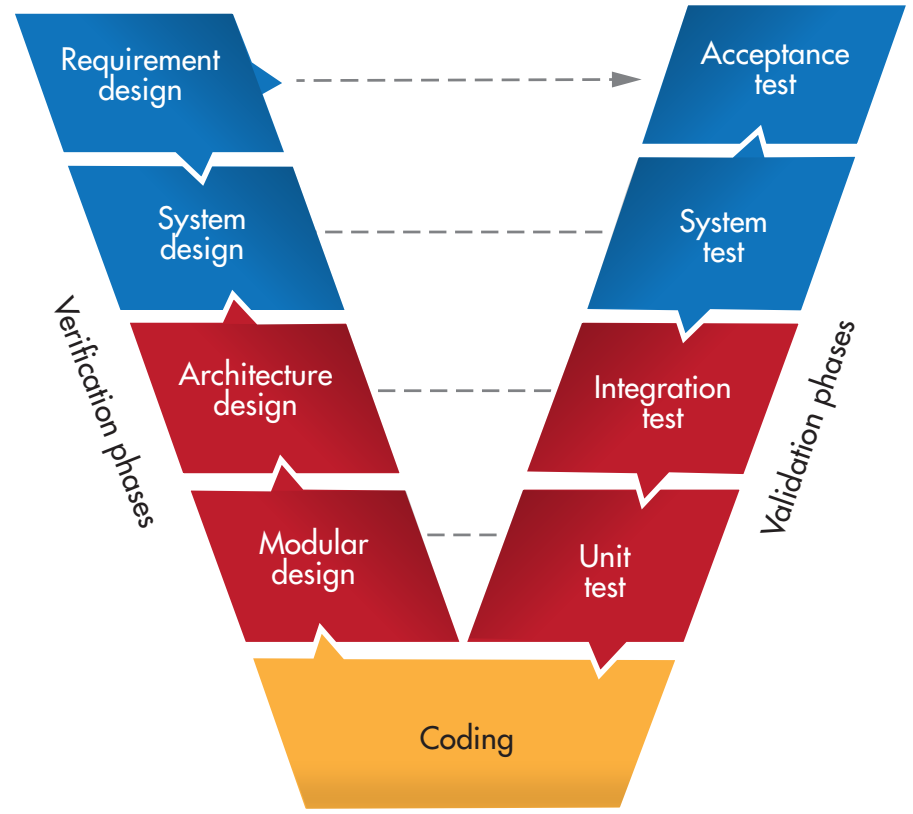
Poorly defined requirements that are not operationally linked and do not consider test implications can result in an unfavorable system evaluation, which can delay system fielding, increase testing and require system modifications.

For example: Russell is looking to buy a truck to take his family camper into the mountains. The operational need is a truck that can tow the family camper. Maximum speed and fuel efficiency are valid vehicle requirements; however, meeting those requirements will not guarantee that Russell can safely tow the camper into the mountains. Horsepower, towing capacity, vehicle braking and the presence of a tow hitch are better indicators of whether the selected truck will fill the need. An operational need and requirement are linked when failure to meet the requirement will definitively result in the system's inability to fill the need.

Requirements define the system design that is necessary to fill the identified operational need. Testers design tests to determine whether the current system design fills that operational need. If the requirements do not reflect what is necessary to fill the need, then testing can show that a system in fact does not fill the need, despite meeting system requirements. The camper example demonstrates why it is vital that those with a stake in the requirements ensure that they reflect the needs of operational units, to avoid halting system development and fielding.

Requirements identify the essential questions that testing must answer to verify that the system provides the desired capabilities. The systems engineering "V" model demonstrates the importance of requirements and their relationship to testing. The V model can also be described as a pyramid, with requirements development and testing forming the base for delivering an effective system. (See Figure 1.) Requirements also establish the level of statistical confidence and precision required for adequate verification of capabilities.

FIGURE 1



THE 'V' MODEL OF SYSTEM DEVELOPMENT
The V model summarizes the stages of systems engineering. Requirements definition is key to all subsequent system development efforts, including testing. (Image by U.S. Army Acquisition Support Center (USAASC) and www.am7s.com)

KNOWING YOUR ENVIRONMENT

The test and evaluation community has observed five common challenges to well-developed requirements. These enemies of sound requirements have stymied program development and increased the scope of testing. All acquisition stakeholders at all echelons must understand the risks these enemies carry with them and consider those risks while developing and staffing system requirements. Requirements development is a team effort, so requirements developers are encouraged to involve all stakeholders early in the process.

The following examples are actual requirements taken from recent Army requirements documents. The intent is to foster a practical understanding of the risks in requirements development and their potential impacts. In many cases, these examples were revised as part of the document staffing process.

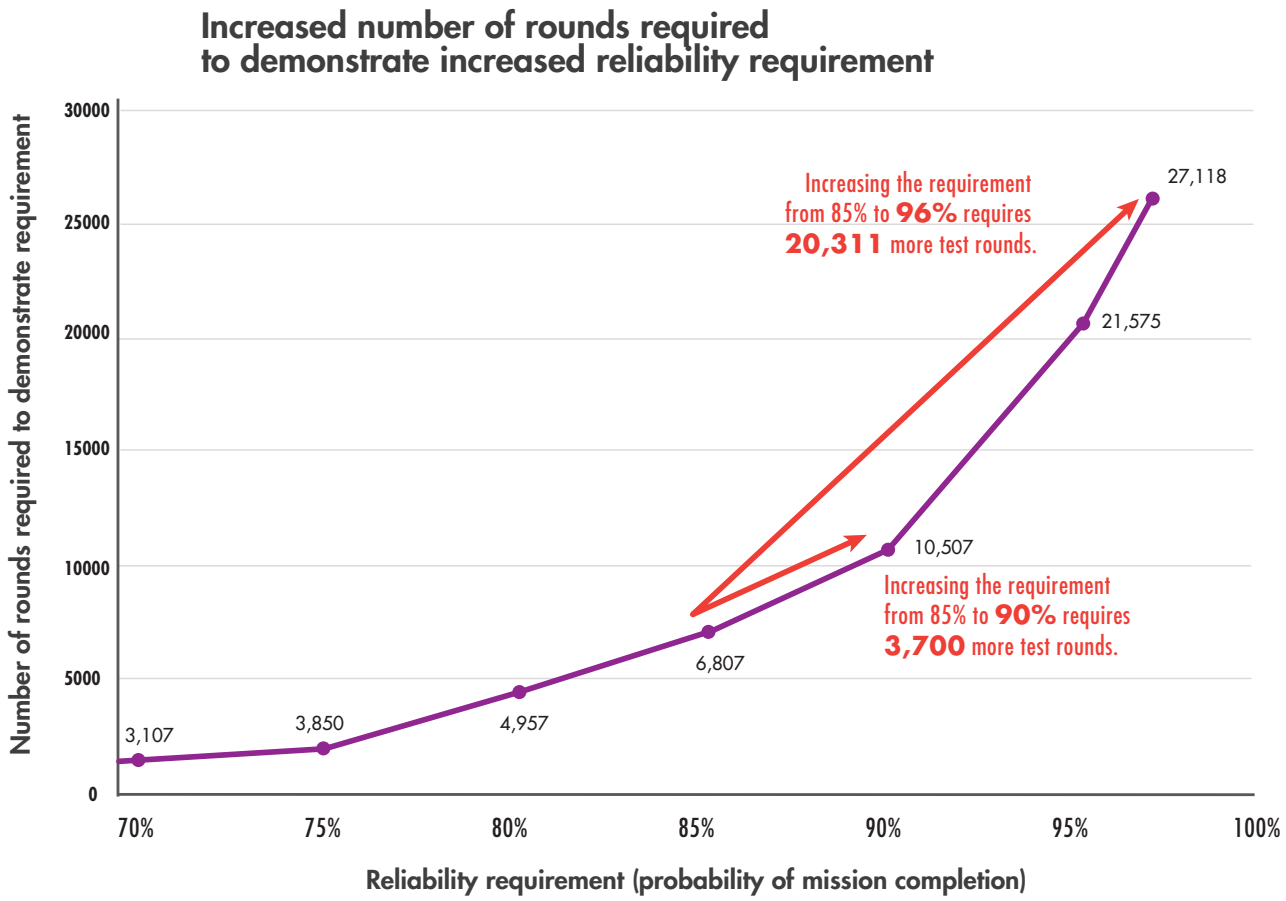
CHALLENGE #1: NOT OPERATIONALLY FOCUSED

A best practice is to ask, "Do I still want this system if it can't meet this requirement?" Answering "yes" to this question probably means that the requirement is not linked to the operational need the system is intended to fill and should be revised or deleted. As an example of a requirement that is not operationally focused, consider this key performance parameter (KPP) for an artillery round.

KPP: Artillery round is effective against moving targets.

It is certainly possible to fire artillery rounds against a moving target. However, this is not the primary purpose or mission for artillery rounds; rather, it is something usually saved for extreme circumstances. This requirement increases the risk that the system fails the requirement in testing, potentially delaying system fielding. The requirement also drives lengthy and expensive testing since there are many things, such as target type or range to target, that could affect whether the round is effective against moving targets.

FIGURE 2



SMALL INCREASE, BIG COST

Increasing a weapon system's reliability, or probability of mission completion, from 85 percent to 90 percent might sound simple, but it comes at a significant test cost. Testing would require the system to fire 10,507 rounds to verify that the new system provides the 5 percent increase in reliability over the system it was replacing. By contrast, testing would require 6,807 rounds to verify that the new system had the same reliability as the system it was replacing. (Image courtesy of USAASC and Joshua R. Barker)

Requirements should support a complete, end-to-end operational evaluation of the entire system in support of the mission. It is dangerous to exclude subsystems, such as government-owned radios or sensors, or limit the requirement to specific domains, such as mechanical assessments. Subsystems, as part of the overall system, can impact its performance and reliability. Most systems are used in multiple domains and situations, factors that can affect performance as well. Failing to include these aspects in requirements development increases the risk of an unfavorable system evaluation because it equates to an attempt to exclude potential system failures that exist in reality.

CHALLENGE #2: OVERLY AMBITIOUS REQUIREMENTS

Stretching capabilities is a worthwhile goal, but one to approach with caution when developing requirements. Establishing a requirement that is difficult, perhaps even impossible, to meet can have several impacts on program success. One of them is that

testing could fail a system that is providing a valuable capability, because it didn't meet a lofty requirement. A related risk is that overly ambitious requirements increase the evaluation's susceptibility to uncontrolled variables, as the following example from a sensor's requirements document highlights.

KPP: 99.9 percent probability of detection.

This requirement leaves very little room for the system to fail test iterations and still meet the requirement. This quest for perfection makes the evaluation more susceptible to uncontrolled variables, such as user error or something that has little to do with the core capability of the system. That is, the system might fail a test, but the reason could be a Soldier error or inclement weather.

Another problem is requiring too high a level of statistical confidence. Statistical confidence is a scientific parameter used to make sure the test produces enough data to show that the demonstrated results are representative of the system at any time it is used during its life cycle. A statistical confidence of 80 percent is the Army accepted best-practice standard for an adequate test design. Reducing the statistical confidence below 80 percent increases the risk that the demonstrated test results are not representative of the system's actual performance. Statistical confidence can be reduced below 80 percent in specific scenarios, however, when circumstances or resource constraints require the acquisition community to assume more risk.

A big problem with ambitious requirements is the necessity to increase the amount of data required to ensure that the system is meeting the requirement with statistical confidence. Figure 2 demonstrates the impact that ambitious requirements could have on the design of weapon system reliability testing. The greater the number of rounds needed for an acceptable test, the more costly the test will be, in time and money.

The test and evaluation community has observed five common challenges to well-developed requirements. These enemies of sound requirements have stymied program development and increased the scope of testing.

Ambitious requirements have their place, but it is critical that acquisition stakeholders determine whether the potential benefits are worth the additional risk of failure and the necessary resources. The requirements development process should include an analysis showing that the ambitious level of performance is necessary to complete the mission.

CHALLENGE #3: EXTRA OR INFREQUENTLY USED REQUIREMENTS

Extra or infrequently used requirements also can unnecessarily increase the resources required to support system development and testing, as well as the risk that the system fails to meet its requirements. Remember: system requirements drive the system design. Materiel developers may consider design factors that they otherwise would not consider in order to support these extra or infrequently used requirements. These decisions can result in a suboptimal system design as well as the expenditure of research and development funds to develop the required capability.

The design impacts created by extra or infrequently used requirements can increase program costs in both the development and sustainment phases. The test and evaluation community must design a test to verify that the system meets such a requirement in the expected combat environment. The risk increases the chance that the system fails because the conditions surrounding the requirement may be difficult to meet. The example below from an unmanned ground system demonstrates some of these challenges.

KPP: Unmanned system control. The system controller must have the ability to achieve and maintain active and/or passive control of any current Army and Marine Corps battalion and below level unmanned (air or ground) system and/or their respective payloads in less than three minutes.

This KPP requires development of a universal controller that operates with all Army and Marine Corps unmanned air and ground systems. The benefits of a universal controller are obvious: It drives commonality and reduces the number of pieces and parts the unit has to carry and maintain. But the challenges of such a broad requirement are less obvious: It drives a hardware and software solution that is capable of

interfacing with numerous unmanned systems, all of which likely have different interface exchange requirements. That increases the risk that the controller cannot interface with one or more unmanned systems, thereby failing the requirement. Additionally, the test and evaluation community must design a test to verify that the controller can control all unmanned systems; such a test could prove to be lengthy and expensive, depending upon the number of interfaces required.

These requirements will work only to the extent that they're carefully considered within the scope of the intended mission, and their feasibility is within the scope of the time, resources and risk of system development. An alternate course could have been to focus the requirement on the most commonly used unmanned systems.

CHALLENGE #4: OVERLY PRECISE REQUIREMENTS

System requirements frequently include a questionable level of precision in their quantitative performance metrics. Stakeholders may want to ensure that the system is effective, hold the contractor accountable for delivering the desired capability or make sure the requirement is testable. While these are valid objectives, we need to exercise caution when including precise metrics.

Few Americans would tell their car dealer that they are looking for a car that gets no less than 30.01 miles per gallon. This level of precision excludes potentially valid materiel solutions, increases the risk that the system will not meet the requirement and will likely increase testing costs.

Precise requirements are often too technical and therefore difficult to link directly to the desired operational capability. The table in Figure 3 is an example of these challenges from a combat vehicle program. The vehicle is required to demonstrate a fuel consumption rate to the one-hundredth of a mile per gallon and the one-hundredth of a gallon per hour at 25 tons. The challenge is that this requirement drives a lengthy and expensive test program to verify performance down to the one-hundredth level with statistical confidence.

At times, requirements should include precise quantitative metrics. The goal of the requirements development process should be ensuring that the requirements represent the bottom-line standards of performance that the unit needs. Is the Army commander going to say that this vehicle doesn't adequately support the mission if it only gets 1.80 miles per gallon at 25 tons? Perhaps a more effective requirement is how long the vehicle must be able to operate before logistical resupply.

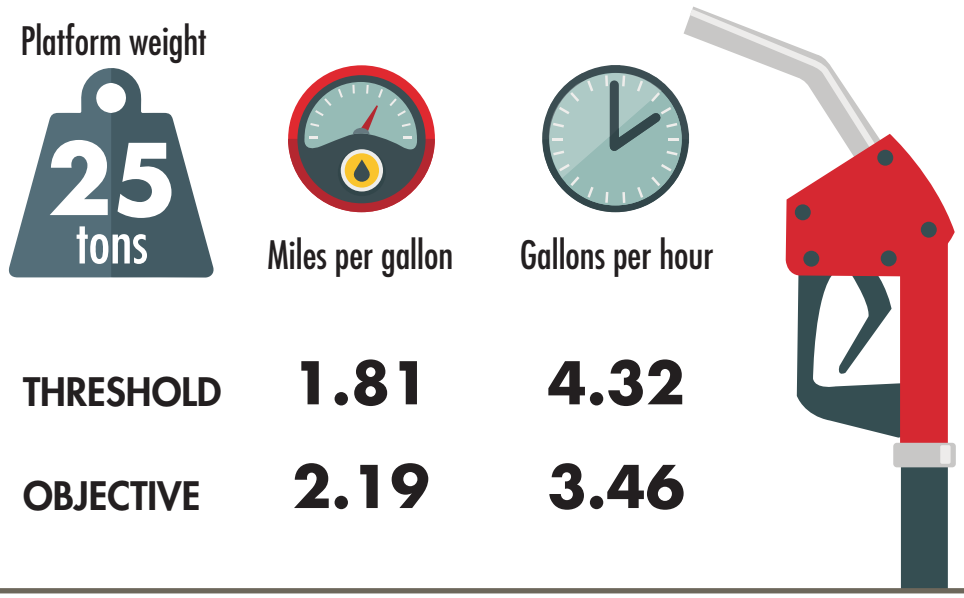
CHALLENGE #5: OVERLOOKING SUPPORTABILITY

System supportability is a major contributor to operation and sustainment costs and a major component of a system's suitability. Supportability and sustainment considerations must be built into the engineering process at the start to streamline development and minimize future risks. If requirements development does not take

FIGURE 3

HOW PRECISE IS TOO PRECISE?

Testing a 25-ton combat vehicle's fuel consumption rate down to the one-hundredth of a mile per gallon and the one-hundredth of a gallon per hour is less likely to be worth the time and expense than, say, testing how long the vehicle can operate before logistical resupply. Thus the latter makes more operational sense as a system requirement. (Image courtesy of USAASC and Joshua R. Barker)



into account system supportability, testing can demonstrate that the system is not supportable or sustainable.

The result could be to significantly increase program cost, because the materiel developer will have to develop solutions to supportability problems later in the engineering process. The requirements development process must consider the maintenance and repair requirements and conditions to ensure that those capabilities exist when the system is fielded.

CONCLUSION

The primary purpose of test and evaluation is to provide decision-makers the essential information needed to determine a system's readiness to proceed to the next program milestone or fielding. Requirements need to lay a foundation that supports achieving this goal.

Requirements that are not focused on the desired operational capability can delay system fielding and increase test costs. They can add unnecessary testing as the test and evaluation community tries to confirm that a system meets a requirement that is not critical to the system's desired capability. Poorly developed requirements can also increase the scope of existing tests.

Operationally linked requirements ensure that acquisition stakeholders are asking the correct questions and are focusing efforts on providing the desired capability that will help our Soldiers on the battlefield.

*For more information, go to **www.atec.army.mil** and **www.benning.army.mil/MCoE/CDID**.*

JOSHUA R. BARKER is the Armored Brigade Combat Team Division chief at the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland. He has nearly 17 years' experience designing and executing test and evaluation strategies for Army combat vehicles and networked systems. He has a B.S. in mathematics from Bethany College. He is an Army Acquisition Corps member and is Level III certified in test and evaluation.

DON SANDO is director of the Maneuver Capabilities Development and Integration Directorate, U.S. Army Maneuver Center of Excellence, Fort Benning, Georgia. He was selected to the Senior Executive Service in February 2008 after retiring from the Army as a colonel with 26 years of active service. He has an M.S. in operations research from the U.S. Air Force Institute of Technology, an M.S. in strategic studies from the U.S. Army War College and a B.S. from the United States Military Academy at West Point. He is a member of the Association of the United States Army.

Requirements define the system design that is necessary to fill the identified operational need. … Requirements identify the essential questions that testing must answer to verify that the system provides the desired capabilities.

SPEEDING UP HIRING

DACM Office, CHRA join forces to stand up the Army Acquisition Workforce Recruitment and Sustainment Center of Excellence.

It's no big secret that the government lags behind its industry counterparts in establishing unique, creative and highly efficient hiring practices. Granted, the government's methods entail a higher degree of challenges when one considers its myriad rules, regulations and policies. But that doesn't mean we can't be creative in becoming one of the government's "employers of choice." In the past, the Army had a systemic problem in that we took an average of more than 130 days to hire a qualified civilian. In some cases, the delay prevented agencies from selecting the most-qualified employees, which consequently impacted Army readiness.

My impetus, as the Director of Acquisition Career Management (DACM), to address this problem was driven by a June 5, 2018, memo from Mark T. Esper, then secretary of the Army and now the secretary of defense. The memo directed that his "number one priority regarding Army Civilian employees is reducing civilian time-to-hire to below 60 days."

SPEEDING THE PROCESS

In implementing this directive, several factors would uniquely test our ability to develop an innovative solution for such a complicated problem. First, we had to ensure that the solution would be predicated on finding the right kinds of talent for the acquisition community and complement the strategic imperative of continuing to provide lethal capabilities to the warfighter. And second, we had to devise a human capital plan that would incorporate the myriad hiring policies, authorities and special programs that had been afforded to the acquisition community through supportive legislation. Only by appreciating this level of complexity were my team and I able to proceed with a viable solution.

However, our success would not have been possible without first establishing a viable partnership with a peer organization vested in achieving the same goal. In October 2016, the U.S. Army Acquisition Support Center established a pilot program with the Army's Civilian Human Resources Agency to explore the benefits of streamlining the hiring process and leveraging expedited hiring authorities granted by Congress in the National Defense Authorization Acts for the fiscal years 2016 to 2018. After 12 months of evaluating the program, we determined the pilot a success. It effectively reduced our hiring time for qualifying candidates from 104 to 76 days.

With this milestone, our stakeholders decided to strive for the program's full operational capability. In August 2019, we created a subordinate division, the Army Acquisition Workforce Recruitment and Sustainment Center of Excellence. It continuously collaborates with key Army partners and other DOD stakeholders on the best organizational practices to continue implementing this initiative as painlessly as possible. Essential aspects of this program include standardized information and training on the nuances of hiring civilians for acquisition positions, leveraging hiring authorities, and ensuring that participants fully understand the Defense Acquisition Workforce Improvement Act (DAWIA).

IMPROVING THE FLOW

The Army Acquisition Workforce Recruitment and Sustainment Center of Excellence works with key stakeholders in the Army and DOD on best practices aimed at keeping hiring times low and staff skill levels high, providing information and training on the nuances of hiring civilians for acquisition positions, leveraging hiring authorities, and ensuring that participants fully understand DAWIA requirements. (Image by the U.S. Army Acquisition Support Center)

Goals of the Army Acquisition Workforce Recruitment and Sustainment Center of Excellence:

- Support Army civilian hiring reform goals.
- Meet the secretary of the Army's 60-day reduction in time-to-hire.
- Leverage direct hiring authority and expedited hiring authority as the preferred methods for hiring.
- Maintain a singular interpretation of DAWIA and its implications for acquisition workforce hiring.
- Oversee the ability to shape, hire and retain a /highly qualified and professional Army Acquisition Workforce.

Source: Civilian Human Resources Agency and the Army DACM Office

As we progress, we are learning quite a lot from expanding the pilot. The most beneficial outcome is reaping the value of adapting new ideas or methods with many organizational participants as the program continues to evolve toward its full operational capability. By continuing to collaborate as constructively as we have, we've developed and strengthened partnerships that are consistently yielding innovation.

We are excited the program is on a path toward maturity. Eventually, the center of excellence will be headquartered at Fort Sam Houston, Texas, along with the division for General Schedule pay system civilians. The divisions for the Science and Technology Reinvention Laboratories and AcqDemo pay systems will be at Aberdeen Proving Ground, Maryland, and each division will have multiple satellite locations across the United States.In the past, anybody who had said "the government's hiring process met industry standards," clearly wasn't paying attention. Now, if one asks, "Are there some places where we've had pockets of excellence inside of government?" Absolutely. Or, "Have we utilized some specialized authorities and programs?" Absolutely. Or even, "Did we look at those and try to garner some best practices and apply them?" Of course, we did.

But in the big picture, government hiring has never been considered a model to emulate. And this program is an example of a good model to emulate. While it has improved over time, it has never been a user-friendly system by any stretch. Even people who have been in the system and used it for decades, like me, have never been fond of it. So now, as we recognize that we have to step into a new era of talent acquisition and talent management, is the time to address its every aspect. And onboarding and hiring through this Army Acquisition Workforce Recruitment and Sustainment Center of Excellence is one of the ways we can address all of our opportunities to be better at managing talent.

U.S. General Services Administration

Free for government attendees
Earn up to 20 Continuous Learning Points (CLPs)

FAST 2020

FEDERAL ACQUISITION SERVICE
TRAINING CONFERENCE

Advancing Acquisition

APRIL 14-16, 2020
ATLANTA, GEORGIA
GEORGIA WORLD CONGRESS CENTER

REGISTER NOW
www.gsa.gov/FAST

Hosted by the General Services Administration (GSA), the Federal Acquisition Service Training (FAST) Conference 2020, is a multiday, national training conference for the federal acquisition workforce, industry partners and customer agencies to be held in the Georgia World Congress Center, Atlanta, Georgia. **The event is free for all government attendees.**

This event will advance federal acquisition by offering comprehensive training led by renowned procurement experts on the latest acquisition trends and all of GSA's offerings. Continuous learning points (CLP) will be provided for all training.

FAST 2020 will also offer industry the opportunity to network with large and small businesses within the same industry and develop teaming arrangements to win future business. Agency partners will be able to conduct market research with industry partners on-site!




WORTH IT

The Training With Industry program expands and enhances officers' knowledge of industry practices.

by Jacqueline M. Hames

Military and corporate business best practices are fundamentally different, and the barrier to effective collaboration between the military and industry can often be found in that space. The Training With Industry (TWI) program aims to close that gap, one TWI fellow at a time.

The program helps to develop a strong relationship between the Army and industry partners, enabling both to learn each other's methods of operations, said Lt. Gen. Paul A. Ostrowski, principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)). "This understanding will secure a better glide path between the Army and our industry partners by creating new bonds that allow us to minimize future obstacles," he said.

COMMUNITY AND CURIOSITY

TWI is a work-experience program for Army officers, from captain to lieutenant colonel, that provides exposure to managerial techniques and industrial procedures in corporate America. "The program matches highly qualified acquisition officers with a wide array of businesses from inside and outside the defense sector," Ostrowski said. Acceptance into the program is fairly competitive, and the Army selects the best from the acquisition community to represent not only ASA(ALT), but also the Army and DOD as a whole.

"Industry spends a great deal of time and money on streamlining how they do business to be more efficient and effective," Ostrowski said. After their TWI rotation, officers are expected to identify industry best practices and implement them at their next duty station, he said.

This past year, the program expanded from 12 positions to more than 30. Program fellows could be placed with one of many big-name corporations, such as Lockheed Martin Corp., Ford Motor Co. and Amazon.com Inc.—or smaller, nontraditional technology-based firms—where they can educate industry on how the Army runs and learn about industry best practices. "This mutual exchange of knowledge is vital to the enduring relationship between the Army and our industry partners," Ostrowski said.

But don't just take his word for it.

REMEMBERING THOSE WHO SERVE

Lt. Col. Thomas Monaghan poses with Ford's Wounded Warrior Support vehicle at a Veterans Day celebration. Ford employees and celebrities alike sign the car as a gesture of thanks to service members. (Photo courtesy of Lt. Col. Thomas Monaghan)

"Some of the key things that Army Soldiers and all of our fellows bring to the program are leadership, community and curiosity," said Sarah Martin, military affairs program manager for Amazon. "They are great additions to their teams because they know how to establish connections and community very quickly. We enjoy learning from their leadership skills just as much as they learn from us."

Martin manages the defense and government fellowships and exchanges for Amazon; her responsibility is to make sure fellows are set up for success from their first day through the end of their program. "The goal for their fellowship is to learn innovative best practices from Amazon that they can apply when they return to their military or government organization," she said.

Typically, fellows are placed on teams across the company so that they can learn by doing, she added, and there are regular events where fellows can interact with company leadership. Each program participant is given a specialized treatment, she said. "There is really no one-size-fits-all solution. The scope, scale and rotation of projects in the fellowship program truly depend on the fellow," Martin said. "For example, some fellows are strategic leaders in supply chain or logistics, and it may make the most sense for that fellow to work on one large program or project for the whole year." Other fellows may benefit from multiple projects to give them greater perspective on emerging technology or leadership development, she said.

THE FORD EXPERIENCE

TWI graduate Lt. Col. Thomas Monaghan was the first fellow placed at Ford Motor Co. in Detroit. At first, Ford didn't quite know what to do with him, but after looking at all the acquisition certifications on his resume, the company zeroed in on Monaghan's status as "a former mechanized Bradley guy" with experience in rail operations. Ford assigned him to work shipping and receiving and physical shipping problem sets, and to visit plants to look at the internal processes and see where they could develop efficiencies.

"And that was my first day. The first couple of hours I was there, there was a complete shift on what they thought I was supposed to do," Monaghan said.

As a car enthusiast, the assignment with Ford was "pretty cool" for Monaghan. He spent roughly three months helping to improve the build process at the Mustang plant, and he was able to test a GT350R right off of the assembly line—in fact, Monaghan became certified to test vehicles at Ford while completing project rotations.

"I rotated around, working with what they called problem-solving teams. So I went to the different plants—I did 187 individual projects over the year," he said. Some projects were short, maybe a few hours in duration, while others were longer, spanning months.

Since Ford started sponsoring TWI fellows, it has hosted Soldiers consistently. Lt. Col. Christopher Orlowski is on assignment with the company now. "I was placed into engineering manufacturing operations for North America, which is primarily responsible for Ford's engine manufacturing operations in Canada and the United States," he said. Orlowski is the first Army officer to work in engine manufacturing, and the third TWI fellow placed at Ford. With

GROUP DYNAMICS
Sarah Martin, fourth from the right in the front row, joins members of the Amazon Military Fellowship cohort in Kerry Park, Seattle, during a week full of tours, deep-dive meetings, community service and other excursions for the annual Seattle Summit in November 2019. (Photo courtesy of Sarah Martin)

this placement, he didn't really know what to expect, but feels the assignment is a great learning opportunity. Although Orlowski doesn't have much experience with engine manufacturing, he does have a doctorate in aerospace engineering and spent time as a program manager with the Defense Advanced Research Projects Agency.

Orlowski is working with the director of North American Engine Manufacturing Operations, Kevin Bicking, and will help support the launch of some of Ford's new engine programs for the 2021 model year. He hopes to learn how Ford does business forecasting and drives efficiencies such as reducing cost while reducing consumption. Ford is focusing on reducing the consumption of energy, material usage, the amount of trash going to landfills and water usage. "Part of that is because it has a cost, part of it is because Ford is pushing for increasing environmental friendliness and environmental advocacy," Orlowski said.

Orlowski wants to bring to his next program management position a deeper awareness of how competing priorities are tied together. "Design decisions impact manufacturing, which impacts efficiency, which impacts the supply base, and all of those things need to be considered and taken into account, and not just what makes the system performance better," he said.

Rapid decision-making skills were the key thing that Monaghan learned while at Ford. "I watched them make multimillion-dollar decisions based off of a 15-minute conversation," he said. Ford employees came to a meeting ready to make decisions; they were well-educated on the subject at hand and ready to address courses of action because they realized "a good decision now is better than the best decision three years from now," otherwise they would lose the competitive edge, Monaghan said. He believes the Army would benefit from that philosophy—right now, it can take a long time to make decisions on divestiture or procurement; adopting Ford's philosophy could improve production timelines for the Army.

No matter what lessons TWI fellows learn from industry, Monaghan encourages them to be active participants in the program. "If you think the TWI year is a year to take off and take a knee and relax, you're totally wrong," he said. A year goes by quickly if you're still on the command track and obligated to take pre-command courses; it's more like 10 months. "You are a

future leader of the Acquisition Corps—you need to go out there and understand as much about that industry you're working in" as possible, he said.

Martin reminds the fellows to ask for help when they need it, and to cultivate a willingness to learn. For other industry partners like Amazon, she encourages them to better understand the military. "One of the most helpful suggestions was to read the NDS [National Defense Strategy]—and, from there, I was able to work backward and build out an entire training and education program to meet the needs of military fellows," she said.

FROM TWI MANAGER TO FELLOW

Lt. Col. Shelia Howell's experience with the TWI program is a little different than other participants'—she used to be a TWI program manager. Supporting the warfighter has been her mission since she started her Army career as a human resources officer in 2003, and she wanted to continue that support throughout her career. The TWI program let her continue a service role as a program manager. Howell saw firsthand what a great opportunity the program was for Soldiers. "It is a tremendous opportunity that the program offers to really build your business acumen and have a deeper understanding of industry," she said. "It was priceless, and I really wanted to have the opportunity as well."

Even though she was a program manager for TWI, she still had to undergo the normal application process. "They hold a board, and they create an OML [order of merit list] … but I think that one of the main requirements is that you're at a point in your career where it works out for you," she said. The program should not be detrimental to a Soldier's career, and the candidate should be a good representative of the Army as well as the Acquisition Corps when with industry, because sometimes the TWI program is the only contact that company may have with a military member, she added.

KNOWLEDGE TRANSFER

Lt. Col. Sheila Howell, left, learning the ropes from Juanita Houdieshell at Lockheed Martin. "One of the main requirements is that you're at a point in your career where it works out for you," said Howell. (Photo courtesy of Lt. Col. Sheila Howell)

Howell was placed with Lockheed Martin in Orlando, Florida, and is currently on assignment there. She was able to tailor her experience with the company and is able to rotate around to different teams from different lines of business. At the time of her interview for this article, she was working with the capture team, learning the ins and outs of program management at Lockheed. She sat down with one of Lockheed's financial program managers to discuss the types of things that he looks at from an earned value management perspective. "That was really good to learn some of those financial metrics and how they look at it, and what kind of levers they pull to ensure that they are meeting their targets," she said. Understanding those measures on a deeper level has been her biggest takeaway so far. "I really do want to have a better understanding of how industry operates," Howell said. "I think that, as acquisition officers, that is an invaluable skill to have."

CONCLUSION

All three of the TWI fellows, past and present, agree that, to succeed in the program, you have to be a self-starter, and that you should leave a better understanding of the military—particularly, Army acquisition—behind with the industry host.

In addition to fostering a greater understanding between the military and industry, the TWI program helps convey the Army's six modernization priorities to industry, Ostrowski said. "We must recognize that the six priorities are not just an Army initiative, but it is also guidance to industry, so they know what they should focus on to drive innovation and get the best equipment to our Soldiers for the ever-changing fight."

For more information, go to ***https://asc.army.mil/web/career-development/programs/aac-training-with-industry/.***

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.

CAREER NAVIGATOR

APPLY, LEARN AND CONQUER

The Training With Industry program is an excellent opportunity for officers. Here's what you need to know before you apply.

Army leadership, particularly within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)), continually emphasizes the need for the force to learn from its industry partners—from large, traditional defense corporations to smaller businesses that traditionally have not contracted with DOD. It's one thing to talk with an employee from Ford Motor Co. about how they do business, or to read it in an article, but it is quite another to actually go to the company headquarters and experience Ford's rapid decision-making process, or learn how to cut production costs to streamline a budget. As it happens, Soldiers can gain that experience through the Training With Industry (TWI) program, sponsored by the Army's Director, Acquisition Career Management Office.

WHAT IS TWI?

The one-year work-experience program provides active-duty Soldiers with exposure to managerial techniques and industrial procedures within corporate America, according to the TWI website. This kind of training isn't usually available through other military schools or civilian universities and is therefore a unique experience; Soldiers are removed from the military environment and totally immersed in a corporate one. Officers from the Army Acquisition Corps between the ranks of captain and

SOME ASSEMBLY REQUIRED
Lt. Col. Christopher Orlowski is currently on assignment at Ford Motor Co. as part of TWI, where he is supporting the launch of engine programs for the 2021 model year. He's pictured here on a rotation at an assembly plant. (Photo courtesy of Lt. Col. Christopher Orlowski)

The one-year work-experience program provides active-duty Soldiers with exposure to managerial techniques and industrial procedures within corporate America.

lieutenant colonel (O-3 to O-5) compete for assignments with 30 industry partners—including Ford, Amazon.com Inc., Boeing Co., General Dynamics Land Systems and Intel Corp. Applicants are matched to assignments based on their backgrounds and the skills the receiving company desires. When the officers return to their duty stations, they bring back a wealth of knowledge for their immediate commands as well as the whole Army.

One thing to keep in mind before you apply: You will incur an active-duty service obligation of three-for-one in computed days. In other words, for a one-year work-experience opportunity, you will owe the Army three years of active-duty service.

HOW DO I APPLY?

Officers can apply for TWI if they are eligible for rotation during the summer assignment cycle. An October 2019 memorandum from ASA(ALT) outlines the policies, procedures and application processes for the TWI program, but be sure to contact your assignment officer at the U.S. Army Human Resources Command for all the information you'll need to apply. In general, applicants should:

- Have a minimum of three years of active-duty service, but not more than 19 years, and provide a memorandum acknowledging acceptance of the active-duty service obligation.
- Possess a security clearance of secret or higher.
- Be competitive for promotion or recently promoted, so participation in the program doesn't risk the officer's opportunity to move to the next rank.
- Be Defense Acquisition Workforce Improvement Act Level II certified in either program management or contracting.

CONCLUSION

TWI gives officers the opportunity to train with companies that develop innovative, cutting-edge technologies and are leaders in their fields. Each fellowship position was established for officers to gain valuable knowledge about industry acquisition practices, and for them to leave industry partners with a better idea of how to work with the Army. For fiscal year 2020, there were 45 applicants for the 30 available positions, so be sure your application is top-notch. Here are some additional resources:

- TWI Student Handbook: **https://www.hrc.army.mil/content/Training%20With%20Industry.**
- TWI Initial Training Plan example: **https://asc.army.mil/web/wp-content/uploads/2019/07/TWI-Initial-Training-Plan-Example.docx.**

For more information, or if you have questions on how to apply, contact Maj. Saleem Khan at ***saleem.a.khan4.mil@mail.mil*** *or 703-664-5716.*

—JACQUELINE M. HAMES

THE BIG ASK

As the Army gets a much-needed technological upgrade, the Naval Postgraduate School does its own technological upgrade of graduate education for acquisition professionals.

by John T. Dillard, Col., USA (Ret.)

On Dec. 20, 2019, the first cohort of 30 Army Acquisition Corps officers graduated from the new degree curriculum, called 522, at the Naval Postgraduate School (NPS) with a master of science degree in systems engineering management. In addition, most of those graduates have completed their joint professional military education and Army intermediate-level education at the Naval War College, which has a satellite campus on the same Monterey, California, naval base. Over the course of their graduate studies at NPS, students receive 34 different Defense Acquisition University course equivalencies as a concurrent benefit that saves them valuable time away from the acquisition work that needs to be done.

Those 30 officers can credit their new systems engineering management degrees to Lt. Gen. Paul A. Ostrowski, principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), and NPS President Ann Rondeau (Vice Adm., USN, Ret.), who steered the changes to the NPS curriculum in Army acquisition.

It was a big ask. And Ostrowski wasn't the first principal military deputy to request a technological upgrade to the program. Indeed, his two predecessors also wanted to see change.

Starting in 2011, three successive principal military deputies to the ASA(ALT) had asked for more science, technology, engineering and mathematics in the systems acquisition curricula at NPS, which has been sponsored by the Army since 1991. But it was Ostrowski who really pushed for it to come about in 2017, collaborating closely with Rondeau for implementation.

Despite pushing for the technological upgrade to the NPS graduate education, Ostrowski said it was Rondeau and her systems engineering faculty who were the real change agents. It also took some heavy lifting by the U.S. Army Director, Acquisition Career Management (DACM) and the U.S. Army Acquisition Support Center. Several iterations of combined courses were staffed and modified for optimal composition and sequencing. We had never seen that kind of supporting-supported relationship to bring about educational advancements at NPS. The two flag officers met face to face at NPS and immediately struck a partnership for the restructuring. We transformed the curricula from purely organizational dynamics to engineering reasoning applied in science

FIRST IN 522
The first cohort of Army Acquisition Degree Curriculum 522 graduated in December with a master of science degree in systems engineering management from NPS in Monterey, California. (Photo by Javier Chagoya, NPS)

and technology pursuits, while keeping the needed methodologies in contract and program management. Our end goals haven't changed for the broader objectives of improved critical thinking, enhanced decision-making and a larger professional network among the workforce.

Ostrowski is a 1996 alumnus of NPS, and a former student of mine. As we discussed proposed changes, he told me, "We have to recalibrate our graduate education at NPS." He wanted NPS to focus more on product than process, emphasizing new capabilities over policies. "We need more technical, less managerial. Our folks already know how to lead people. What they really have to manage in acquisition is complexity," he said. Recent studies of military capacity to execute national security and defense strategies showed a shrinking technological edge over our near-peer threats.

Realizing there weren't many officers in the ranks with highly technical or engineering undergraduate degrees, the Army's academic advisers at NPS observed that specialized degrees like engineering management were the fastest-growing graduate education segments in the Army, while nonspecialized management programs were precipitously declining. Also, the Government Accountability Office specifically cited a lack of systems engineering in many high-profile weapon system program failures; large program cancellations of the past 10 years included Future Combat System, Comanche and Crusader. Everything pointed to a need for more skills in the areas of systems engineering as well as the acquisition essentials of contracting, program management, and test and evaluation. A long-standing degree at NPS was the systems engineering management degree for folks without an engineering undergraduate degree. With that as our foundation, we could easily integrate courses from across the campus.

MORE THAN BUSINESS AS USUAL

Over the next year, the NPS Department of Systems Engineering had the needed courses and faculty members to modernize and satisfy our sponsor's shifting educational needs. With a palpable sense of urgency coming from the Pentagon and global challenges on the horizon, the Army's 18-month master's degree program at NPS reorganized to provide Level III Defense Acquisition Workforce Improvement Act (DAWIA) training equivalencies in three different disciplines: systems engineering, program management and contract management; with Level II in test and evaluation.

Ostrowski often says of the new programs, "This is what right looks like!" and added, "President Rondeau understands our current national security environment and helped us forge the path to meeting our new educational requirements." Since the first cohort, he has sent three additional groups of Army Acquisition Corps officers, arriving twice per year. There'll be two more groups coming in January and June 2020, so even with the departure of this first large cohort, there'll be around 80 officers on the

ground in Monterey. That's the biggest Army acquisition footprint ever seen at NPS.

BIGGER AND BETTER

NPS leadership not only welcomed the changes Ostrowski requested, but also helped build a correlated distance learning program, called 722, awarding the same degree, for the Army's multifunctional career field civilians in acquisition. As a part-time, 24-month degree program, it delivers DAWIA Level III certified training equivalencies in program management and systems engineering along with Level II in test and evaluation and contracting fundamentals. More than 40 acquisition civilians have already enrolled in that program, being centrally selected by the DACM Office within the U.S. Army Acquisition Support Center.

One of the striking aspects of both the military resident 522 and civilian distance 722 programs is another technological upgrade—the Capstone Study Project—and how it differs from a traditional master's thesis paper. Projects are selected by the Army and other services, which "sponsor" (as the client) five-person student teams as they solve real-world problems with a time-phased systems engineering approach. A pair of faculty project advisers is assigned to each team to coach them through the six-month process of architecting solutions. In the end, the clients, the Systems Engineering Department faculty and all of the other Army Acquisition Corps students are briefed by each team on their project results.

Another NPS graduate, Lt. Gen. L. Neil Thurgood, director for hypersonics, directed energy, space and rapid acquisition and director of the Rapid Capabilities and Critical Technologies Office, visited NPS last June, and gave one of our six student teams its capstone thesis project: to find an affordable radar that can be mounted on a ground combat vehicle and track targets on the move. His message to our 62 assembled Army Acquisition Corps officers was that the new 522 program was going to be extremely advantageous for them, because of their resulting qualifications to serve in either 51A or 51C assignments. He advised them that diversity of knowledge is often more important in acquisition than depth in any single field.

The other five teams conducted their capstone projects in such topics as: Multiple concepts of operations for swarms of unmanned aerial systems.

- An acquisition value model for Special Operations Forces materiel.
- An analysis of contracting transactions in deployed versus garrison environments.
- Prioritizing Army Community Services funds allocation.
- Field experimentation of the Soldier-Borne Sensor for optimal display size.

The last team just won the competition for Systems Engineering Management Outstanding Capstone Project.

CONCLUSION

The latest investment by the Army at NPS is the establishment of a new military position on the faculty, the Systems Engineering and Army Acquisition Chair, to help administer the Army's programs and oversee them for the military deputy and DACM. Col. Joyce B. Stewart will be the first in the position. Stewart, a seasoned program manager, arrives in April 2020 from the Army's Office of the Chief Systems Engineer. She will bring Army relevance and current perspectives from her recent experience. She is welcomed by President Rondeau as an NPS asset and will help us move into the next decade, in support of all Army acquisition students at the school.

Overall, the new 522 and 722 degree programs deliver what Army leadership asked for: more technological relevance in an era of increasing threats, with students actually using the tools they've acquired before they leave for their follow-on acquisition assignments. Qualified to serve in a larger variety of assignments than ever before, our graduates are going to be able to contribute to warfighting readiness in the newest technological fields. They'll be well-equipped to equip the warfighters.

For more information on either the military or civilian program, go to ***https://asc.army.mil/web/career-development/programs/*** *and* ***https://asc.army.mil/web/news-alt-jas18-mastering-acquisition/****.*

JOHN T. DILLARD, COL., USA (RET.), managed major weapons development efforts for most of his 26-year career in the U.S. Army. He is now a senior lecturer in the Systems Engineering Department of the Graduate School of Engineering and Applied Sciences at NPS, where he also serves as the technical representative for the Army's new Master of Science programs in Systems Engineering Management. He holds an M.S. in systems management from the University of Southern California and is a distinguished military graduate of the University of Tennessee at Chattanooga with a B.A. in biological sciences. Dillard is a frequent contributor to Army AL&T and his most recent, previous article appeared in the Fall 2018 issue.

LEAD WHERE YOU LAND

AMY K. LARSON

COMMAND/ORGANIZATION: Army Contracting Command – Rock Island

TITLE: Contract specialist

YEARS OF SERVICE IN WORKFORCE: 6.5

AAW/DAWIA CERTIFICATIONS: Level III in contracting; Level I in information technology and in industrial and contract property management

EDUCATION: MBA, Master of Organizational Leadership, and BBA in marketing, management and philosophy, St. Ambrose University

Amy Larson has done a lot of leader-ish things for someone whose position doesn't officially require it. She mentors junior staff, put together a group to support new hires, partnered with a co-worker to turn around a struggling program at her command, and has become the go-to person for just about any issue thanks to an extensive cross-organizational contact list she has developed. She has also availed herself of several leader development programs offered by DOD and the Army Director, Acquisition Career Management (DACM) Office, including the Defense Civilian Emerging Leader Program (DCELP), the Acquisition Leadership Challenge Program, the Inspiring and Developing Excellence in Acquisition Leaders Program and the Executive Leadership Development Program.

"Because I am not a positional leader, I have to always be looking for opportunities to use my skills," said Larson, a contract specialist for the Army Contracting Command – Rock Island (ACC-RI), Illinois. "I spread myself a little thin, and it's a challenge to juggle a lot of things at once, but I wouldn't change it for the world."

She has been with ACC-RI for nearly seven years, and came to acquisition after a career in academia. "I wanted to work in the public sector, and chose contracting for the legal and regulatory aspects and the challenge of the detailed work," she said. As a contract specialist, she negotiates cost, price and schedule for explosives and ammunition. "My biggest satisfaction is knowing that the government has provided the tools to support my mission and positively affect others around me, despite the fact that I am not yet in a leadership role," she said.

A desire to learn more about government leadership and to overcome the challenge of "starting a government career late in life" motivated Larson to seek out developmental training opportunities. "I have always had an intrinsic desire to be great at my job, and I found this was one of many options for me to act on that. The civilian contracting career model developed by the DACM Office served as a guide in professional development, and helped me identify next steps."

For her, the most impactful course was DCELP. That course "was all about meeting people in the middle—adapting to them," she said. "Because everyone is different, you need to have the ability to fluidly use different styles of conflict management, learning, leadership, etc., depending on the people you're dealing with. Be cognizant that your way is not the best or only way, and keep in mind that being able to adapt your style is going to get you further than having your feet planted."

The course's setting, at a conference center in Southbridge, Massachusetts, is an important part of its success, Larson said. Lodging, dining and classroom facilities were all in one spot. "It was inevitable that we would get to know the other students extremely well. Also, no one was from that area, and therefore we couldn't go home or to an office after classroom sessions, which provided a lot of valuable networking opportunities." The DCELP

curriculum includes team-building activities, high-energy lectures and student-led discussions—"the trifecta of learning," said Larson—which also added to the program's impact. "I have always been extremely comfortable networking and reaching out to people from my DCELP cohort when I have a question and need a new perspective outside my command. It has been more than three years since graduation, and we still are in touch as a group."

Larson has gained a great deal from the courses she has taken. "The networking has proven to be invaluable," she said. "I frequently reach out to colleagues I have met in these trainings when I've exhausted all other options, and other participants reach out to me. I have met people in all agencies that have helped in year-end time crunches, mainly Defense Finance and Accounting Service, and I have connections in all areas so when I have a question, I have a friend a phone call away. And, because I save all my material both electronically and in hard copy, I have a massive amount of resources at my disposal that I refer back to and share with others."

Among those resources is a notebook that she brings to every training program. It includes important terms, reading recommendations from instructors and colleagues, and inspirational quotes. "This notebook is pretty amazing, and I refer back to it more than I ever thought I would. And each time I refer back to it, I can almost hear the conversation I pulled the information from."

To make sure the learning sticks beyond the classroom, Larson selects one idea or skill—influencing, conflict resolution or crucial conversations, for example—and works on it over several weeks. "Whatever I'm working on, I put a reminder in my Outlook calendar, and I practice it until it is habit," she said. "If I feel like I may fall short, I can ask my team lead or branch chief to observe my progress to see if they note an improvement."

As a result of what she has learned, her leadership "has strategically placed me in difficult situations, on demanding teams and arduous projects, and on challenging integrated product teams," she said. "I have been able to take a neglected program and redesign it into a very successful part of our command. I have helped rewrite policy; influenced others to buy in; and made the program recognizable by becoming relatable, collaborating, creating a champion and facilitating continuous change."

That program is her command's Sexual Harassment/Assault Response and Prevention Program. "My senior executive put out a posting for a program manager-type assignment, and I jumped on it. The personnel assigned to it previously were Soldiers who were 'volun-told' they'd be working on it. The command decided to take a different approach, and see if anyone would want to do it," Larson explained. She and a colleague, Rebecca Jessen, volunteered. "We are lucky enough to be completely different in skill sets but like-minded in accomplishing the mission, and we've taken the program to something quite amazing."

The pair determined that the program's difficulties stemmed from the fact that the program lacked the passion and the sincerity for its care of the command and its people. "That was an easy fix, although it took time. We demonstrated that we genuinely cared: When we trained, we shared personal stories—we didn't just read the Army training slides. We had awareness days with swag items and baked goods that we bought or made ourselves—one person was inspired to hand-make more than 500 teal ribbons, one for each person on our command. As a result, we now have 550 people in our organization as passionate about the issue as we are."

—SUSAN L. FOLLETT

MAKING AN IMPACT

Larson's cohort at DCELP, which she calls her most impactful training course. DCELP "was all about meeting people in the middle—adapting to them," she said. (Photo courtesy of Amy Larson)

ON THE MOVE

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

NEW DASA FOR RESEARCH AND TECHNOLOGY

Dr. Philip Perconti, director of the U.S. Army Combat Capabilities Development Command's Army Research Laboratory, was named deputy assistant secretary of the Army for research and technology (DASA(R&T)) and Army chief scientist, effective Nov. 24.

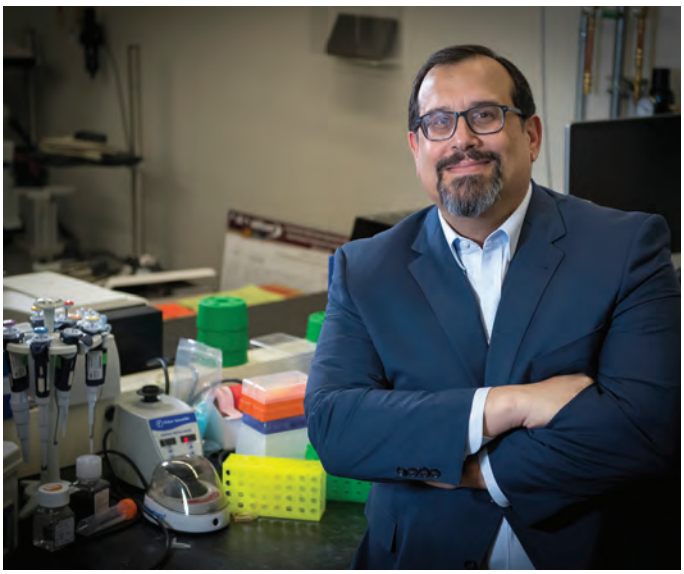
In his new position, Perconti is responsible for Army research and technology dedicated to empowering, unburdening and protecting Soldiers and modernizing the force. He answers to the assistant secretary of the Army for acquisition, logistics and technology. The DASA(R&T) fosters invention, innovation and demonstration of technologies to enable future force capabilities.

A member of the Senior Executive Service since January 2013, Perconti had been a senior leader at the Army Research Laboratory for nearly seven years. He first served as its Sensors and Electron Devices Directorate director, then became the acting laboratory director in April 2016. The Army selected him to be its official director in June 2017. Before joining the lab, Perconti was director of the Science and Technology Division of the U.S. Army Communications-Electronics Research, Development and Engineering Center's Night Vision and Electronic Sensors Directorate for 12 years.

During his tenure as laboratory director, Perconti expanded collaborative efforts with industry and academia by placing Army scientists and engineers alongside partners in Chicago, Boston and Austin, Texas. Under his leadership, the lab leveraged more than $70 million of in-kind contributions for Army-focused research through Open Campus initiatives.

His initiative of identifying and establishing 10 Essential Research Programs is something he said he hopes will endure after his departure. During a Nov. 12 town hall at the lab's campus in Adelphi, Maryland, Perconti said, "There are certain things I value most. Probably the number one thing I value most is integrity. Integrity equals credibility in my mind. If you're going to make a claim that you have 10 areas that are essential, then you had better deliver on those 10 areas."

Someone needs to be the guardian of the future, he said. "We need to understand the threat that potentially exists for the United States with regard to materiel development and the science and technology that is being developed worldwide," he said. "We need to understand how we can



take that technology and apply it in ways that would bring new and disruptive capabilities … transformative capabilities to the Army, long-term."

Perconti, who replaces **Dr. Thomas P. Russell**, holds three degrees in electrical and computer engineering: a doctorate from George Washington University, an M.S. from Johns Hopkins University and a B.S. from George Mason University.

Perconti is a Fellow of the Military Sensing Symposium and a member of the Eta Kappa Nu Electrical Engineering Honor Society of the Institute of Electrical and Electronics Engineers, the Army Acquisition Corps, the Technical Cooperative Program Sensors Multi-Sensor Integration Panel and the Institute of Electrical and Electronics Engineers. He has published extensively on many aspects of military sensing and on countermine and counter-improvised explosive device technology. He has authored or co-authored more than 40 publications, including three book chapters, and holds two patents.

Dr. Patrick J. Baker was named the new director of the Army Research Laboratory.


1


1


2

U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND

1: CHANGE OF COMMAND AT CCDC

Maj. Gen. John A. George (right, in top photo) assumed leadership of the U.S. Army Combat Capabilities Development Command (CCDC) from **Maj. Gen. Cedric T. Wins**, center, during a change of command ceremony Nov. 1 at Aberdeen Proving Ground, Maryland. **Gen. John M. Murray**, commanding general of the U.S. Army Futures Command (AFC), presided over the ceremony, in which George moved from deputy director and chief of staff of AFC's Futures and Concepts Center. Assisting in the ceremony was CCDC **Command Sgt. Maj. Jon R. Stanley**, left. (U.S. Army photo)

George is CCDC's second commander, following the organization's February 2019 transition from the U.S. Army Research, Development and Engineering Command (RDECOM) to AFC. His 31-year career includes command and staff positions with the United States Military Academy at West Point; NATO Joint Command Southeast, Turkey; Headquarters, Department of the Army, Washington; U.S. European Command, Stuttgart, Germany; and Force Development Directorate, G-8, Department of the Army. George, a West Point graduate, holds an M.S. in social psychology from Penn State University and an M.S. in national resource strategy from National Defense University's Industrial College of the Armed Forces.

Wins retired Nov. 6 at a ceremony led by **Gen. Gustave F. Perna** (right, bottom photo), commanding general of the U.S. Army Materiel Command (AMC). Wins assumed command of RDECOM in August 2016 when it was an AMC subordinate command. He led the organization through business reforms, reprioritization of science and technology portfolios, and the transition to CCDC.

Before his assignment as RDECOM commander, he served as director of force development in the Office of the Deputy Chief of Staff, G-8. His 34-year career included leadership and staff assignments at Headquarters, Department of the Army and the Joint Staff, Washington; Strategic Planning, J-8, U.S. Special Operations Command, MacDill Air Force Base, Florida; and the Requirements Integration Directorate, Army Capabilities Integration Center, Joint Base Langley – Eustis, Virginia. (Photo by Conrad Johnson, CCDC)

2: ARMY RESEARCH LAB GETS NEW DIRECTOR

The Department of the Army named **Dr. Patrick J. Baker** director of the CCDC's Army Research Laboratory (ARL), effective Dec. 8.

Baker, the lab's seventh director, replaces **Dr. Philip Perconti**, who recently left the laboratory to replace **Dr. Thomas P. Russell** as deputy assistant secretary of the Army for research and technology and the Army's chief scientist.

ARL, which has more than 2,000 military and civilian employees, is responsible for basic and applied research to support the ground fighting force of the future. A member of the Senior Executive Service since May 2012, Baker most recently served as director of the laboratory's Survivability Lethality Analysis Directorate before overseeing its transition to a new organization, the CCDC Data and Analysis Center.

Baker spent much of his early research career at ARL. A product of Army educational outreach, he started as an engineering trainee from Drexel University in July 1984 at one of the lab's forerunners, the U.S. Army Ballistic Research Laboratory. He left the lab to pursue graduate studies under Army Research Office funding at Vanderbilt University in 1989. After a stint at the University of Dayton Research Institute, he returned to the Army laboratory system in 1995.

Baker then rose from Army-unique bench research in energetic materials though the leadership ranks, serving in multiple broadening and developmental assignments on Army, joint and international panels as well

as in acting supervisory and deputy director assignments. His assignments included director of the lab's Weapons and Materials Research Directorate and acting director of the U.S. Army Natick Soldier Research, Development and Engineering Center in Natick, Massachusetts.

"Dr. Baker has held several critical positions within CCDC," wrote **John S. Willison**, CCDC deputy to the commanding general, in an email to the workforce. "Under his leadership, CCDC ARL will continue to build on a history of innovative science and technology while contributing to our command's critical role as a component of the Army Futures Command."

"I am grateful to the Army for this opportunity to serve in this new capacity," Baker said. "Our Soldiers deserve nothing short of the best from the discoveries that come from a committed, creative and teamed scientific community. I've seen the transformational impact this community can produce as part of the Army team, and I am confident the ARL Team will build even more momentum and continue to deliver as we move forward."

U.S. ARMY MEDICAL RESEARCH AND DEVELOPMENT COMMAND

3: DIRECTOR RETIRES AFTER 40 YEARS

Michael Leggieri, right, director of the DOD Blast Injury Research Coordinating Office in the U.S. Army Medical Research and Development Command (USAMRDC), accepted an award commemorating 40-plus years of federal service from **Dr. Mark Dertzbaugh**, the command's acting deputy principal assistant for research and technology, in a retirement ceremony Oct. 29 at Fort Detrick, Maryland. Leggieri served as an enlisted Airman and an environmental science officer before settling into his most recent role in 2007, where he was responsible for collecting and curating all DOD blast injury efforts across military, corporate and academic sources. (Photo by Ramin A. Khalili, USAMRDC Public Affairs)

U.S. ARMY TANK-AUTOMOTIVE AND ARMAMENTS COMMAND

4: NEW CSM AT TACOM

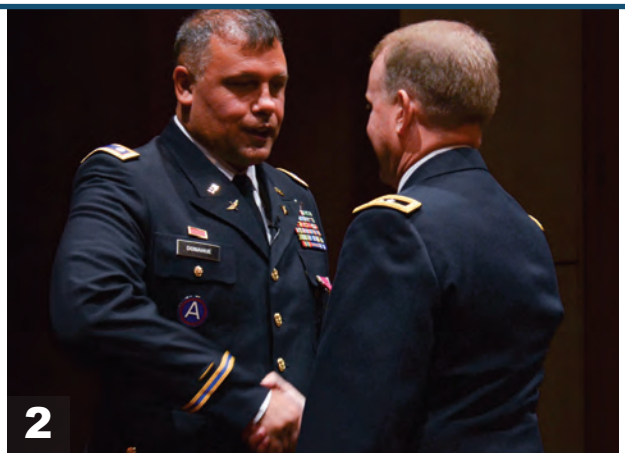
Command Sgt. Maj. Jerry M. Charles has been named command sergeant major for the U.S. Army Tank-automotive and Armaments Command. Charles's 26-year career includes a recent assignment as the sergeant major for Headquarters, U.S. Army Pacific Deputy Chief of Staff at Fort Shafter, Hawaii, and operational deployments in support of Operation Enduring Freedom and Operation Iraqi Freedom. Charles, who assumed responsibility Nov. 8 from **Command Sgt. Maj. Ian C. Griffin**, holds a master's degree in management and leadership from Webster University.

ARMY RAPID CAPABILITIES AND CRITICAL TECHNOLOGIES OFFICE

5: SES APPOINTMENT AT RCCTO

Marcia B. Holmes, deputy director of Hypersonics, Directed Energy, Space and Rapid Acquisition for the Army Rapid Capabilities and Critical Technologies Office (RCCTO), was recognized Nov. 1 for her appointment to the Senior Executive Service. **Lt. Gen. L. Neil Thurgood**, director of Hypersonics, Directed Energy, Space and Rapid Acquisition and RCCTO director, hosted the ceremony at Redstone Arsenal, Alabama. (Photo by Bill Parker, RCCTO)


1


2


3


4

PROGRAM EXECUTIVE OFFICE FOR AVIATION

1: CHANGE OF CHARTER AT UTILITY HELICOPTERS

Col. Calvin J. Lane, right, accepted the charter of the Utility Helicopters Project Office from **Maj. Gen. Thomas H. Todd III**, program executive officer (PEO) for Aviation, during a Sept. 5 change of charter ceremony at Redstone Arsenal, Alabama. Lane took over the project manager role from **Col. Billy Jackson**. (Photo by Gary Jones, PEO Aviation)

2: RETIREMENT CAPS 28-YEAR CAREER

Lt. Col. Daniel Donahue, left, received the Legion of Merit from **Maj. Gen. Thomas H. Todd III**, PEO for Aviation, during a retirement ceremony Sept. 27 at Redstone Arsenal. Donahue retired after a 28-year career supporting Army aviation, culminating as the Afghan aviation modernization officer for PEO Aviation. (Photo by David Hylton, PEO Aviation)

PROGRAM EXECUTIVE OFFICE FOR MISSILES AND SPACE

3: NEW PRODUCT OFFICE AT CMDS

Lt. Col. Beau Barker, right, assumed the charter of the newly established Product Manager for Maneuver – Short Range Air Defense (M-SHORAD) Aug. 16 at Redstone Arsenal, Alabama. **Col. Chuck Worshim**, left, project manager for the Cruise Missile Defense Systems (CMDS) Project Office, which includes M-SHORAD, presided over the assumption ceremony and the unveiling of the product office colors.

Barker previously served as a Department of the Army system coordinator and as executive officer to the deputy assistant secretary of the Army for strategy and acquisition reform. As product manager for M-SHORAD, he will be responsible for the life cycle management of the new M-SHORAD weapon system, as well as the Avenger and Stinger systems. (Photo by Henry Norton, CMDS Project Office)

U.S. ARMY DIRECTOR, ACQUISITION CAREER MANAGEMENT OFFICE

4: DEPUTY DIRECTOR RETIRES AFTER 36-YEAR CAREER

Joan Sable, deputy director of the Acquisition Career Management Office and chief of the Army Acquisition Workforce Strategy and Communications Division, retired Nov. 1 after a 36-year federal career that included 20 years in Army acquisition. **Craig A. Spisak**, director of the U.S. Army Acquisition Support Center (USAASC) and the Acquisition Career Management Office, honored Sable's career during a Sept. 5 retirement luncheon at Fort Belvoir, Virginia.

Sable came to Army acquisition in 1999, having spent several years as an acquisition research analyst with Defense Acquisition University. She played a part in several important Army Acquisition Workforce milestones, including the official stand-up of the Director, Acquisition Career Management (DACM) Office; creation and rollout of the Army Acquisition Dashboard; development and implementation of the Army Acquisition Workforce (AAW) Human Capital Strategic Plan; and the stand-up of the AAW Recruitment and Sustainment Center of Excellence at Fort Sam Houston, Texas, in November.

Replacing Sable as chief of the AAW Strategy and Communications Division is **Scott Greene**. (Photo by Catherine DeRan, USAASC)

THE CHIEF OF STAFF, ARMY ANNOUNCED THE FOLLOWING GENERAL OFFICER ASSIGNMENT:

Maj. Gen. Thomas H. Todd III, program executive officer, Aviation, Redstone Arsenal, Alabama, to deputy commander, Combined Security Transition Command – Afghanistan, United States Forces – Afghanistan, Operation Freedom's Sentinel, Afghanistan.

SECRETARY OF THE ARMY AWARDS FOR EXCELLENCE IN CONTRACTING

Stuart A. Hazlett, deputy assistant secretary of the Army for procurement, has announced the winners of the Secretary of the Army Awards for Excellence in Contracting for fiscal year 2019. The annual awards recognize exemplary contracting organizations and individuals, highlighting those that excel in customer satisfaction, productivity, process improvement and quality enhancement.

TEAM AWARDS

Specialized Services and Construction Contracting: U.S. Army Corps of Engineers (USACE) Border Infrastructure Team, USACE – Dallas

Systems, R&D, Logistics Support (Sustainment) Contracting: Enterprise Training Services Contract Contracting Team, U.S. Army Contracting Command (ACC) – Orlando, Florida

Installation Level Contracting Office and/or Directorate of Contracting: Other Transaction Agreement Training Team, ACC – New Jersey

Contingency Contracting: 902nd Contracting Battalion, Joint Base Lewis – McChord, Washington

SPECIAL AWARDS

Barbara C. Heald (Deployed Civilian) Award: Serina A. Allingham, ACC – Rock Island, Illinois

Innovation in Contracting Strategies: Facility Support Operations Services Team, U.S. Army Mission and Installation Contracting Command (MICC) – Fort Bliss, Texas

Exceptional Support of the AbilityOne Program: Product Manager for Sets, Kits, Outfits and Tools Team, Program Executive Office for Combat Support and Combat Service Support, Project Manager for Force Projection; and ACC – Warren, Michigan

Outstanding Contract Specialist/Procurement Analyst: Suzanne Wiggins, USACE – Dallas

Contracting Professional of the Year: Joseph M. Carroll, ACC – Redstone Arsenal, Alabama

Contracting NCO of the Year: Master Sgt. Jeremiah J. Scheil, USACE – Savannah, Georgia

CONTRACTING OFFICER AWARDS

Installation Level Contracting Office and/or Directorate of Contracting: Shaun McAfee, Regional Contracting Office – Italy; 414th Contracting Support Brigade

Specialized Services and Construction Contracting: Teresa V. Dinwiddie, MICC – Yuma Proving Ground, Arizona

Systems, R&D, Logistics Support (Sustainment) Contracting: Stephanie M. James, ACC – Rock Island

Contingency Contracting: Maj. Katrina B. Grimes, 648th Contracting Team, 922nd Contracting Battalion, MICC – Fort Campbell, Kentucky

DEFENSE ACQUISITION WORKFORCE ACHIEVEMENT AWARDS

Hon. Ellen M. Lord, undersecretary of defense for acquisition and sustainment, has announced the winners of the 2019 Defense Acquisition Workforce Achievement Awards, with the Army taking home honors in nine categories.

INDIVIDUAL ACHIEVEMENT AWARDS

Acquisition in an Expeditionary Environment: Maj. Eugene Choi, U.S. Army Contracting Command

Auditing: Jessica Oliver, Defense Contract Audit Agency

Contracting and Procurement: Simon Klink, F-35 Lightning II Joint Program Office (JPO), U.S. Navy

Cost Estimating: Nicole E. Gulla, Joint Program Executive Office (JPEO) for Armaments and Ammunition

Earned Value Management: Melissa Ransom, Program Executive Office (PEO) for Land Systems, U.S. Marine Corps

Engineering: Joseph Krumenacker, F-35 Lightning II JPO

Facilities Engineering: Laureen A. Borochaner, U.S. Army Corps of Engineers

Financial Management: Julie Blankenbaker, Naval Air Systems Command

Information Technology: Capt. Yazmin H. Garcia Smith, Air Force Materiel Command

International Partnership: Jean-Anne A. Butler, Air Force Materiel Command

Life Cycle Logistics: Chief Warrant Officer 4 **Martin A. Lopez Beltran**, Marine Corps Systems Command

Production, Quality and Manufacturing: James G. Clark, U.S. Army Combat Capabilities Development Command (CCDC)

Program Management: **Col. David A. Warnick**, PEO for Missiles and Space

Requirements Management: **Col. Sean A. McMurry**, JPEO for Chemical, Biological, Radiological and Nuclear Defense

Science and Technology Manager: **Lt. Col. Mara Kreishman-Deitrick**, U.S. Army Futures Command

Services Acquisition: Alicia Spurling, U.S. Special Operations Command (SOCOM)

Small Business: Paul D. Ward, SOCOM

Software: **George Senger**, PEO for Command, Control and Communications – Tactical

Test and Evaluation: Col. Varun Pari, F-35 Lightning II JPO

TEAM AWARDS

Software Innovation: U.S. Air Force Kessel Run – Boston

Flexibility in Contracting: National Geospatial-Intelligence Agency JANUS Team – Springfield, Virginia

Workforce Development Innovation (Large Organization): **CCDC Ground Vehicle Systems Center – Warren, Michigan**

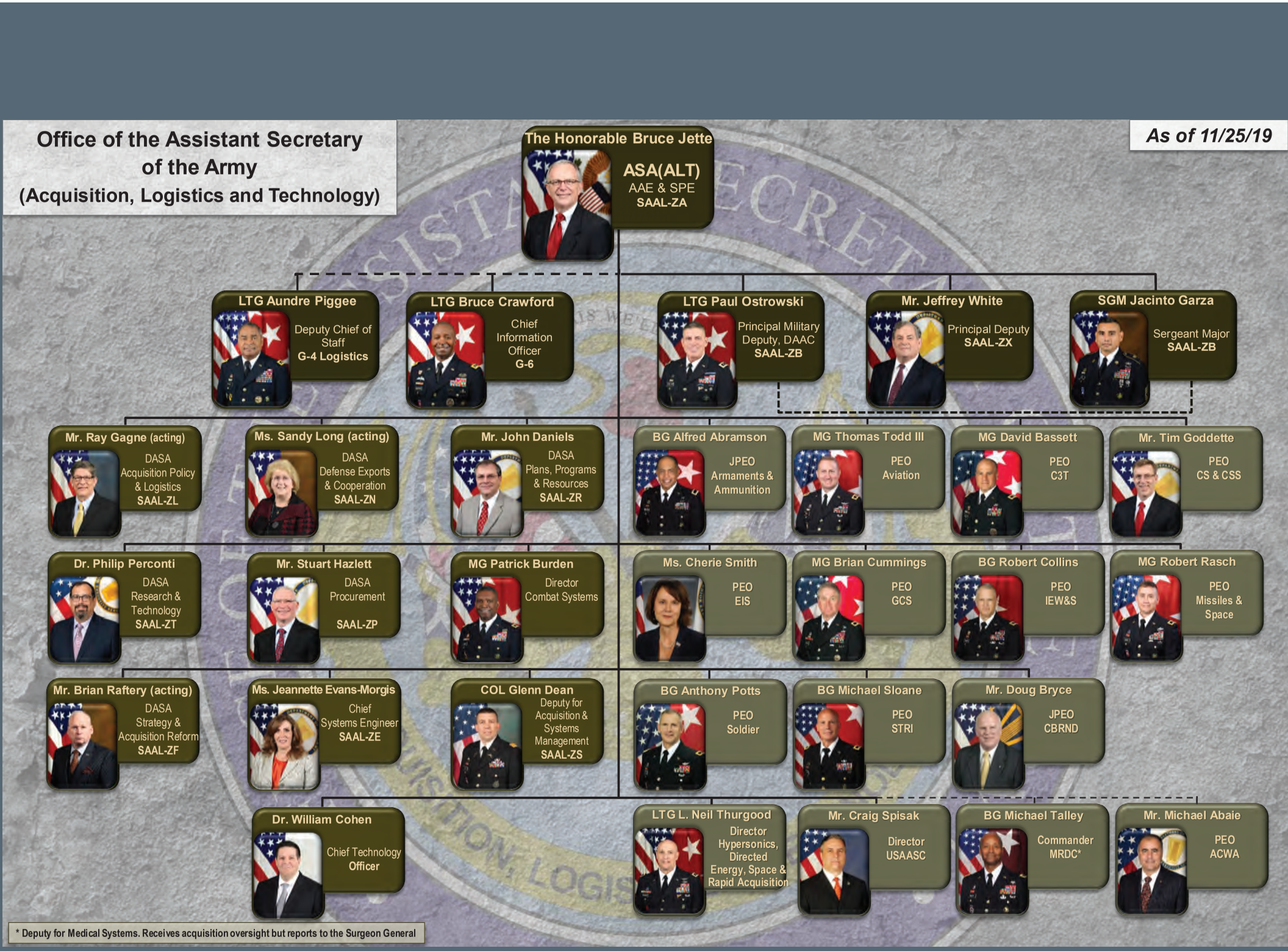
Workforce Development Innovation (Small Organization): SOCOM Special Operations Forces Acquisition, Technology and Logistics – MacDill Air Force Base, Florida

WINNING ARMY TEAM

The Hon. Ellen M. Lord, center, presented the DOD Acquisition Team Award for Workforce Development Innovation (Large Organization) to the Ground Vehicle Systems Center on Oct. 29. To see more award photos, go to **https://asc.army.mil/web/news-army-wellrepresented-in-workforce-achievement-awards/**. (DOD photo)

Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology)

As of 11/25/19



* Deputy for Medical Systems. Receives acquisition oversight but reports to the Surgeon General

ARMY ACQUISITION, LOGISTICS & TECHNOLOGY
ISSN 0892-8657

DEPARTMENT OF THE ARMY
ARMY AL&T
9900 BELVOIR RD
FORT BELVOIR, VA 22060-5567

ASC.ARMY.MIL

HEADQUARTERS DEPARTMENT OF THE ARMY | PB 70-20-01 | APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED

"Powering down decision-making to the appropriate level of the acquisition process increases the Army's ability to provide timely capabilities to Soldiers, while remaining fiscally responsible."

Dr. Bruce D. Jette
Army Acquisition Executive
Page 4

PUBLISHED BY

U.S. ARMY
UNITED STATES ARMY USASAC ACQUISITION SUPPORT CENTER

PIN: 206071-000