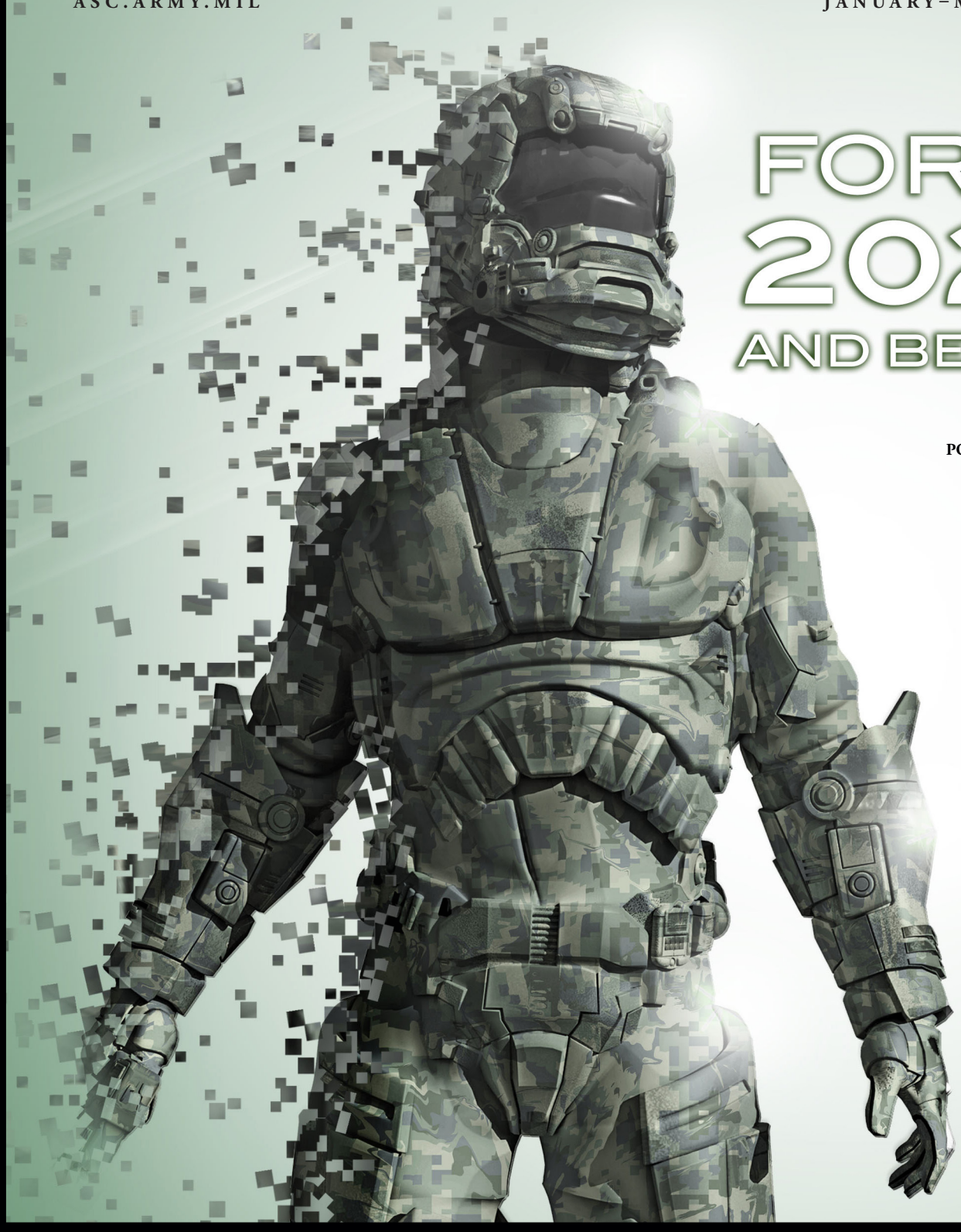
DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

ASC.ARMY.MIL

JANUARY–MARCH 2015



FORCE 2025 AND BEYOND

POWERING THE FUTURE

Commands, installations advance toward greater energy sustainability

'ALMOST HERESY'

GEN David G. Perkins on the new AOC: 'Win in a Complex World'

BEYOND BBP 2.0

Kendall outlines new —and old—tenets of Better Buying Power 3.0

From the Editor-in-Chief

TALK BACK

For more news, information and articles, please go to the USAASC website at **http://asc.army.mil**. Click on the Publications tab at the top of the page.

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

To contact the Editorial Office:
Call 703-805-1034/1038
or DSN 655-1034/1038

Email:
usarmy.belvoir.usaasc.list.usaascweb-army-alt-magazine@mail.mil
or
armyalt@gmail.com

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

"Trying to predict the future is a discouraging and hazardous occupation. … The only thing we can be sure of about the future is that it will be absolutely fantastic."

Arthur C. Clarke
"BBC Horizon," 1964

For Sir Arthur C. Clarke, the future will be the stuff of today's fantasy. There is no single path to it, but, from an Army acquisition perspective, we must make certain that the "fantastic" capabilities realized in the future are ours, not those of our adversaries. There are two ways to do this. The first is by letting current capabilities drive what the future looks like; the second is to envision the future we want and drive the technology toward it. The Army can't avoid the first, but it must embrace the second. That is the focus of this issue: the future.

To drive technology toward the future capabilities we want and need, we as a community have to accept more risk. Not everything will work out perfectly; there will be failures along the way. Timelines will be missed and money will be an issue, as always. Some of the conditions initially envisioned will change along the way, making a system in development obsolete or irrelevant. That should be no surprise. Predicting the future is "discouraging and hazardous," and we are experiencing some of that hazard today, realizing the future as it was predicted 10 or 20 years ago.

Much has been made in recent months of DOD spending more than $46 billion between 2001 and 2011 on weapon systems that never became operational: Future Combat Systems, the Comanche helicopter, the Crusader artillery system and new presidential helicopters. While those systems didn't make it, technologies from them have proved useful, and the lessons we learned continue to inform today's approach to acquisition. In any case, "failure" should not come as a shock. After all, most of commercial industry's research and development projects have a return on investment of only 20 percent. That means 80 percent of the billions invested annually will not result in one product—and these are the private-sector industries that government agencies are told to emulate.

Yes, we must be good stewards of the taxpayer's dollar, but to get to the future we desire, we need to accept a level of risk. This concept is a central theme of this issue's candid interview with the U.S. Army Training and Doctrine Command's commanding general, GEN David G. Perkins, on the new "U.S. Army Operating Concept: Win in a Complex World, 2020-2040." (See Page 106.)

We cannot maintain our technical superiority in the future without investment, but where do we invest and how much? Find out how Army G-8 prioritizes in "The Long View: LIRA decision support tool enables better long-range planning and budgeting," on Page 126.

Sensors will be critical to U.S. technical superiority in the future, and they're ubiquitous—just look at your smartphone. See how the U.S. Army Research, Development and Engineering Command's Communications-Electronics Center is working to create an integrated sensor architecture that can make the most of all that data in "Hybrid Threats, Hybrid Thinking," on Page 68.

As always, it's you, the reader, who makes this magazine possible. So we routinely reach out to our readership and ask for your opinions about how the magazine is doing. Now you can read the latest survey results, on Page 170.

For more coverage, please check out our online magazine at **http://usaasc.armyalt.com/**. And, if you missed the survey and have comments or questions, write me at **ArmyALT@gmail.com**.

Nelson McCouch III
Editor-in-Chief

DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

JANUARY–MARCH 2015

FEATURES

FROM THE AAE

ACQUISITION

LOGISTICS

SCIENCE & TECHNOLOGY

ON THE COVER

There is much we can't know about the future, even as we spend tremendous energy and intellect trying to envision it. From its new operating concept to Better Buying Power 3.0, the Army is planning for what the future will look like, a task complicated by uncertainty over potential adversaries and fiscal prospects. One thing we do know is that the future will be digital.

DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

JANUARY–MARCH 2015

FEATURES

ELECTRONIC EXTRAS

Even die-hard hard-copy readers will want to check out the electronic extras available on the app and online version of Army AL&T. Go to **http://usaasc.armyalt.com/** or use the iOS or Android app to view additional content related to the stories in this edition. The + icon in the electronic versions indicates additional content.

EDITORIAL STAFF

NELSON MCCOUCH III
Editor-in-Chief

MARGARET C. "PEGGY" ROTH
Senior Editor

ROBERT E. COULTAS
Departments Editor

STEVE STARK
Editor

CATHERINE DERAN
MICHELLE STROTHER
Layout and Graphic Design

Army AL&T magazine (ISSN 0892-8657) is published quarterly by the ASA(ALT). Articles reflect views of the authors and not necessarily official opinion of the Department of the Army. Articles 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:

RAYMOND T. ODIERNO
General, United States Army
Chief of Staff

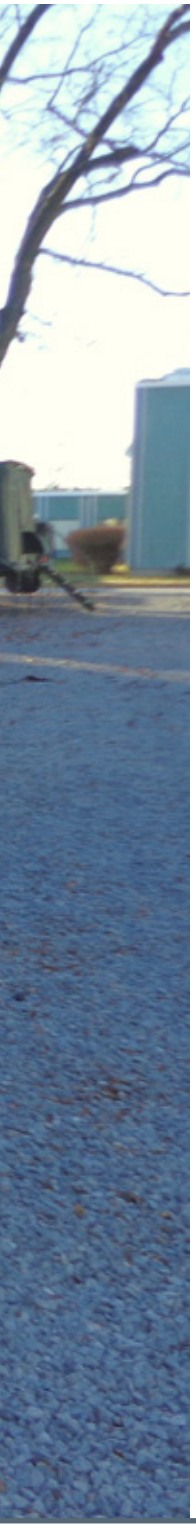
Official:

GERALD B. O'KEEFE
Administrative Assistant to the Secretary of the Army
1434606

ADVANCING FORCE PROTECTION

Researchers at the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC), with help from the Advanced Structures and Composites Center at the University of Maine, have developed the Improved Modular Ballistic Protection System, which protects against threats that are most likely to hit a base camp. Force protection is one of several high-priority areas in which the Army is working toward a leaner, more mobile force. (Photo by Karen Horak, NSRDEC Collective Protection Systems Team)

FROM THE ARMY ACQUISITION EXECUTIVE
THE HONORABLE HEIDI SHYU



Toward A More Expeditionary Army

Acquisition will pave the way to Force 2025 with smart modernization, S&T innovation

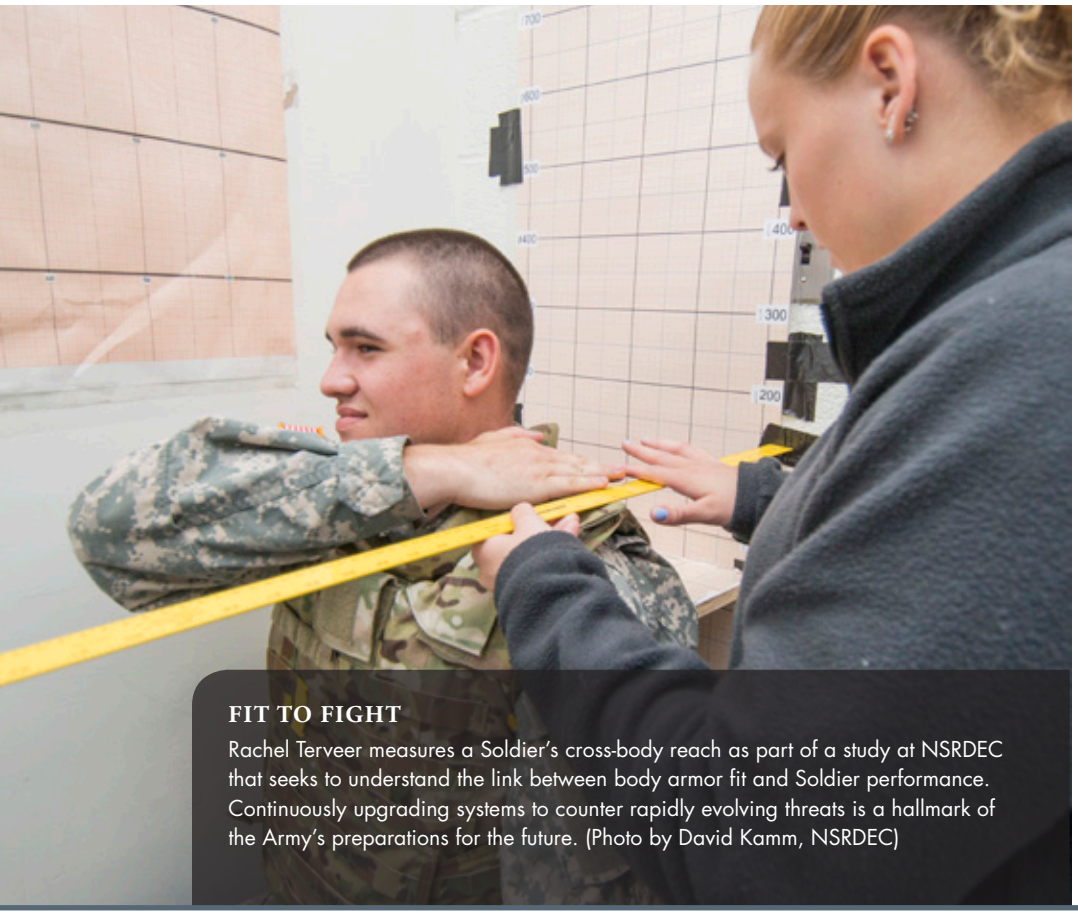
Throughout the United States Army's history, two fundamental and interwoven themes have emerged as constants. First, the threat landscape is governed by constant change. From the Colonial era to the present, change has remained the common denominator in the geopolitical climate facing our Army. This ever-evolving nature of threats has led to the second theme: The Army has always found strength when it learns to adapt. Adapting to and defeating each threat in its path has allowed the Army to maintain its dominance in any environment.

After more than a decade of war, now is the time to plant the seeds of readiness for future engagements. The global security environment facing the United States continues to change, prompting the Army to develop a strategy for maintaining a decisive land power advantage against unpredictable and unstable security situations.

While the Army's strength has been its adaptability, its weakness has been in its expeditionary structures. To dominate against any future threat, the Army must regain its expeditionary capabilities. The Army of tomorrow must shorten its logistics tail, allowing 50 percent faster deployment than the Army of today. I've challenged our workforce to find innovative ways to meet that goal by integrating smart choices into the service's operations, even in this time of fiscal constraint. With a near-term focus on "enabling an expeditionary Army," Force 2025 intends to shape the Army of the future by studying

STRONGER CONNECTIONS

The fleets of the 2nd Stryker Brigade Combat Team, 2nd Infantry Division and the 3rd Stryker Brigade Combat Team, 3rd Infantry Division, both based at Joint Base Lewis-McChord, WA, are converting from the line-of-sight, radio-based Enhanced Position Location Reporting System to the faster and more easily managed satellite-based Blue Force Tracking 2 network. The Army is working toward a vision for the end-to-end Network of 2025, which includes reducing the complexity of tactical and deployable networks. (U.S. Army photo)



FIT TO FIGHT

Rachel Terveer measures a Soldier's cross-body reach as part of a study at NSRDEC that seeks to understand the link between body armor fit and Soldier performance. Continuously upgrading systems to counter rapidly evolving threats is a hallmark of the Army's preparations for the future. (Photo by David Kamm, NSRDEC)

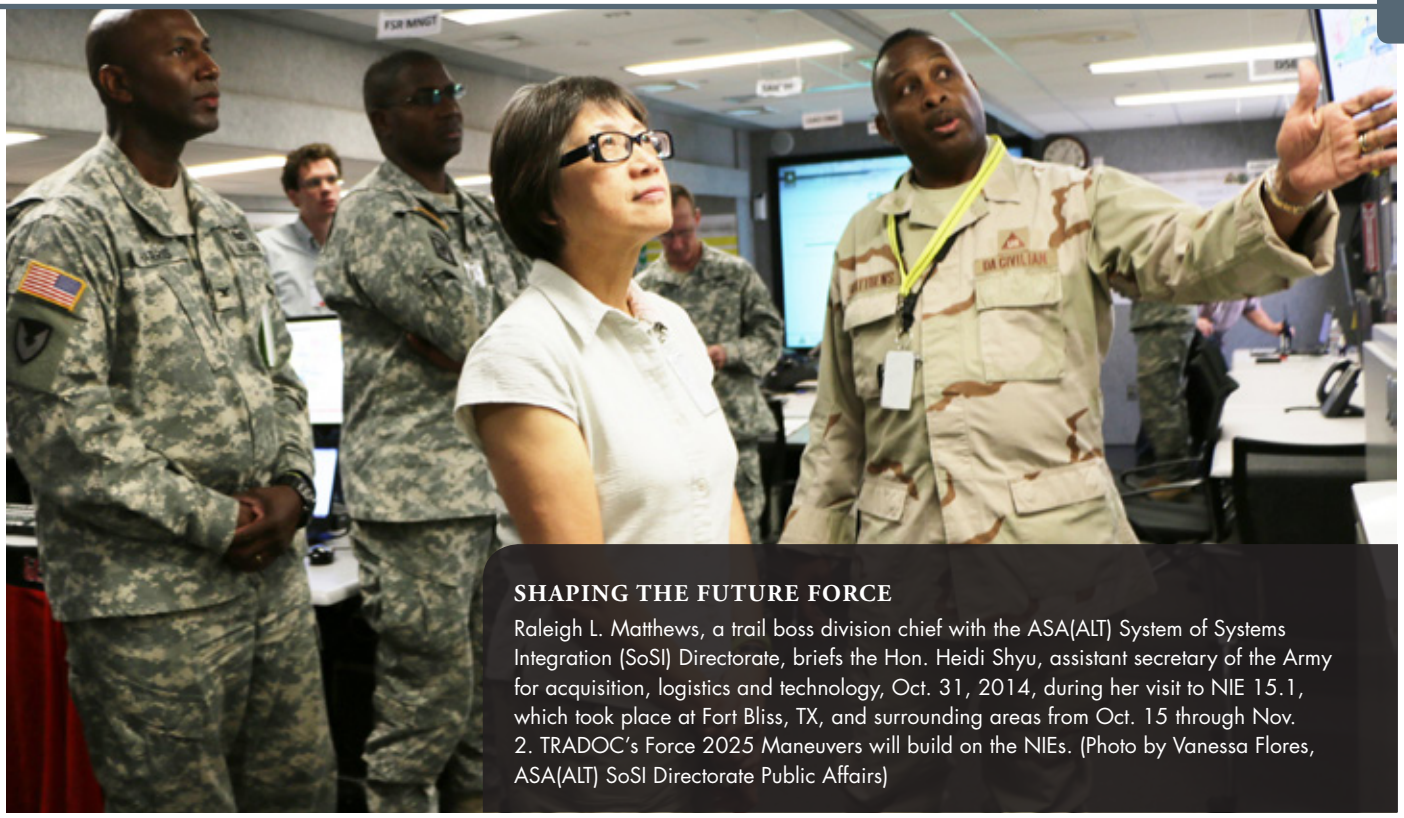
its current capabilities and making strategic assessments today. By 2025, the Army will be a leaner, more mobile and more lethal force, capable of responding to ever-changing security challenges.

Members of the materiel and acquisition enterprise will be key players in implementing the vision of Force 2025 by designing solutions to build up the expeditionary capacities of the Army. As we adapt to the "new normal" of budgetary uncertainty, we recognize the opportunities that the Force 2025 strategy affords us. We must leverage our science and technology innovations as a solution to increasing budget pressures. With a shrinking force, it is incumbent upon Army Acquisition to maintain its commitment to cost-efficient technologies in order to prevent a capabilities vacuum in the wake of ever-declining resources.

S&T: FULCRUM OF SUCCESS

Science and technology (S&T) development serves as the linchpin in making Force 2025 and Beyond a reality. With enhanced logistics and sustainability, manned-unmanned teaming and automated ground supply, we are heading toward a leaner force. With continued development of high-energy lasers, long-range fires and modular, active protection systems, we will help the Army safeguard its overmatch. With actionable intelligence and common, modular components architecture, we will continuously upgrade our systems to counter rapidly evolving threats.

The Army Acquisition Community looks forward to working alongside our Army and industry partners to build the expeditionary force of tomorrow by making smart choices today. The end state of Force 2025 depends upon the beginning. The early years of the Force 2025 framework—FY14 and FY15—have already



SHAPING THE FUTURE FORCE
Raleigh L. Matthews, a trail boss division chief with the ASA(ALT) System of Systems Integration (SoSI) Directorate, briefs the Hon. Heidi Shyu, assistant secretary of the Army for acquisition, logistics and technology, Oct. 31, 2014, during her visit to NIE 15.1, which took place at Fort Bliss, TX, and surrounding areas from Oct. 15 through Nov. 2. TRADOC's Force 2025 Maneuvers will build on the NIEs. (Photo by Vanessa Flores, ASA(ALT) SoSI Directorate Public Affairs)

begun to pave the way toward 2025 by shaping a culture of smart modernization and S&T innovation. We are working toward a leaner, more mobile force with effective, efficient and expeditionary Soldier capability in FY15. By 2025 and beyond, we will continue to enhance capabilities in areas including modular armor, integrated head protection systems, early-entry fuel distribution systems and integrated force protection.

THE ARMY HAS ALWAYS FOUND STRENGTH WHEN IT LEARNS TO ADAPT. ADAPTING TO AND DEFEATING EACH THREAT IN ITS PATH HAS ALLOWED THE ARMY TO MAINTAIN ITS DOMINANCE IN ANY ENVIRONMENT.

EXERCISES AND MANEUVERS

As a critical step toward implementation of this framework, the commanding general of the U.S. Army Training and Doctrine Command (TRADOC) and TRADOC's Brigade Modernization Command will lead a series of Force 2025 Maneuvers to evaluate the mobility, survivability and lethality capabilities of today's force.

These exercises are an important means to achieving the end state of Force 2025 and Beyond. They build upon the foundation of the semiannual Network Integration Evaluation (NIE), which assesses network capabilities in pursuit of doctrine, organization, training, materiel, leadership and education, personnel and facilities recommendations.

For over a decade, the Army's battle laboratory has been the battlefield itself. As operations in the field wind down, it remains critical for the Army to have the means to test technological developments and implement Soldier feedback. The NIE is an arena to rapidly evaluate the technologies and capabilities Soldiers employ in the field, providing battle-relevant analysis. Beyond guiding TRADOC toward the more enhanced expeditionary capabilities of the Force 2025 strategy, lessons learned from NIE also help the Army Acquisition Community develop effective, interoperable and sustainable systems for our Soldiers.

CONCLUSION

Force 2025 and Beyond incorporates the Army's legacy of adaptability and informs our decisions for achieving the Army of the future. The Army must modify its portfolio and increase its expeditionary, mobility and lethality capabilities while adapting to the rapidly evolving threats in an environment of declining resources. Army Acquisition is prepared to meet these challenges, and will continue to develop innovations that ensure that our Soldiers remain the decisive edge.

SPOTLIGHT:

Mr. Forrest W. Collier

A well-grounded dedication to Army aircraft

MR. FORREST W. COLLIER

COMMAND/ORGANIZATION:
Utility Helicopters Project Office, Program Executive Office for Aviation

POSITION AND OFFICIAL TITLE:
Product director for UH-60V (currently deployed on a 10-month U.S. Navy Reserve mobilization as a senior intelligence duty officer)

YEARS OF SERVICE IN WORKFORCE: 12

YEARS OF MILITARY SERVICE: 17, 7 in years in the U.S. Marine Corps Forces Reserve and 10 years in the U.S. Navy Reserve (currently serving)

AWARDS:
Defense Intelligence Agency Junior Officer of the Year (JOY); U.S. European Command Joint Analysis Center JOY; Information Dominance Warfare Officer pin; Joint Service Commendation Medal; Joint Service Achievement Medal; Navy and Marine Corps Achievement Medal; Selected Marine Corps Reserve Medal; and several Special Acts Awards as a Department of Army Civilian

EDUCATION:
M.S. in management and B.S. in mechanical/aerospace engineering, University of Alabama in Huntsville

Forrest W. Collier was born and raised in Huntsville, AL, to an aerospace heritage. So his destiny has always been in the air.

"My family came to the area in the early '50s as the early missile programs were getting started at Redstone Arsenal," he said. "My maternal grandfather served both as an Army officer and Army civilian on Redstone during the '50s and '60s. My paternal grandfather was a technician on the Redstone rocket program, and later on the Saturn V as part of the Apollo Space Program at NASA. My parents worked on the Apollo Space Program as government contractors, including the Saturn V program and the Apollo Lunar Rover program."

Collier said his family has had the strongest influence on his life and career. "Growing up in Huntsville, it was hard not to have an admiration for the aerospace industry; the fact that my family was directly involved in these major, historic programs made my interest in the field very strong."

When Collier was 19, he enlisted in the Marine Corps Reserve, which made a lasting impression that would greatly influence his future endeavors.

"I was fortunate to serve under several exceptional noncommissioned officers. These men made a strong impression on me, setting the example for professionalism, leadership, self-sacrifice and devotion to our country. These are qualities I have tried hard to emulate in my military and civilian careers," he said.

In 2004, Collier was selected for the Navy Reserve's Direct Commission Officer program and has since served the Navy as an intelligence officer.

"It has been a great experience, affording me the opportunity to serve in foreign countries, at sea, and to develop as a leader and professional. One prominent impact my naval service has had on me is an in-depth, continued awareness of the threats our country faces throughout the world. This awareness reinforces for me the critical value of a professional acquisition force and the important role we play as a largely civilian workforce in defense of our nation."

What do you do, and why is it important to the Army or the warfighter?

As product director within the Utility Helicopters Project Office, I led my team through a successful Milestone B for a new mission design series, the UH-60V Black Hawk. The UH-60V will modernize

the last remaining analog aircraft in the Army's fleet, while providing our Soldiers access to the global information grid over the next 30 years. My UH-60V office also recapitalized 40 Black Hawks for the Army, Air Force, foreign military sales and other government agencies. We also developed several programs for aircraft currently in the fight.

One of the most critical needs met was the immediate acquisition and fielding of equipment to units in the field, including replacements for the UH-60L Attitude and Heading Reference System. My team provided CAB [combat aviation brigade] commanders with increased capability by fielding these systems in a rapid fashion. CAB commanders have lauded this effort as "critical to the war effort" in writing and in briefings.

How did you become part of the AL&T Workforce?

I wanted to work in the aerospace industry. The Redstone Technical Test Center—now the Redstone Test Center—was hiring test engineers through the Army's intern program. After receiving my bachelor's degree in mechanical/aerospace engineering, I interviewed and was hired as a test engineer with the Airborne and Field Sensors Test Branch, responsible for system-level test planning, execution and reporting of Army aviation assets.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most, and why?

I became a member of the Army AL&T Workforce in 2002, with OEF and OIF [Operations Enduring Freedom and Iraqi Freedom] spanning my entire career. During this time, we have experienced an abundance of new requirements driven by the unique challenges of the counterterrorism problem set. The biggest change is the increase in our combat effectiveness because of the maturation of networking capabilities. The speed at which critical information can be gathered, assessed and communicated to support decision-making at all levels is unmatched in comparison with previous wars. The speed and effectiveness in meeting warfighter needs with materiel solutions that combat emerging threats and improve situational awareness and survivability have been the most impressive contribution from the AL&T Workforce.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

My greatest satisfaction is making tangible contributions to our nation's security. We serve as an enabler for our combat forces, continually increasing the lethality of our kinetic and non-kinetic capabilities while simultaneously improving survivability. Working in this field is both an honor and a responsibility, providing opportunities to enhance the security of our nation through the development of solutions that increase the odds of achieving mission success while improving the chances of a safe return. As a member of the reserve armed forces actively engaged in OCO [overseas contingency operations], I have witnessed the results of the AL&T Workforce's efforts and the superiority that those efforts have enabled in our fighting forces.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

During my AL&T career, we have enjoyed an abundance of financial and personnel resources, which have enabled the rapid development and fielding of materiel solutions. It is critical to our national security that we combat ever-changing threats within a financially constricted environment. We must enable and reward critical thinking. Growing a talented workforce will improve the efficiency in developing and acquiring new technologies and materiel solutions.

The government must refocus its efforts on those critical warfighter requirements that are derived from a national security strategy that effectively addresses our current and emerging threats. Partnering with industry to develop new contract structures that effectively spur innovation while incentivizing the control of cost growth will be critical in the future to maintain the same level of capability advancement within a resource-constricted environment.

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

The quality and breadth of dedicated active-duty [personnel], civilians and contractors that I have the honor of working with daily is something most people do not appreciate about the AL&T Workforce. My team is professional, dedicated and proficient, enabling the successful execution of daily combat missions through the modification of UH-60L Black Hawks for operations and OCO deployments in Africa and the Middle East. The most surprising part of my job is the size of the utility helicopter fleet (2,135 aircraft) and the number of roles and special mission sets it performs across the services and other government agencies.

—MR. ROBERT E. COULTAS

HACKING CYBER STOVEPIPES

To provide capabilities for Force 2025, ASA(ALT) adopts holistic approach

by Mr. Matthew Maier and Mr. Jerry Cook

Long-established financial institutions, popular American retailers, a major movie studio and even a large oil company: The list of the hacked continues to grow.

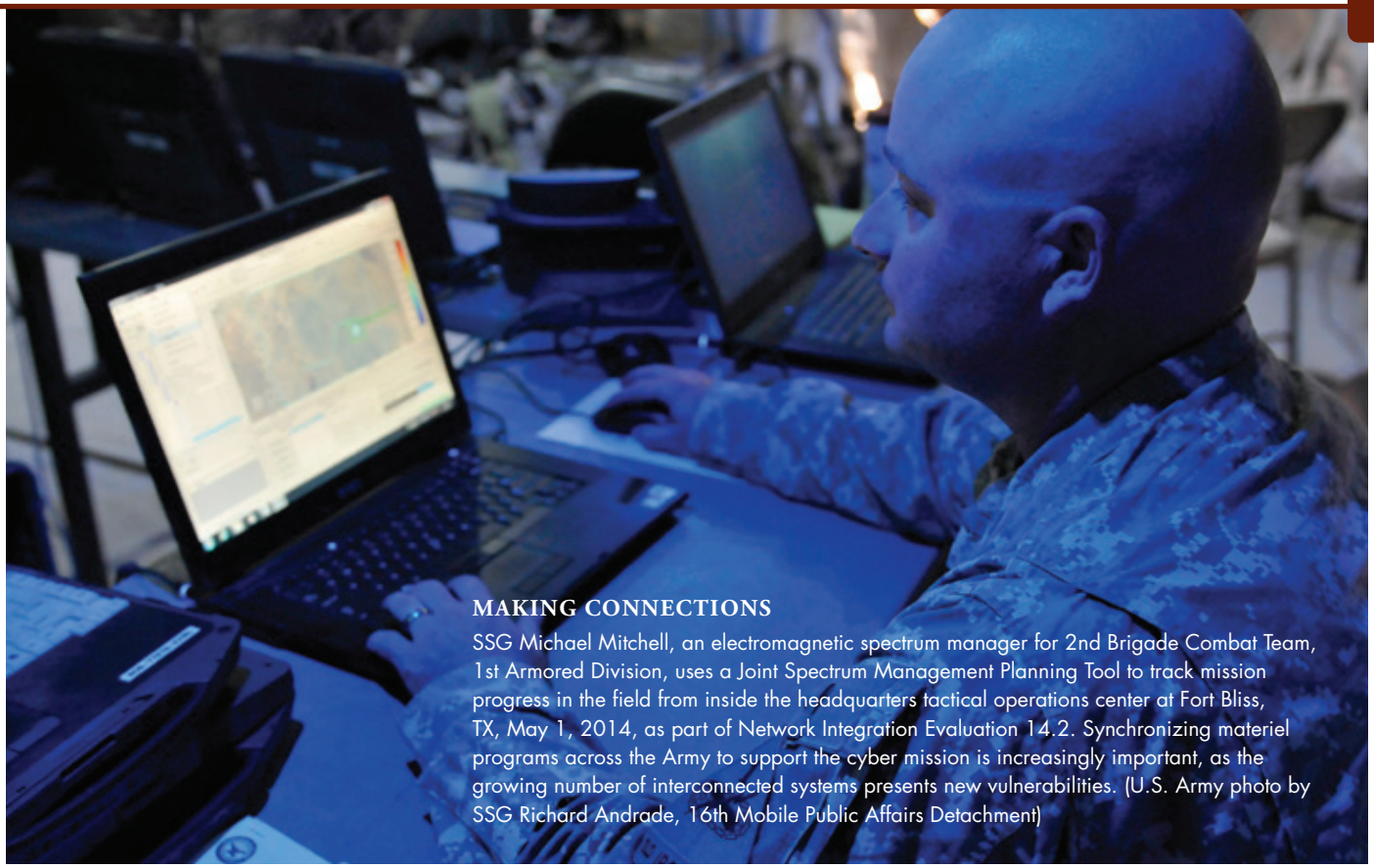
Even though businesses spend millions of dollars to protect their computer networks, hackers found vulnerabilities, got into the networks and in some cases went unnoticed for weeks or even longer. What's even more alarming—for everyone who relies on computer networks, including the U.S. military—is how hackers breached the networks.

At one financial institution, hackers reportedly gained access through a website for its annual charitable race, while a home improvement retailer discovered that attackers used custom-built malware—disguised as anti-virus software—to enter its system and evade detection for weeks. At another well-known chain, hackers gained access not by directly attacking the company's network, but by going through its heating and cooling vendor. At the oil company, malware was installed in the online take-out menu of a restaurant frequented by employees.

For industry, these attacks are disruptive, embarrassing and damaging to the bottom line. For the military, however, a war in cyberspace can be every bit as catastrophic as conventional warfare.

Recognizing the scope of the threat, the Army recently established cyber as a warfighting domain on a par with land, sea, air and space. The military vision for Army Cyberspace operations is to apply these capabilities as part of a combined arms approach in support of unified land operations. To meet new demands for cyber expertise, leaders stood up U.S. Army Cyber Command (ARCYBER), designated the Cyber Center of Excellence at Fort Gordon, GA, and created a new career management field focused on building cyber warfare expertise, blending signal and intelligence skills into the 17 series military occupational specialty.

To provide these cyber warriors with the tools they need to execute their complex mission, the community led by the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) has developed a comprehensive and coordinated approach to the development,



MAKING CONNECTIONS
SSG Michael Mitchell, an electromagnetic spectrum manager for 2nd Brigade Combat Team, 1st Armored Division, uses a Joint Spectrum Management Planning Tool to track mission progress in the field from inside the headquarters tactical operations center at Fort Bliss, TX, May 1, 2014, as part of Network Integration Evaluation 14.2. Synchronizing materiel programs across the Army to support the cyber mission is increasingly important, as the growing number of interconnected systems presents new vulnerabilities. (U.S. Army photo by SSG Richard Andrade, 16th Mobile Public Affairs Detachment)

procurement and delivery of cyber technology. This holistic, system-of-systems approach, combined with a rapid acquisition process, will allow the Army to reduce cyber vulnerabilities across its enterprise and tactical networks, while remaining responsive to emerging threats in support of Force 2025.

LAYING A COMMON FOUNDATION

On the acquisition front, 2014 proved a pivotal year. The ASA(ALT) community received and responded to 10 operational needs statements from ARCYBER to begin delivering initial capabilities. At the same time, it began establishing the resources and processes that will support cyber acquisition over the long term.

To ensure coordination across the Army's 12 program executive offices (PEOs), ASA(ALT) in February 2014 designated its Systems of Systems Engineering and Integration (SoSE&I) Directorate as Cyber Focal for acquisition, charged with synchronizing materiel programs across the Army to support major aspects of the cyber mission now and in the future. This synchronization is increasingly important as the Army's tactical, deployable network continues to draw more services from the Army's enterprise network—providing commanders with a dominating view of the battlefield, but also increasing the number of interconnected systems that a vulnerability could affect.

Currently, program managers and testers are responsible for scanning individual network systems to identify and mitigate vulnerabilities, but there isn't an overall system-of-systems approach to cybersecurity. That's critical, because only a system-of-systems approach can provide the real-time visibility required to monitor and ensure security across today's integrated network. The Army is aiming to match its new approach to cyber development and acquisition to the integrated nature of communications capabilities today and for Force 2025.

After creating the Cyber Focal office, ASA(ALT) immediately set out to act on the findings of a Lean Six Sigma project that targeted life-cycle processes. The ongoing initiative, which started in 2014, pulled together key stakeholders to initiate process improvement across the Army's certification, mission assurance, roles, responsibilities and compliance issues associated with its cyber acquisition plan.

The ASA(ALT) effort provides a "common language" of terms and goals when talking about Army cyber acquisition, allowing for better communication across organizations. It also identified 16 process improvements, now being implemented, that range from standardized patch management capabilities, to improving testing speed, to establishing standard contract language. These process improvements

will position ASA(ALT) to respond to the newly created Army and National Guard cyber units by leveraging newly improved processes, thus enabling rapid acquisition through synchronized requirements, acquisition and resources to deliver and sustain Army information systems and networks.

EQUIPPING THE CYBER FORCE

In bringing together the PEOs, ASA(ALT) is identifying interdependencies and interoperability issues among their many capabilities and systems to create a plan for equipping Force 2025 and Beyond. Three PEOs have key roles in supporting future cyber technologies: the PEO for Command, Control and Communications – Tactical (C3T), as the lead in defense of the tactical network; the PEO for Enterprise Information Systems (EIS), as the lead in defense of the enterprise network; and the PEO for Intelligence, Electronic Warfare and Sensors (IEW&S), as the lead in offensive cyber efforts. Together, the PEOs are advancing network and mission command modernization, which will simplify system integration while improving visibility in detecting cyber threats and enabling execution of defensive action in cyberspace.

For example, the Army is continuing to advance the Common Operating Environment (COE), which will dramatically improve interoperability and information exchange across the force while creating the agility necessary for the Army to deliver capabilities rapidly to address any contingency. The COE, an extensive system of systems that includes six computing environments (CEs) managed by PEOs across the ASA(ALT) community, increases security by converging more than 190 programs into the six CE software infrastructures, instituting common standards and streamlined software updates to reduce cyber vulnerability.

STATUS CHECK

Soldiers in charge of tech control at the 552nd Signal Company conduct an inspection, cross-checking equipment status with a circuit data card, March 13, 2014, at Camp Red Cloud, Uijeongbu, South Korea. By continuing to advance the COE, the Army will increase security; the COE converges more than 190 programs into the six CE software infrastructures, instituting common standards and streamlined software updates to reduce cyber vulnerability. (Photo by Korean Augmentation to the U.S. Army CPL Oh Jongsoo)

COE also builds on a common, cyber-hardened foundation of data. Today, when a tactical system receives and processes data, it applies its own validation rules, meaning that it determines how information should be classified. Most information initially receives the highest possible classification, called "system high," which then requires the operator to go through the time-consuming process of manually transmitting the appropriate data on the Non-secure Internet Protocol Router Network, Secure Internet Protocol Router Network and/or multinational networks.

The COE's unified data approach uses "cell level" classification, which automatically redacts the applicable information displayed on integrated systems so that the unauthorized user can see only the fields he or she has the clearance to see. By implementing information security measures at the data level rather than the system level, COE increases cyberprotection at the source without limiting interoperability. This approach also improves network resilience, or the ability to respond to and operate during a cyberattack, such that an adversary's penetration of Army systems and networks will affect less data, decreasing the attack's effectiveness and ability to degrade ongoing Army missions.

IMPROVED NETWORK DEFENSE

Currently, Army cyber experts have to react to threats that are coming at increasing volumes and intensity. But through architecture modernization, the Army of 2025 could see a leveling of the playing field, with defensive efforts empowered by a network that is cyberhardened, anticipates threats and is self-healing.

PEO C3T is working with ASA(ALT), PEO EIS and PEO IEW&S to map out key technology goals for systemic and active defense of the tactical network, to avoid wasting vital resources on stovepiped answers. The PEOs are also working closely with the science and technology community to identify cyber programs that are already in place and matching those to current and future capability gaps. One essential security measure is improving authentication standards through multifactor authentication, which will help mitigate basic user errors such as failing to change a system's default password. Moving beyond Common Access Card-based token authentication, the Army envisions a stronger but more streamlined multifactor authentication model without the need for a token-based system. Further down the line, the service will leverage emerging technologies that customize biometrics for the tactical world. For example, even though fingerprint access to computer systems is widely used in industry, it's impractical for Soldiers who wear gloves in the tactical environment.

The goal is to make authentication quick, accurate, simple for the Soldier and difficult to bypass. To address this, PEO C3T is working closely with the U.S. Army Communications-Electronics Research, Development and Engineering Center on various capabilities such as retina scanning, dynamic signature, speaker recognition and face recognition.

Another critical cyber technology imperative is integrated Network Operations (NetOps) capabilities, which are the tools that communications officers use to plan, initialize, monitor and manage the network. Over the past few years, the Army has reduced by more than two-thirds the number of NetOps systems used to run and operate the network for a brigade combat team.

The next step is continued convergence of these tools to achieve network visibility from the enterprise to the tactical level, achieving efficiencies and improving operational flexibility as well as providing the "big picture" perspective of the cyber threat. Integrated NetOps will significantly increase situational awareness of the cyber realm, allowing leaders in a tactical operations center a quick view of the health of tactical networks, key cyber terrain and other network assets. With enhanced NetOps serving as a key

VIRTUAL ATTACK

More than 1,200 communications professionals from 31 NATO and Partnership of Peace countries, along with European security partners, joined in exercise Combined Endeavor 14 in Grafenwoehr, Germany, Sept. 9, 2014. Combined Endeavor, the world's largest multinational command, control, communication and computer systems exercise, included virtual attacks to test security capabilities. (Photo by Sgt Derrick Irions, U.S. Marine Corps Forces Europe and Africa)

enabler for the Force 2025 network, the Army will continue to apply the system-of-systems approach, integrating tools within and between the tactical and enterprise domains to boost security for the holistic network.

ENABLING RAPID CYBER RESPONSE

In addition to the COE, stronger authentication, integrated NetOps and other steps to harden the network architecture, the acquisition community is establishing a process to enable quick and proactive insertion of cybertechnology when it becomes available. The Cyber Focal office envisions a combination of multiple, agile acquisition methodologies that would provide the capacity to send cyber capabilities out quickly—within months, days or even hours—after a threat is identified. This capacity relies on having funding in place, programs of record established, contracts signed and people ready to respond. While this is not an easy task, the acquisition community's early successes in quickly aligning resources to address the operational needs statements from ARCYBER provide a template for improved responsiveness in the short term. The Army continues to lay the groundwork for agile procurement over the long term by identifying resourcing and contracting methods, while coordinating across the development community to identify and transition promising research and development technologies.

Another key process improvement to enable the cyber mission for Force 2025 involves security patching for networked systems. Today, these updates are sent out in cycles that can take months, and often require manual touch-labor installation on-site at unit locations. The Army's goal is to drastically reduce that time, logistics burden and vulnerability by providing increased automation of scanning and remediation of threats. The effect will be much shorter cycle times to maintain an adequate security posture.

This would take place by pushing out patches remotely through a secure portal, where fielded Army systems then download them automatically and combatant command leaders make risk-based decisions guiding implementation of system updates and patching, typically based on mission priorities. Such a process would allow ASA(ALT) and other Army system owners to reduce management overhead associated

CYBER MINDSET
The acquisition community is building cybersecurity into its modernization plans—developing new technologies that better protect information, training the workforce to recognize threats, and creating the enduring organizational structures that will enable the Army to respond to the unexpected. (Photo by Ryan Myers, PEO C3T)

with security patching while maintaining increased agility and security. The next step, moving beyond automated vulnerability management, would be network systems that are self-healing, so a system not only recognizes when it has been hacked, but also knows how to bypass or shut down the compromised part of the system until a patch is deployed.

CONCLUSION

Information dominance is an integral part of the Army mission—today and tomorrow. But cyberthreats demand new approaches. To address these challenges and increasingly operationalize the cyber domain, ASA(ALT) and the PEOs are actively structuring technology development, acquisition and delivery to better secure the Army network across the enterprise.

By anticipating future challenges and working together with a system-of-systems mindset, the Army Acquisition Workforce can provide our Soldiers timely cyber capability with an increasingly hardened, interoperable and global network that supports the secure information-sharing environment for Force 2025 and Beyond.

For more information, go to ***http://www.army.mil/asaalt/*** *or* ***http://peoc3t.army.mil/c3t/****; or view the video of the Oct. 15, 2014, Institute of Land Warfare forum "Increasing Cyber Capabilities for the Army" at the Association of the United States Army Annual Meeting & Exposition, at* ***http://www.dvidshub.net/video/366966/contemporary-military-forum-10-cyber-capabilities****.*

MR. MATTHEW MAIER is director of the ASA(ALT) Cyber Focal office in SoSE&I. He holds an M.S. in systems engineering from George Mason University and a B.S. in electrical engineering from Virginia Tech. He is Level III certified in program management, systems engineering, and test and evaluation, and is a member of the Army Acquisition Corps (AAC).

MR. JERRY COOK is a special projects officer in PEO C3T. He holds an M.S. in executive engineering from the University of Pennsylvania and a B.S. in electrical engineering from the University of Texas at San Antonio. He is Level III certified in program management, test and evaluation and engineering, and is a member of the AAC.

TESTING THE WATERS

ATEC, PEO C3T explore new paradigms for testing emerging technologies

by MG Peter D. Utley and MG Daniel P. Hughes

For as long as there has been a professional Army, there has been testing to make sure Soldiers get weapon systems that work. We are experts at testing tanks and trucks, howitzers and helmets, antennas and ammunition. But what about an Android app, downloaded in the field to a ruggedized smartphone or tablet? Or a commercially developed radio that adds range and drops weight every other year?

These are the questions the Army test and acquisition communities are tackling today to align our testing approaches to the innovative and adaptable systems that will support Force 2025. Equipping the future force to prevail over emerging challenges will require agility in how we deliver new capabilities, especially in the rapidly progressing realm of network, mission command and cyber. Smart, agile testing is a critical ingredient for these programs' success, and the U.S. Army Test and Evaluation Command (ATEC) is partnering with program executive offices (PEOs) to establish constructs that maintain testing rigor and independent evaluation while responding to the realities of new technology.

Striking this balance will help reduce testing time and cost to the Army and enable us to maintain overmatch against our adversaries. But while these efforts are informed by years of testing knowledge, recent process improvements and lessons learned from the Network Integration Evaluation (NIE) and other events, some technologies push the boundaries of previous experience. With limited military precedent for acquiring and testing these types of capabilities, ATEC and PEO Command, Control and Communications – Tactical (C3T) are combining models from the commercial world, our own best practices and select test cases to lay the groundwork for smart testing for the future.

TACTICAL APPS

When you download a new app to your smartphone, you don't run tests on the phone each time—you trust that the app has been validated and will add new capability to an already functioning system. To provide a similar experience for Soldiers, the Army is establishing a battle rhythm and the supporting technology framework that will allow us to build and deliver tactical apps for various mission functions as needs arise. With the advance validation of the hardware devices and software frameworks hosting the apps, government and industry developers can leverage approved software development kits and style guides that exist or are being implemented for various computing environments.

This approach allows a variety of organizations to create and sponsor apps, while making sure that they are building to the appropriate standard—much like Apple's iOS, Google's Android or another operating system would serve as the "broker" to ensure

SYNCING UP

Soldiers with the 2nd Heavy Brigade Combat Team, 1st Armored Division synchronize their communications equipment before boarding a CH-47 Chinook helicopter during NIE 14.2, held in April 2014 at Fort Bliss. The Army's new NIE construct supporting Force 2025 will make disciplined use of test resources while continuing to incrementally modernize the network for the future force. (Photo by SSG Richard Andrade, 16th Mobile Public Affairs Detachment)

LOGGING ON

SPC David Moor, a cavalry scout with the 2nd Heavy Brigade Combat Team, 1st Armored Division (2-1 AD), uses the JBC-P system inside a Mine Resistant Ambush Protected vehicle during NIE 14.2. JBC-P hosts the MACE framework that enables organizations to build tactical apps quickly for the Android environment. (Photo by SSG Richard Andrade, 16th Mobile Public Affairs Detachment)

that a new feature does no harm to the existing product.

The focus then becomes tailoring the level of testing to the nature of the app itself, whether it is a complex integrated-fires app or radio-configuration app, or a simpler sunrise-sunset app, calculator or training vignette. Some apps are essentially stand-alone capabilities, such as a calculator, while others need to interface with other data, such as pulling GPS location information and other services from the Joint Battle Command – Platform (JBC-P) system. This wide variety means that the program manager or other app sponsor needs to work closely with the testing counterpart early in the development process to determine the risk-reward trade-off and the best test approach.

We will also take into account the app's life expectancy. An app showing Soldiers how to identify symptoms of a specific disease outbreak, for example, would probably have a shorter shelf life than an app for fires coordination. The goal is a cooperative assessment between the materiel developer and the testing experts of what's required for each capability, so that the Army can deliver technologies more quickly and still provide confidence that they're going to perform as needed for the Soldier, without overburdening the testing process.

All apps will be vetted in the developmental testing and laboratory environment for functionality and security. Those that interface with other systems will also receive an interoperability assessment before fielding. For the more involved apps that also require an operational test, our goal is to establish a cycle wherein

apps can be tested in batches a few times a year, allowing sponsors and testers to pool resources and reduce costs.

These tests will vary in location and complexity depending on the capabilities involved. The Army will structure the scenarios and survey questions to obtain data and user assessments focused on the new apps, so that we can determine whether the apps meet requirements and that the Soldier obtained the desired results. This battle rhythm, planned for implementation in the next few years, will allow us to develop, test and deliver tactical apps within a year, and sometimes faster when needed for a rapid response. That may still sound like an eternity compared with the commercial world, but it will allow us to maintain safety and security for Soldiers while offering a vast improvement over today's four- to five-year cycle for mission command capability.

An early example of the new model is the On Demand Information Networking (ODIN) application developed for the Mounted Android Computing Environment (MACE), a standard framework hosted on JBC-P that enables organizations to build tactical apps for the well-known Android environment. The familiarity of Android makes the apps easier for Soldiers to use and for developers to build. Through MACE, the apps are developed once and are capable of running on multiple hardware platforms at multiple echelons and across multiple networks. In 2014, this framework enabled PEO C3T's project manager for tactical radios (PM TR) to quickly prototype ODIN, which is designed to allow Soldiers to dynamically connect radio networks over the air, reducing to three clicks and three minutes a process that now requires several days and even weeks to plan and execute.

READY FOR TRACKING

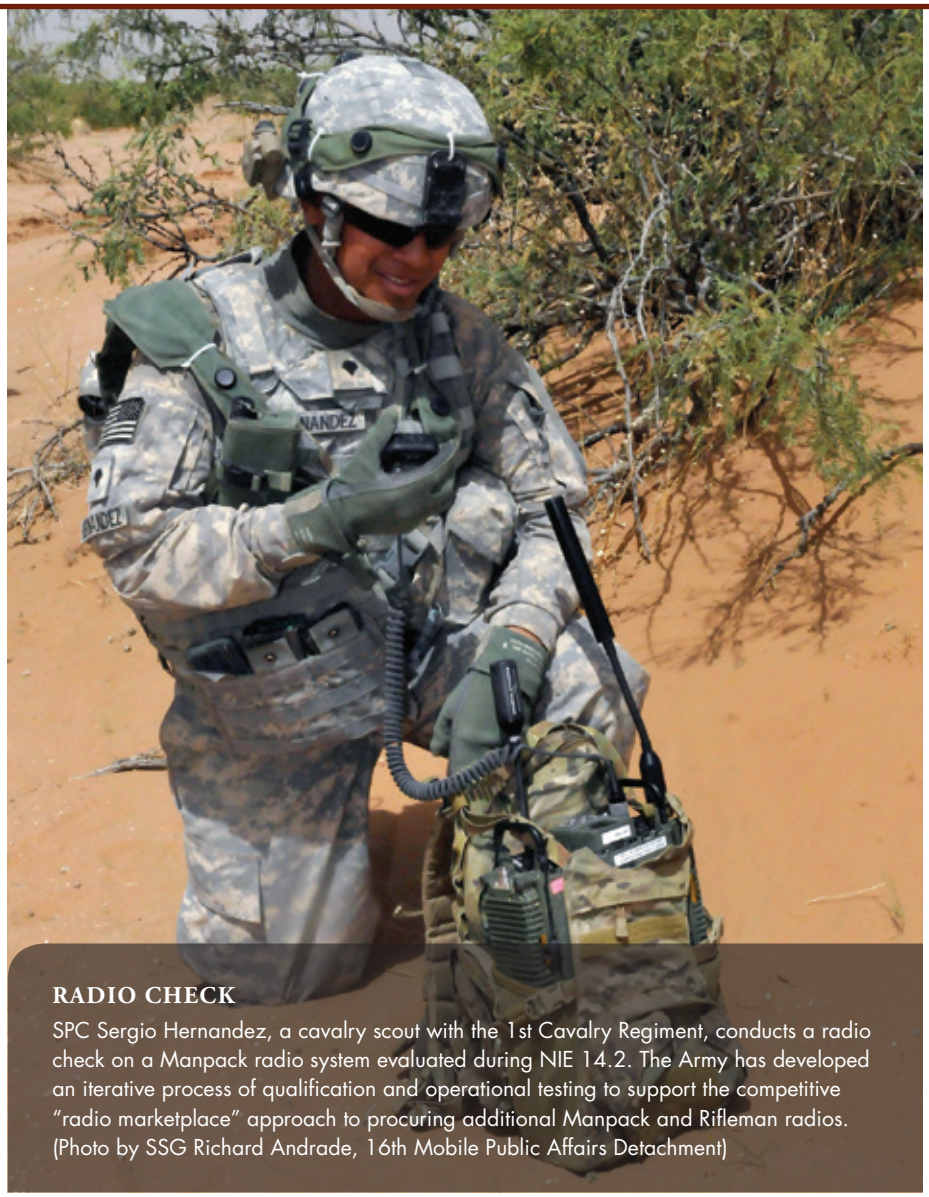
A Soldier accesses JBC-P mapping capability on a ruggedized tablet. The level of testing for tactical apps will be tailored to the capability; some apps are essentially stand-alone, while others need to interface with other data, such as pulling GPS and location services from JBC-P. (Photo courtesy of DRS Technologies Inc.)

EVALUATION EVOLVES

Soldiers drive a vehicle equipped with Warfighter Information Network – Tactical Increment 2 during NIE 15.1 in October 2014. The Army recently revised the construct for the NIE, which in FY16 will become an annual event that focuses on program-of-record testing. The new Army Warfighter Assessment, also held at Fort Bliss, will replace the other semiannual NIE event. (U.S. Army photo by Amy Walker, PEO C3T)

Unlike a stand-alone app, ODIN does not just ride on a computer and interface with an operator—it needs to share and display information across the network so that users can view and join available radio nets. As PM TR personnel worked to create ODIN, they not only applied the MACE standards, but also interacted regularly with PM Mission Command within PEO C3T to determine what information the app would need to pull from and push across the Blue Force Tracking network; how it would function in bandwidth-disadvantaged environments; and how it would connect with other aspects of the JBC-P system.

This team effort extended into risk reduction in the integrated laboratories at Aberdeen Proving Ground, MD, followed by an operational assessment with ATEC and Soldiers at the NIE 15.1, which began in October 2014 at Fort Bliss, TX, and White Sands Missile Range, NM. In all, ODIN took less than a year from idea to test. As the Army moves forward to formally evaluate the host MACE framework itself over the next year, we are documenting lessons learned from the ODIN experience to help shape future agile app development and evaluation for the MACE infrastructure.



RADIO CHECK
SPC Sergio Hernandez, a cavalry scout with the 1st Cavalry Regiment, conducts a radio check on a Manpack radio system evaluated during NIE 14.2. The Army has developed an iterative process of qualification and operational testing to support the competitive "radio marketplace" approach to procuring additional Manpack and Rifleman radios. (Photo by SSG Richard Andrade, 16th Mobile Public Affairs Detachment)

RADIO MARKETPLACE

Another area of technology that demands a new testing approach is the emergence of software-defined tactical radios, which use high-bandwidth waveforms to transmit and receive voice, data, video and other information across great distances and beyond line of sight. Approved by the Office of the Secretary of Defense, the Army's acquisition strategy for the Handheld, Manpack, Small Form Fit Rifleman and Manpack radios does not follow the traditional structure of development, test, achieving full-rate production and then buying large quantities of a system from a single vendor. Instead, the strategy calls for a "radio marketplace" in which multiple qualified vendors will compete for smaller-quantity delivery orders on a regular basis, driving innovation through competition.

The purchase of nondevelopmental-item commercial radios for military operations is possible because the radios will use secure, standard waveforms that are owned by the government, certified by the Joint Tactical Networking Center and made available to run on multiple hardware models that industry produces. But while comparisons to smartphones exist in the commercial communications market—with most consumers upgrading their cellphones every few years as both phone and networking technology evolve—the radio marketplace concept is new territory for the Army.

To support the strategy, the Army has developed an iterative process of qualification testing and operational testing that will allow for maximum vendor participation and flexibility for technology to evolve in areas such as weight, range, processing power and battery life. Each vendor who wins a Rifleman or Manpack radio contract will first provide a limited

number of radios to participate in a qualification test, involving straightforward lab and field assessments in a controlled environment. Products that meet specifications will proceed to an operational test featuring Soldier scenarios in a more dynamic environment. The operational test results will inform the Army's selection of vendors, who will then compete for delivery orders for each radio.

The strategy also includes on-ramp opportunities for vendors whose technologies mature significantly following the first round of tests, and the Army is developing the protocols to support that process. We must also be able to tailor the tests to focus on specific new features—such as greater range, processing power or battery life—as they emerge on the market, without neglecting the rest of the system. As with apps, the key to successful testing supporting the radio marketplace will be flexibility and communication between the acquisition and test communities, so that we can decide in partnership how to match the process to the product.

THE ARMY HAS DEVELOPED AN ITERATIVE PROCESS OF QUALIFICATION TESTING AND OPERATIONAL TESTING THAT WILL ALLOW FOR MAXIMUM VENDOR PARTICIPATION AND FLEXIBILITY FOR TECHNOLOGY TO EVOLVE IN AREAS SUCH AS WEIGHT, RANGE, PROCESSING POWER AND BATTERY LIFE.

FACING THE FUTURE TOGETHER

Aside from specific capabilities, we have taken other steps to deepen the acquisition-test partnership that the future force demands. For example, we are holding regular summits and methodology discussions that unite program managers and test experts as well as affected Army commands, to foster dialogue and increase understanding of various areas including cyber and the collection of reliability, availability and maintainability data.

By helping program offices grasp different test techniques and boosting testers' knowledge of the technologies they will evaluate, these sessions contribute to successful test preparation and execution, saving time and cost. Additionally, as the Army continues to refine its cyber mission, assign responsibilities and identify needed capabilities, we will need to apply smart testing and procurement principles so we can rapidly respond to and correct vulnerabilities. ATEC, U.S. Army Cyber Command and PEOs that provide defensive and offensive cyber capabilities are contributing to an overall test strategy to better examine cyberprotection early and often at the system-of-systems level.

CONCLUSION

We are also moving forward together to execute the Army's revised construct for the NIE. Beginning in FY16, it will become an annual event focused on program-of-record testing. The new Army Warfighter Assessment, also held at Fort Bliss, will take the place of the other semiannual NIE event and provide a more experimental venue to focus on doctrinal development supporting new technologies for Force 2025 and Beyond.

While Army leadership is still finalizing several details of the transition, we believe the new approach will make disciplined use of test resources while continuing to modernize the network incrementally for the future force. Like other initiatives to support Force 2025, the future NIE construct will require the acquisition and test communities to adapt in several areas, from the timing of risk reduction and training to holding tests at other venues so that we continue to meet milestones. In all of these cases, it is our role to work together to provide the agility that will translate the 2025 vision into reality.

For more information, visit ***http://www.atec.army.mil/*** *or* ***http://peoc3t.army.mil/c3t/****; or the articles at* ***http://www.army.mil/standto/archive_2014-10-21/****,* ***http://www.army.mil/article/125511/*** *and* ***http://www.army.mil/article/127310/****.*

MG PETER D. UTLEY is the commanding general of ATEC. He holds an M.A. in national security and strategic studies from the U.S. Naval War College and a B.S. in biology from The Citadel, the Military College of South Carolina.

MG DANIEL P. HUGHES is the PEO for C3T. He holds an MBA from Oklahoma City University, an M.S. in national resource strategy from the Industrial College of the Armed Forces and a B.A. in political science from the University of Texas at Arlington. He is Level III certified in program management and a member of the Army Acquisition Corps.

Q&A: SMART TEST PREP

Warfighter Information Network – Tactical (WIN-T) Increment 2 is the mobile backbone of the Army's tactical network, providing mission command on-the-move and extending the network over vast distances and difficult terrain. The system completed its follow-on operational test and evaluation (FOT&E) 2 during the Network Integration Evaluation (NIE) 15.1 in October-November 2014. Results will inform a full-rate production decision in spring 2015. COL Ed Swanson, project manager for WIN-T, and LTC LaMont Hall, product manager for WIN-T Increment 2, discuss how the program prepared for this major test.

ARMY AL&T: Tell us about the role of the developmental test (DT) 1 and DT 2 held earlier in 2014 as building blocks to get ready for the FOT&E 2.

LTC HALL: These were really developmental tests in name only. We worked hard with our counterparts in the test community to replicate the rigor and methods typically found in an operational test. The first DT was completed at Aberdeen Proving Ground (APG), MD, in late February in snowy, cold, wet and windy conditions, and involved Soldier operators who used almost a brigade's worth of equipment in a tactical environment. The event featured eight days of record test, approximately 800 training hours and 21 network nodes, including 16 mobile nodes that drove 8,000 miles during the test.

COMMANDING PRESENCE

A vehicle equipped with a WIN-T Increment 2 Point of Presence supports mission command on-the-move during the FOT&E 2 conducted at White Sands Missile Range in October 2014 during NIE 15.1. Results will inform a full-rate production decision in spring 2015. (U.S. Army photo by Amy Walker)

The second test was even more extensive, covering more than 1,250 miles a day in the scorching June heat of White Sands Missile Range, NM. To help capture data during the DT2, the Army installed a complete suite of instrumentation on each WIN-T Increment 2 equipped-vehicle, which monitored the entire network and the performance of each system. Hundreds of gigabytes of data per day were collected and sent back to APG for analysis.

U.S. Army Test and Evaluation Command personnel rode in each WIN-T Increment 2 vehicle and noted all operations during mission threads. For both DT events, the instrumentation and various data collection methods monitored the performance on the back end, while Soldiers provided continuous feedback through daily after-action reviews on the front end.

Our goal with the discipline, design and intensity of the DTs was to collect critical system performance data and valuable Soldier feedback on system usability improvements, and to avoid surprises once we began the FOT&E 2. You can never predict exactly what you'll encounter in an operational test, but you can eliminate a lot of potential issues by doing the legwork upfront.

ARMY AL&T: Before the FOT&E 2, WIN-T Increment 2 participated in two other large-scale operational tests in the NIE environment. What lessons learned from those experiences did you apply to the latest test?

LTC HALL: From Soldier feedback at previous NIEs, we recognized that we needed to simplify the system in terms of startup, shutdown, operation and troubleshooting, so we redesigned

NEW APPROACHES

A full battalion of networked Stryker vehicles participate in the WIN-T Increment 2 FOT&E 2, which led to new TTPs to support mission-specific uses of the system. (U.S. Army photo by Amy Walker)

the user interface to make it much more intuitive across the board. Training is always a challenge when preparing for an operational test at an NIE event, when Soldiers are being asked to learn many systems at once. Each time we came back through the NIE, we refined our training approach based on user feedback—primarily by incorporating more hands-on training and refresher courses to get at the realism and repetition the Soldiers need to be successful once they're out in the field.

COL SWANSON: Another related lesson learned was that you can't just focus on your own system. At NIE there are typically dozens of other systems and technologies playing a part in the exercise, and even small adjustments to one of them can affect your system's performance—so a very disciplined configuration management process that is strictly adhered to is a key to success. Going into the FOT&E 2, we brought a holistic focus to all of the systems that were scheduled to participate in NIE, conducted detailed risk assessments and impact analysis both internally within the PM and across the PEO, and held regular configuration management sessions and integrated system readiness reviews to identify cross-product dependencies and reduce risk before the test. This paid off when we completed the pre-NIE validation exercise phase and delivered a functioning network, with all operational threads validated, to the unit two days early—a first for the Army in the NIE process.

ARMY AL&T: How have the tests helped shape new tactics, techniques and procedures (TTPs) for using WIN-T Increment 2 in the field?

COL SWANSON: As program managers, we design, build and test to requirements, but we really rely on the users to take that system and adapt it to the realities of day-to-day operations. It's been fascinating to watch the capability set-fielded units and the NIE units adapt the technology and develop TTPs to meet their unique needs. In Afghanistan, we saw units adapt the Soldier Network Extension (SNE) from a company command vehicle into a mobile, ad hoc network hot spot providing reach-back connectivity for multiple personnel. They would drive the vehicles where they needed to go, whether it was a remote forward operating base where they were taking down fixed network infrastructure or a polling place during the Afghan elections, and plug in multiple laptops for email, chat and portal access, as well as the ability to make Voice over Internet Protocol satellite calls.

LTC HALL: We've seen field artillery units take the SNEs and connect them to their radar systems in order to pass time-sensitive targeting data back to the fire control centers. This has eliminated the requirement to set up, monitor and protect two to three line-of-sight radio retransmission antenna sites. For several missions, the kill-chain timeline was 10 times faster when using the WIN-T Increment 2 satellite network compared with previous times when using the line-of-sight Single Channel Ground and Airborne Radio System data and voice network. These and other new TTPs are an important aspect of testing: The more experience Soldiers get with the system in an operational environment executing their combat missions, the more they—and we—understand what it can do for them.

ARMY AL&T: Is there anything else you would like to add that might benefit other program managers preparing for major test events?

LTC HALL: It is critical to get Soldier feedback on your system as early as possible in program developmental test events that are conducted in operationally realistic environments, as you prepare for your operational test. This will help to minimize the surprises during the actual operational test. Obtaining stakeholder buy-in for your test plan in advance; limiting the scope of the test to critical requirements; identifying, prioritizing and then mitigating risks to the operational test; and pretesting the most difficult test objectives are some other areas that may help program managers prepare for major test events.

UBIQUITOUS BANDWIDTH

With the Army's new EMC2, members of the 82nd Airborne Division, such as these Soldiers on board a C-17, will have in-flight Internet and mission control capabilities as they support the joint Global Response Force. Beginning in early 2015, EMC2 will provide commands with applications such as Command Post of the Future as well as access to video teleconferencing, VoIP calls, and intelligence, surveillance and reconnaissance feeds from unmanned aerial vehicles. (Photo by TSgt Bradley C. Church)

ALWAYS CONNECTED

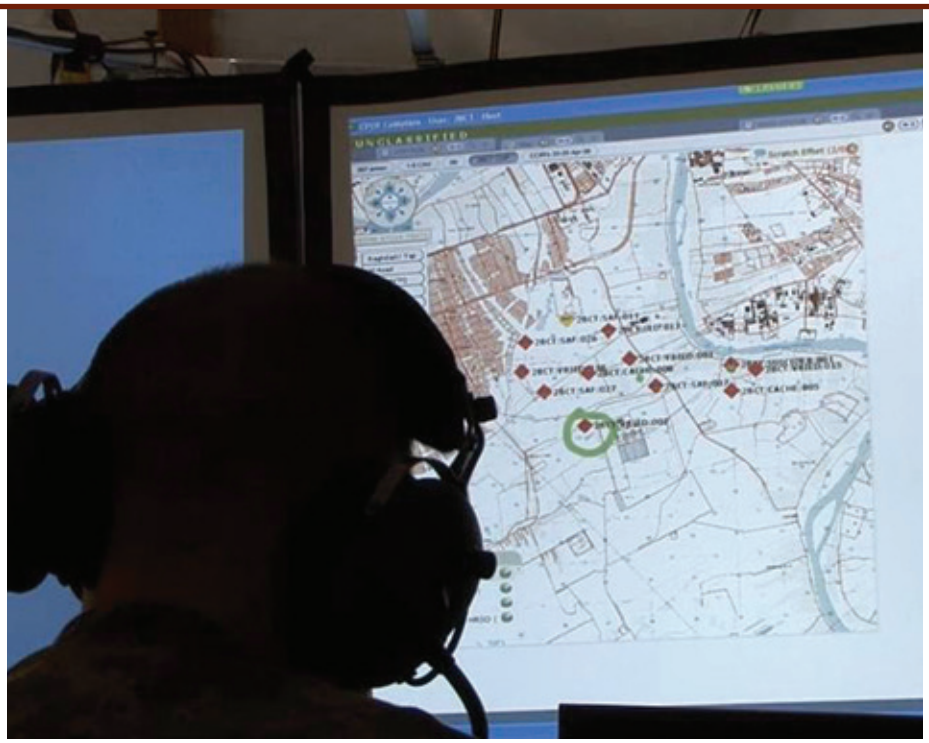
Satellite communications network enables more expeditionary Army to move beyond the FOB

by Mr. Darren LeBlanc

For the past 13 years, much of the Army fought from forward operating bases (FOBs). The FOBs housed command posts with well-established network infrastructure, which served as an information "home base" for troops between patrols. That approach was well-suited to the operational environment and counterinsurgency mission in Iraq and Afghanistan, but future contingencies and support operations—even the current Ebola response mission in West Africa—demand more flexibility. Command posts must be smaller and more agile to support rapid deployment. Forces must be able to connect to critical information while en route to a developing situation. Network systems must be integrated on vehicle platforms of all shapes and sizes, so Soldiers can communicate on-the-move, regardless of location or echelon.

To meet these challenging requirements, the Army's tactical communications network backbone, Warfighter Information Network – Tactical (WIN-T), is also evolving beyond the FOB. By harnessing new technologies and optimizing current capabilities, the future network, with WIN-T serving as its communications pipeline, will enable a globally responsive force to seamlessly communicate from any location, linking the foxhole to the enterprise. Armed with advanced network communications, future forces will be able to quickly and simultaneously address multiple contingencies in every environment. For example, should concurrent military or humanitarian support be needed in the deserts and mountains of the Middle East, the jungle terrain of the Pacific Rim, frigid environments in northern Asia and the urban environments of developing nations, the Army will be able to adapt the network to support the unique information needs of each situation.

The satellite-based WIN-T network is essentially the Soldier's anywhere, anytime Internet service, providing the tactical communications network backbone to which other networked systems and applications need to connect in order to function. WIN-T provides the data "pipe" that enables Soldiers to access redundant, reliable forms of communication and mission command applications, both at-the-halt and on-the-move, at the farthest tactical edge. Commanders can be untethered from their command posts



TOOLS OF THE EXPEDITIONARY TRADE

Communications officers use network operations (NetOps) tools to plan and manage the tactical communications network. The Army's NetOps convergence efforts aim to achieve network visibility from the enterprise to the tactical level, while reducing the number of tools required to do so, as well as the tools' size, weight and power consumption. (U.S. Army photo)

to lead from anywhere on the battlefield, and Soldiers can exchange critical situational awareness between upper and lower echelons. WIN-T's satellite capability extends tactical radio networks beyond line of sight, keeping Soldiers connected over vast distances and terrain obstructions to significantly expand their operational reach.

Improvements to WIN-T are part of the Simplified Tactical Army Reliable Network (STARNet) road map that lays out the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T) system-of-systems portfolio from today through 2021 by identifying opportunities for injecting capability upgrades to enable the Army's Force 2025 network. STARNet seeks to address current and future network and mission command requirements by delivering advanced technology improvements with enduring characteristics such as agility, simplicity, increased capacity, security and affordability—all of which will help the Army win in a complex world.

AGILE COMMAND POSTS

To support the operational imperatives of Force 2025 and Beyond, the Army is pushing to simplify its command-post configurations and reduce setup and teardown time to increase agility. Currently, brigade command posts require significant cabling that must be transported, laid out, bundled and plugged into servers. The Army recently introduced Wi-Fi coverage for the command post, which removes a multitude of those cables and allows Soldiers more computing mobility. In addition, an encrypted 4G LTE infrastructure that can cover an entire FOB provides a high-bandwidth connectivity option for hand-held devices and frees leaders from the command post, giving Soldiers remote, secure network access to multitask with enterprise services applications and to join phone and video teleconferences anywhere on the FOB.

An early version of the networking equipment required to create a wireless command post includes four components and weighs 396 pounds. The future small-form-factor solution now under development by WIN-T has two components and weighs 86 pounds, reducing setup time, complexity and the burden on Soldiers.

Another technical enhancement supporting more agile command posts is the ability to virtualize hardware components, so that a physical piece of hardware becomes a weightless piece of software. Virtualization is enabling the Army to improve network performance, simplify network operations, and reduce size, weight, power and cooling (SWaP-C) requirements for command posts and vehicles.

One such effort, the WIN-T Increment 1 End-Of-Life (EOL) Technical Refresh, began with the 29th Division Headquarters from the Maryland Army National Guard (ARNG) in October 2014, with an aggressive fielding schedule planned to bring this new capability rapidly to all Army and ARNG WIN-T Increment 1 units by the end of 2017. The upgrade includes new commercial hardware and software components that reduce SWaP-C by combining capabilities that once required their own hardware onto virtualized servers. These virtualization efforts also provide 50 percent more expansion capacity for future modernization, by allowing the Army to add functions to a "box" without increasing the number of hardware components. The EOL effort reduces the number of required transit cases by one-third, shedding 1,000 cases over the next three years, and reduces the

COMMERCIAL CAPABILITIES

The Army is working to install commercial Internet and phone packages at its five worldwide regional hub nodes (RHNs), such as this one in Camp Roberts, CA, which received the package in June 2014. The capability will enable Army and National Guard units to provide commercial services during emergency incidents should a disaster strike anywhere on the planet. The RHN's baseband and satellite communications capabilities enable regionalized reachback to the Army's global WIN-T network. The use of commercial technologies, such as Wi-Fi and VoIP, is also enabling tactical communications. (U.S. Army photo)

weight of the remaining cases. That frees up strategic lift, saves space for other critical items and reduces Soldier burden, supporting a more expeditionary force.

Command posts, like Soldiers, can become more expeditionary by changing the tactics, techniques and procedures (TTPs) related to their deployment, as Soldiers found during the latest WIN-T Increment 2 operational test. That test, aimed at evaluating the recent upgrades that make the system easier to operate and maintain, was held in conjunction with the Army's Network Integration Evaluation (NIE) 15.1 in October and early November 2014 at Fort Bliss, TX, and White Sands Missile Range, NM. More than 5,000 Soldiers, including the 2nd Brigade Combat Team, 1st Armored Division and supporting units, conducted the test, which lasted 19 days and covered more than 3,000 square miles. Units used the system's flexibility to create their own unique mobile, tactical command posts, referred to as TACs, to replicate the critical mission command and communication systems found in the much larger tactical operations center (TOC) headquarters. The units used a WIN-T Increment 2-equipped vehicle and other support vehicles as the TAC. When the larger TOC moved to a new location, units retained situational awareness and operational tempo in their forward, agile TAC.

FIGHTING ON ARRIVAL

Because of the Army's continuous network modernization efforts, WIN-T was ready to support U.S. Africa Command, the 101st Airborne Division (Air Assault) and supporting units in their response to the Ebola outbreak in West Africa, in Operation United Assistance. Providing command and control information for troops and aid organizations is one of the Army's key missions in the operation, along with constructing medical facilities and funneling supplies throughout the affected region. The Army network supports improved coordination across the coalition of organizations responding to the Ebola outbreak, by sharing critical information such as the locations and status of treatment units, training updates for health workers and progress made to contain the disease.

The Army gradually built network capacity as units arrived in Liberia, growing from a lightweight, early-entry capability to larger WIN-T systems to establish a robust command-post headquarters structure. The Army also quickly turned on Blue Force Tracking satellite coverage over the region for increased situational awareness.

Rapid deployment into developing situations—a pillar of Force 2025 efforts—is already a fact of life for today's Global Response Force (GRF) units. As part of the GRF, the Air Force's C-17 and C-130 aircraft serve as the delivery system for the Army's XVIII Airborne Corps (mainly the 82nd Airborne Division), which maintains deployment-ready paratroopers and infantrymen to provide an immediate military capability on the ground anywhere in the world at very short notice. With help from the Army's new satellite-based Enroute Mission Command Capability (EMC2), beginning in early 2015, commanders of GRF units will be able to plan missions while on board an aircraft, while their Soldiers receive operational updates and watch full-motion video of upcoming drop zones before their parachutes ever open. EMC2 enables in-flight connection to the WIN-T network backbone, allowing commanders to tap into mission command applications like Command Post of the Future and to access video teleconferencing, Voice over Internet Protocol (VoIP) calls, and intelligence, surveillance and reconnaissance feeds from unmanned aerial vehicles.

As the Army's force structure continues to evolve, it is also vital to increase the capability and versatility of other early-entry teams and units. With the new Transportable Tactical Command Communications (T2C2) program, small teams will be able to deploy at a moment's notice with full command post-like connectivity

EXPEDITIONARY TESTING

Soldiers from 1st Stryker BCT, 1st Armored Division operate Stryker vehicles equipped with WIN-T Increment 2 networked systems, as part of NIE 15.1 in October 2014 at Fort Bliss, TX. The test marks the first evaluation of WIN-T integrated onto Stryker platforms. WIN-T Increment 2 provides Soldiers with mobile high-bandwidth satellite connectivity and is critical to Army mission command modernization. Anywhere, anytime communications are critical to the Army's expeditionary goals. (U.S. Army photo)

VIRTUALIZATION IS ENABLING THE ARMY TO IMPROVE NETWORK PERFORMANCE, SIMPLIFY NETWORK OPERATIONS, AND REDUCE SIZE, WEIGHT, POWER AND COOLING REQUIREMENTS FOR COMMAND POSTS AND VEHICLES.

that they can stash in a suitcase and connect to the WIN-T network on arrival. The program's initial operational test and evaluation is currently scheduled for NIE 16.2, followed by a full-rate production decision and fielding to units. T2C2 will provide satellite dishes that deploy in transit cases the size of carry-on luggage to support small detachments and teams, plus larger transportable satellite dishes to support company-sized elements. These capabilities lend themselves to future contingencies in remote locations that lack an established and reliable network infrastructure.

NETWORKED VEHICLE VERSATILITY

The Army's mobile WIN-T Increment 2 has already taken WIN-T beyond the FOB in Afghanistan, where three brigade combat teams (BCTs) used its on-the-move network capability to exchange critical situational awareness as the Army dismantled its fixed network infrastructure to return home. As the Army continues to field WIN-T Increment 2 to select infantry and Stryker BCTs, Soldiers have leveraged the network in unique ways to execute test and training missions. During the program's operational test in October and November 2014, Strykers and Mine Resistant Ambush Protected vehicles integrated with WIN-T Increment 2 were used to rapidly retransmit fire and counterfire support information between upper and lower echelons. Forward observers and fire support officers once restricted by the line-of-sight distances of their radios to exchange fires information between maneuver platoons and brigade executed critical operations at the edge of the fight by leveraging WIN-T Increment 2's secure mobile satellite capabilities.

To support a more expeditionary force, the Army is also using virtualization to significantly reduce SWaP-C requirements for vehicles equipped with the WIN-T Increment 2 network. The Tactical Communications Node (TCN) provides networking and communications to support the command post and is currently built on a Family of Medium Tactical Vehicles platform to hold all of the necessary equipment. The Army is working to virtualize some of the TCN's hardware, creating a TCN "lite" that is scheduled for fielding in 2017. Other WIN-T Increment 2 capabilities can now be integrated onto smaller platforms, such as sling-loadable High Mobility Multipurpose Wheeled Vehicles, to support more agile operations in remote environments.

CONCLUSION

Underpinning all of these modernization efforts—and all of STARNet—are the principles of increasing network simplicity, security, capacity and adaptability. The Army is aggressively leveraging Soldier feedback from theater, NIEs and user juries to make equipment easier to install, operate, train and maintain, and to ensure a common user experience across the network. This will improve task organization and reduce dependence on signal Soldiers and field support representatives to install, operate and maintain communications equipment.

The network of 2025 must move beyond the FOB, providing the flexibility to support a broad range of operational conditions and delivering robust, reliable communications to all echelons and various mission partners throughout all stages of any operation, in any environment. Modernization efforts are laying the groundwork to network the future force, and the Army will continue to drive technology forward to ensure that it remains many steps ahead of its adversaries and is ready to support the unexpected contingencies of a complex world.

For more information, go to the PEO C3T website at ***http://peoc3t.army.mil/c3t/*** *or the PM WIN-T website at* ***http://peoc3t.army.mil/wint/****, or contact the PEO C3T Public Affairs Office at 443-395-6489 or* ***usarmy.APG.peo-c3t.mbx.pao-peoc3t@mail.mil****. For additional information, go to milWiki at* ***http://go.usa.gov/4Qvk*** *(Common Access Card login required).*

MR. DARREN LEBLANC, technical engineer for PM WIN-T, has been a special adviser to the chief engineer, PM WIN-T since 2009. Previously, as chief of radio engineering, he was responsible for all the radio systems under both the WIN-T Increment 2 and the Increment 3 ACAT 1D development programs. He has a B.S. in engineering from Messiah College.

THE AGILE EDGE

Software development methodology helps PD RCAS innovate today for tomorrow's Army

by Mr. Jim N. Cook and Ms. Rita G. Bartholomew

As the U.S. Army prepares for Force 2025 and beyond, the Project Directorate for Reserve Component Automation Systems (PD RCAS) has adopted Agile, a software development methodology and culture. The Agile approach focuses on quick and responsive software development designed to optimize the use and effectiveness of the RCAS suite of applications for Soldiers. The implementation of Agile is having far-reaching effects across the Army National Guard (ARNG) and the U.S. Army Reserve (USAR) by enabling PD RCAS to release a high-quality product more frequently to better meet stakeholders' requirements.

PD RCAS, part of the Program Executive Office for Enterprise Information Systems, provides integrated Web-based software solutions and support services that enable the ARNG and USAR to maintain mobilization, safety, personnel and force authorization data more efficiently. PD RCAS also supports hardware infrastructure integration and provides equipment to maintain database support for all USAR commands and ARNG activities in all 50 states, three territories and the District of Columbia.

PD RCAS' Software Sustainment Division (SSD) has embraced Agile by implementing its core principles and processes while fostering a new culture of rapid software development. This differs from the waterfall approach used previously by PD RCAS, which allowed for only one major release per year.

SCRUMS AND SPRINTS

Although there are multiple approaches to Agile, the SSD has incorporated the "scrum" method, a rugby metaphor that envisions a tightly knit team focused on a single purpose. This is a vast departure from the traditional, more heavyweight spiral and waterfall methodologies. Agile scrum teams are dedicated to continuously improving each RCAS product, such as enterprise, personnel, mobilization, safety and force authorization.

Each scrum team has a government product owner who works closely with the stakeholders and the scrum teams to ensure that products are developed on schedule and within budget. The product owner is ultimately responsible for the success of each software release. A business analyst, also a member of the scrum team, collaborates with the government product owner to gather requirements from the customer. The team lead, or scrum master, facilitates the software development process. Software developers representing integrated engineering disciplines build software based on "user stories"—very slim

TEAMING EARLY AND OFTEN

Scrum team members meet every morning to track changes required to sustain critical RCAS integrated software applications. This intensive collaboration ensures accurate and quick deployment of RCAS software releases. Clockwise from center are Rocky Rawat, personnel support product manager; Prabhakar Kanapala, enterprise team scrum master; Bill Deller, database engineer; Vilmalka Riveros, enterprise team business analyst; and David Lee and Dan Steffan, software engineers. (Photo by Jim N. Cook, PD RCAS SSD)

and high-level requirements, with just enough detail to begin working rather than waiting until every detail is available, as with the waterfall methodology. Then the developers test the software and document rapid, high-quality solutions to meet the Soldiers' requirements in short two-week "sprints."

One or more of these sprints results in a releasable product solution that PD RCAS can either deploy independently or combine with other sprint product solutions to deploy as a formal, larger release. During the sprint's two-week cycle, stakeholders have the opportunity to review and comment on the software. If changes are necessary early in the cycle, the scrum team implements those changes before the final release.

Making changes early in the release reduces cost as well as the risk of not meeting requirements or schedules. As a result of their early and frequent involvement, Soldiers can be confident of the quality of the RCAS software and that it meets or exceeds their expectations.

Ultimately, RCAS processes seek to sustain and deliver high-quality software faster than in the past. PD RCAS has delivered 13 software releases to its stakeholders in 2014, triple the number of releases delivered under the waterfall methodology over the same time frame.

CRITICAL TOOLS

The successful transition to the Agile software development methodology from the waterfall method was completed within about six months. Leveraging available technology, RCAS selected VERSIONOne, an all-in-one Agile management tool. VERSIONOne provides a single, user-friendly system for planning and tracking all of the "epics" (ongoing implementation initiatives), sprints, user stories, defects, tasks, tests and issues. VERSIONOne helps guide scrum team members through each step of the Agile development process, from product and release planning to sprint planning, tracking new functionality and defects, and final product review.

AGILE SUPPORT FOR THE RESERVE COMPONENT

The Agile approach, which focuses on quick, responsive software development, strengthens PD RCAS' mission to provide integrated Web-based software solutions and support services to the ARNG and USAR, enabling them to maintain mobilization, safety, personnel and force authorization data more efficiently. (Image courtesy of PD RCAS)

In addition, PD RCAS employed LASER (L-3 Agile Scrum EnteRprise), which uses a holistic approach designed to modernize and enhance a product through a well-defined product and software development life cycle. LASER rapidly produces high-quality solutions by portioning work (new features) into small increments and building fully tested solutions in short sprints.

Information assurance (IA) is extremely important to the security and integrity of RCAS software, especially with the requirement to reduce the use of Social Security numbers throughout each RCAS application. RCAS employed an additional IA persistent auditing software scanning tool, HP Fortify Software Security, which performs diagnostic assessments on RCAS applications to detect and reduce potential vulnerabilities; evaluate the associated level of risk; and help prioritize application security risk levels.

HP Fortify allows the Agile security and sustainment teams to quickly triage and fix vulnerabilities identified by HP Fortify static and dynamic analyzers. A collaborative, Web-based workspace and repository enable collaborative, role-specific interfaces with detailed reference information and instructions for developers.

The SSD is also incorporating a software tool named CAST, which helps RCAS define coding standards and improve the quality of the software based on parameters from best business practices used across industry. CAST enables developers to compare the RCAS application architecture to other leading software architectures. These side-by-side comparisons allow PD RCAS to lower costs by proactively evaluating mature software solutions, and to create more sustainable applications within the RCAS architecture, all while simplifying maintenance efforts.

COLLABORATION HAS IMPACT

Implementation of the Agile methodology has yielded significant benefits for PD RCAS and other Army programs. For example, software is released every three months to accommodate ever-changing operating environments that demand innovative, adaptable information technology solutions. It also allows developers to satisfy key requirements through close collaboration with end users.

Demonstration sessions with a government subject-matter expert (GSME) at the end of each two-week sprint are critical to ensure success of the LASER methodology. PD RCAS intends to

broaden the scope of GSME involvement to improve the quality of software tests and product releases for Soldiers.

Once the software construction phase is complete, the release phase begins; it includes test preparation and software validation (beta event) conducted primarily at GSME sites. During the beta event, GSMEs have the opportunity to execute their own test scenarios with hands-on access to the latest RCAS release.

Using the Agile methodology for beta events, the RCAS Quality Assurance Division Team also has greatly reduced the time needed to test a new software release from weeks to days, as well as reducing the number of personnel. Soldiers are no longer experiencing the software for the first time now that they have reviewed and exercised with it during sprint demonstrations. This iterative, collaborative approach ensures that the release is intact with functions optimized for the Soldiers' unique environments, allows multiple sites to comply with the software baseline, and heightens Soldiers' confidence in the software.

CONCLUSION

Customers who have worked with the RCAS team have found the Agile approach to be very helpful in terms of its usability, flexibility and speed.

"This has been the easiest testing we have had," said Cindy Marshall, U.S. Army Reserve Command (USARC) systems team chief, G-3/5/7, Force Management Main and a GSME for the RCAS Force Authorization (FA) application. "Everyone was ready to do whatever was necessary to make the applications work correctly. I can't say enough good things about the RCAS FA applications," she said.

LATEST CAPABILITIES

Rita Bartholomew, RCAS release beta event facilitator, provides LTC Jeffrey T. Yon, chief of PD RCAS' Infrastructure and Integration Division, with a hands-on overview of the new functionality and capabilities in the latest software release. (Photo by Pete Van Schagen, PD RCAS Strategic Communications)

LTC Steve Ballew, as Georgia ARNG state safety manager and GSME for the RCAS Safety and Occupational Health (SOH) application, said, "I have been trying to implement this enhancement into SOH for three years, and you all are accomplishing it in three to four months."

Eric Engstrom, lead readiness analyst in USARC's G-33 Readiness Division and a GSME for the Mobilization Planning Data Viewer application, offered this praise: "My thanks for a well-thought-out and rigorous process. I look forward to the next round of testing under the new development regime."

*For more information, contact Jim Cook at 703-806-3071 or **jim.n.cook.civ@mail.mil**; or Rita Bartholomew at 703-806-3119 or **rita.g.bartholomew.ctr@mail.mil**.*

MR. JIM N. COOK, who retired from military service in 1999 after nearly 22 years in the U.S. Marine Corps and ARNG, is the SSD chief for PD RCAS. He holds a B.S. in business management from Excelsior College and is a recent graduate of the Advanced Course of the Army Management Staff College. He is a Certified Scrum Product Owner, Level III certified in technology management and Level II certified in program management. He is also a member of the Army Acquisition Corps.

MS. RITA G. BARTHOLOMEW is a contractor who provides release management and quality assurance support to PD RCAS for Team NCI, Metova Federal. She has an M.Ed. from Virginia Tech and a B.S. in education from James Madison University. She is certified in the Kirkpatrick levels of evaluation.

GROUND TRUTH

Lessons learned point to innovation, savings for Army of the future

by Ms. Ruth S. Dumer

Leveraging past experiences, whether a solution to a problem or a best practice worth replicating, is essential to preserving the U.S. military's status as the best-trained and best-equipped in history. Those who have learned real-world acquisition lessons continue to submit them to the Army Acquisition Lessons Learned Portal (ALLP) to share their experiences. The ALLP, championed by the Army acquisition executive and deployed in October 2012, is a knowledge management tool that not only enhances the performance of the Army acquisition enterprise but also influences its policies, planning and decisions. Following is a sample of lessons that shed light on how we can prepare for Force 2025 and Beyond.

BETTER BUYING POWER

LL_710: The Army has resources that offer the same development and production capabilities as contractors; by using these, the Army can realize large cost savings.

Background

The product office for a communication system identified that contracts would no longer be viable because the program had reached its contract ceiling and a visit to the production facilities of several Army depots revealed that the organic industrial base could produce the items. Using an Army depot's production facilities avoided substantial costs, and this particular depot was already the only source of repair for the items. Additionally, new production by the depot would allow for easier upgrade, compared with previous versions.

Recommendation

Be sure to consider the Army's organic capabilities at the depots when investigating potential development and production vendors, as they may provide the same service at lower cost.

LL_691: Use an acquisition approach that leverages a competitive environment when possible, to maximize return on investment (ROI) for the government.

Background

A program executive office (PEO) developed an acquisition strategy for producing ammunition and operating, maintaining and modernizing the major ammunition plant. Completing the modernization program and purchasing intellectual property laid the groundwork for a competitive acquisition. The successful contract for dual use of the plant (government and commercial) is expected to save almost $1 billion over the 10-year period of performance.

Recommendation
Push relevant information on acquisition programs out to industry as soon as possible and encourage full and open competition. Obtain intellectual property rights and incentivize dual use of facilities.

LL_699: Regular engagement with the systems and software development contractors resulted in increased ROI and added value to the end product.

Background
With dwindling resources, program managers (PMs) need to investigate ways to do more with less. One way to do this is to meet regularly with systems and software development contractors to discuss how to add value to the program and increase the return on investment.

Recommendation
Be sure to engage systems or software development contractors regularly to discuss and implement potential ways of increasing ROI and adding value to the end product. The contractors may have insight and ideas that may not occur to the program management office.

SCIENCE AND TECHNOLOGY

LL_301: To have a successful product transition to a program of record (POR), technology transfer agreements (TTAs) need to include a well-developed integration strategy.

Background
The Army Materiel Systems Analysis Activity's Science and Technology Transition Study, released in May 2013, identified POR acquisition strategy as having the second most frequent impact on transition. Additionally, those programs and products that transitioned to POR tended to have significantly detailed TTAs. Analysis of the integration strategy section showed that 83 percent that had significant detail produced positive impacts for POR transition.

Recommendation
Require a fully developed integration strategy in TTAs, as described in the Defense Acquisition University's template at **https://acc.dau.mil/CommunityBrowser.aspx?id=22757**. It is especially important to identify the level of PM commitment and the POR funding designated for product transition and integration. Also, require that POR acquisition strategy include technology insertion as part of the overall program from inception. The contracting approach detailed in the strategy must support technology insertion.

MEDICINE

LL_204: Initiate Phase 2 clinical trials before Milestone B to mitigate risk of an acquisition program baseline (APB) deviation for the program during the engineering and manufacturing development (EMD) phase.

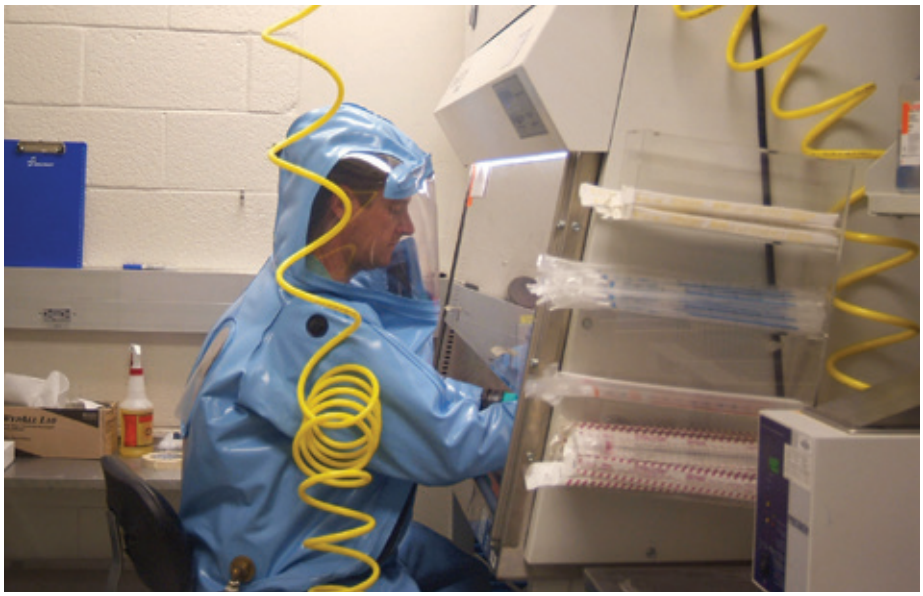
Background
Medical programs that must go through the clinical trial process of the U.S. Food and Drug Administration (FDA) are inherently risky. The FDA typically requires multiple clinical trials before it will grant licensure. Generally there is a requirement that a medical acquisition program conduct Milestone B before initiating Phase 2 clinical trials. However, there is still considerable risk and uncertainty in the Phase 2 trials, which has resulted in APB deviations for several programs.

Recommendation
Initiating Phase 2 clinical trials before Milestone B mitigates risk of an APB deviation for the program. During this period, the PM can incorporate the lessons learned during Phase 2 clinical trials

LEVERAGING LARS
An automotive logistics assistance representative (LAR) with the U.S. Army TACOM Life Cycle Management Command works on a vehicle issue at Bagram Airfield, Afghanistan. Lessons-learned data indicate that leveraging LARs as part of maintenance plans can reduce the costs associated with maintaining a large FSR footprint. (Photo by Summer Barkley)

CONSIDER DEPOT CAPABILITIES

SGT Mike Burrell, left, Stacy Klemke, SPC Daniel Steinbruckner, Darlene Navarra, SPC Zachary Dehn and Pamela Eisenhauer inspect and assemble radio transmitter components before final testing at Tobyhanna Army Depot, PA. The Soldiers are members of the Communication and Electronics Repair Section of the 322nd Support Maintenance Company, Arden Hills, MN. Klemke, Navarra and Eisenhauer are electronics mechanics. The ALLP indicates that Army depots like Tobyhanna can offer the same development and production capabilities as contractors, with the potential for considerable cost savings. (Photo by Steve Grzezdzinski, U.S. Army Communications-Electronics Command)



MITIGATING RISK

Dr. John M. Dye Jr., Viral Immunology Branch chief for the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID) in Frederick, MD, leads a study of the drug ZMapp, an experimental treatment for Ebola patients. The FDA typically requires multiple clinical trials before it will grant licensure, and lessons learned data indicate that initiating Phase 2 clinical trials before Milestone B can mitigate the risk of an acquisition program baseline deviation during the EMD phase. (USAMRIID photo)

into Phase 3 planning, which in turn allows the PM to plan better for the EMD phase. Successful Phase 3 clinical trials depend on ironing out all issues (for example, dosing and procedure) before initiation; this, in turn, can yield significant cost savings.

LL_251: The U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) should be involved early on to allow tailoring of testing to meet the center's needs for specific information, in order to provide a positive statement of support of Type Classified – Standard.

Background

CHPPM typically does not have an opportunity to observe tests or influence the type of tests conducted; usually its only opportunity to review test reports is at their completion.

Recommendation

The PM should consult with CHPPM when drafting the test and evaluation master plan to ensure that the testing provides for the center's informational requirements. The PM should also invite CHPPM to participate in test planning meetings to discuss execution of the detailed test plan.

LL_637: Use indefinite-delivery, indefinite-quantity (IDIQ) contract vehicles for medical countermeasure development contracts.

Background

During the development of a medical countermeasure, the FDA required the drug developer to complete additional studies based on the emerging results. To maintain the overall program schedule, these additional studies had to be

completed rapidly. The existing contract vehicle did not lend itself to rapidly adding this work, whereas an IDIQ contract vehicle would have allowed the flexibility to add the short-notice FDA studies.

Recommendation
Consider using IDIQ contract vehicles for development of medical countermeasures requiring FDA approval, as a best practice.

LOGISTICS, SUSTAINMENT AND SUPPORTABILITY

LL_709: Consider using logistics assistance representatives (LARs) for specific maintenance tasks in support of program maintenance plans and the "fix forward" process, a concept that emphasizes the performance of repairs on-site or as far forward as possible.

Background
LARs are DA civilians serving in motor pools, hangars, maintenance shops and offices around the world, including combat zones. Highly trained maintenance experts, many are retired Soldiers who are "no cost" to the program management office and allow the fewest maintainers required to fully support the mission.

Recommendation
Consider leveraging LARs as part of a program's maintenance plans and fix-forward process to avoid costs associated with maintaining a large field service representative (FSR) footprint, as the Army moves to decrease significantly the number of FSRs.

REQUIREMENTS

LL_738: The Soldier's involvement early in a program's life cycle has positive impacts on the design and requirements, supporting Soldier acceptance.

Background
The PM involved Soldiers in the early prototype excursions, modeling and simulation events and source selection for a system that increased Soldier capabilities. Soldier feedback refined the system design and specifications before the solicitations were released to industry.

Recommendation
Engage Soldiers in military occupational specialties specific to the system being developed at every opportunity, to capture and implement their feedback in the program requirements, as appropriate. This will have significant performance impact.

*For more information on these and other Army Lessons Learned within the ALLP, go to **https://allp.amsaa.army.mil**.*

MS. RUTH S. DUMER is an operations research analyst with the U.S. Army Materiel Systems Analysis Activity, Aberdeen Proving Ground, MD. She holds an MBA with a concentration in operations research from Aspen University and a B.S. in computer science from Towson University. She is Level III certified in both test and evaluation and engineering, and Level II certified for systems planning, research, development and engineering – systems engineer.

EARLY INVOLVMENT

SPC Kalina Welch, preventive medicine technician, uses a pipette to isolate DNA samples that will be used to determine if diseases are present. The ALLP indicates that involving the U.S. Army Center for Health Promotion and Preventive Medicine (CHPPM) in test planning meetings and in drafting a test and evaluation master plan will ensure that the testing provides for the center's informational requirements. (Photo by Jane Gervasoni, U.S. Army CHPPM)

KEYED IN

Key parameter initiative improves technical data to reduce costs, improve quality

by Mr. Shawn M. Dullen

In 2010, the Office of the Project Manager for Combat Ammunition Systems (PM CAS) felt pressure on all sides related to its ability to consistently provide the warfighter with high-quality, reliable mortar and artillery ammunition in a timely and cost-efficient manner. The industrial base continued to shrink, which hampered steady production, and the industrial base frequently expressed concerns about the producibility of items because of obsolete specifications, difficult tolerances and restrictive requirements. Recognizing these vulnerabilities, PM CAS searched for a solution that would not only be effective but would also endure.

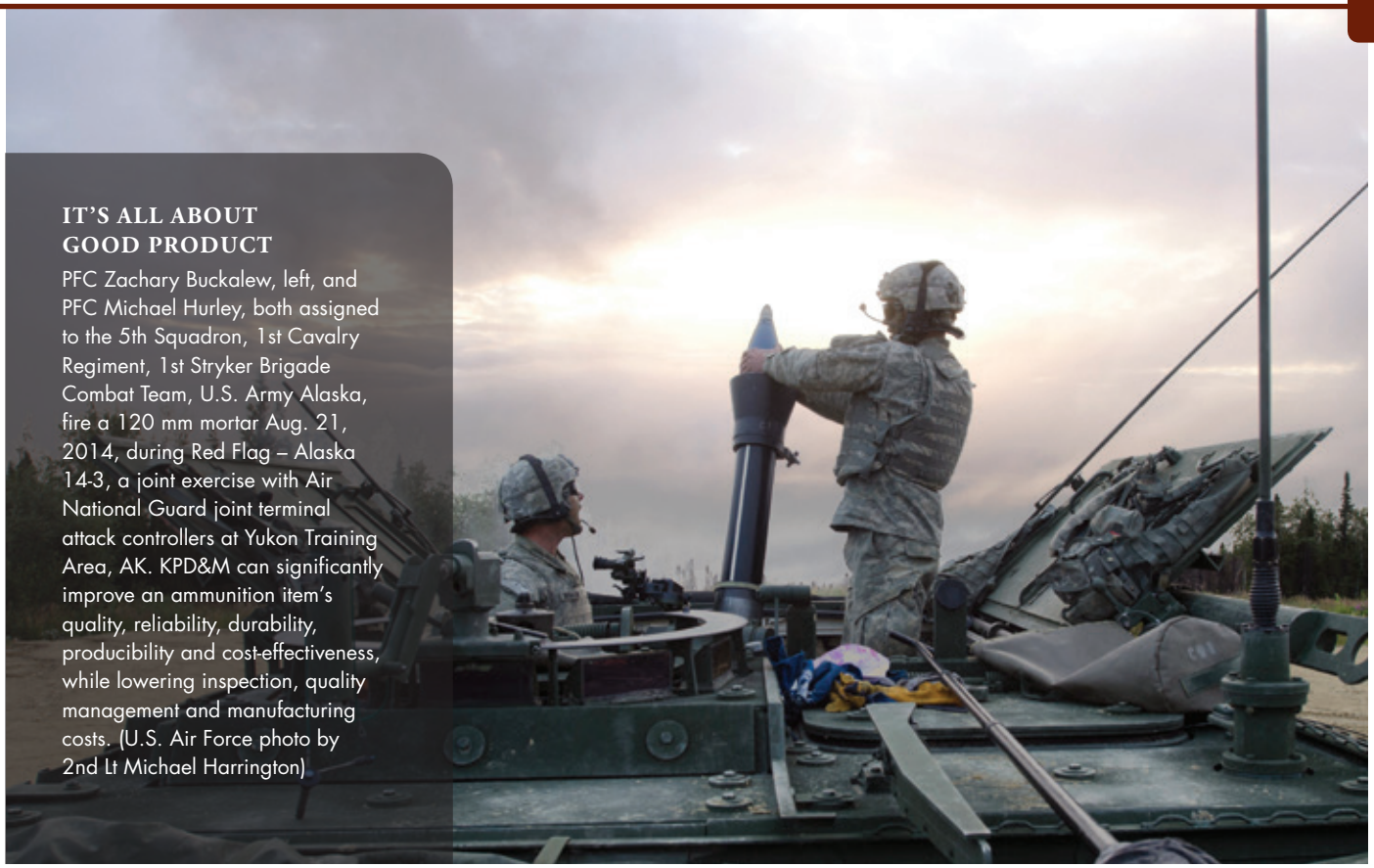
The solution it selected was to implement the Key Parameter Development and Management (KPD&M) initiative. KPD&M is a rigorous five-phase, 12-step process that identifies the design factors (key parameters) that have the most influence on desired performance, and the associated manufacturing parameters requiring process control.

PM CAS equips the Army with all tube-launched, indirect-fire munitions, and the Army and Marine Corps with mortar weapon and fire control systems. In addition, as the Single Manager for Conventional Artillery and Mortar Ammunition, PM CAS procures ammunition for other services through life-cycle program management.

Ensuring that production conforms to the government's technical data package (TDP) and evaluating the potential impacts and risks of product not meeting government standards have been recurring and difficult issues for PM CAS. Compounding PM CAS' difficulties were issues with resolving malfunctions in the field; resolution was hampered by limited knowledge of item design and the complex interactions among components. These issues drove up costs and program risks.

Using KPD&M, PM CAS has succeeded in establishing customer-driven leading indicators, using statistical process control, that ensure successful product performance through objective and measurable evidence. For example, a leading indicator could be a process variable that significantly affects the performance of an end item. The KPD&M process has improved the government TDPs to which PM CAS has applied it by making the most efficient use of existing resources.

PM CAS initially invested in items with the most potential for improvement—the 120 mm mortar and 105 mm artillery family of munitions. There are currently six projects that PM CAS selected based on performance issues, manufacturing concerns or malfunction investigations. For example, one mortar program had high scrap rates—up to 14 percent—a limited supplier base as a result of tight tolerances, and several



IT'S ALL ABOUT GOOD PRODUCT

PFC Zachary Buckalew, left, and PFC Michael Hurley, both assigned to the 5th Squadron, 1st Cavalry Regiment, 1st Stryker Brigade Combat Team, U.S. Army Alaska, fire a 120 mm mortar Aug. 21, 2014, during Red Flag – Alaska 14-3, a joint exercise with Air National Guard joint terminal attack controllers at Yukon Training Area, AK. KPD&M can significantly improve an ammunition item's quality, reliability, durability, producibility and cost-effectiveness, while lowering inspection, quality management and manufacturing costs. (U.S. Air Force photo by 2nd Lt Michael Harrington)

malfunction investigations even though the product met TDP requirements.

WHY KPD&M?

KPD&M can significantly improve an item's quality, reliability, durability, producibility and cost-effectiveness, while lowering inspection, quality management and manufacturing costs. The process is a means to completely understand how the TDP tolerances relate to performance variability, and to make the item work in uncontrollable conditions. Thus KPD&M provides objective, measurable evidence that the product is safe, reliable, robust and operationally effective.

KPD&M can be applied to any phase of the life cycle. It may also be applied effectively to legacy systems that have been in production for many years.

- **Phase one** establishes the infrastructure for KPD&M deployment and thorough understanding of the system, subsystem and subassembly and component requirements. Accomplishing this calls for the use of tools such as quality function deployment and new, unique and difficult analysis to prioritize requirements.
- **Phase two** establishes hypotheses for what design features influence the product's performance under uncontrollable conditions. A series of systems engineering tools—such as functional flow models, boundary diagrams, input-output-constraint diagrams, parameter diagrams and first principle models—establish key relationships.
- **Phase three** tests phase two's hypotheses and determines what features influence the product's performance under uncontrollable conditions. The team accomplishes this by developing and executing sequential experiments to identify what features influence the product's performance (mean and variance) under controlled conditions, what uncontrolled conditions influence performance, and what features interact with uncontrolled conditions. This information identifies the design key parameters.
- **Phase four** establishes tolerance limits for the key parameters and for those characteristics that did not have a major influence on performance; these features have the potential to save a lot of money. The goal is to identify how these features' variations influence product performance by performing probabilistic analysis with the empirical models developed in phase three, or by performing a tolerance design of experiment.
- **Phase five** develops a process control plan for the key parameters by implementing the Process Capability, Control and Improvement Clause. This phase identifies what process parameters influence the specified design key parameters

and develops a control for those process parameters by using tools such as process maps, failure modes and effect analysis, design of experiments, capability studies and statistical process control.

PM CAS PILOT PROJECT

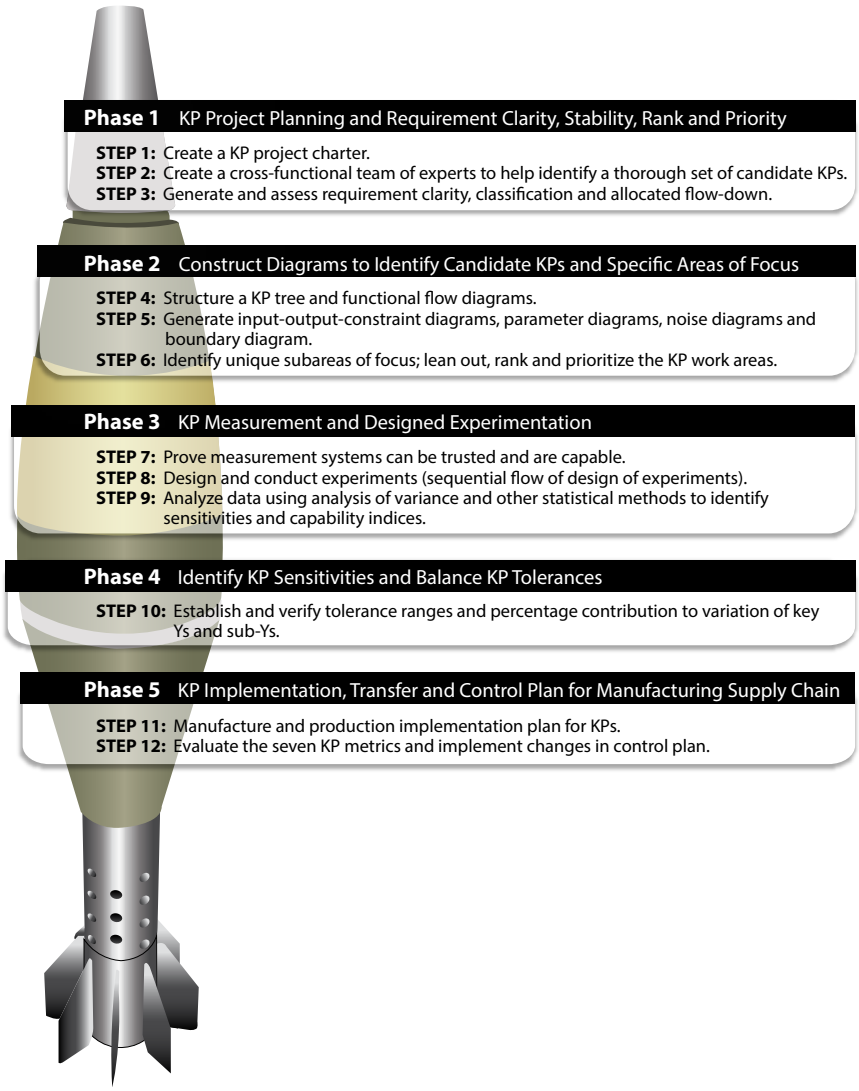
The first pilot project was the M31 Fin Assembly, which is used on the 120 mm Mortar Family of Munitions (FOM) to provide flight stability and to transfer energy for propulsion. This project was selected because of producibility concerns, and because the industry partner was a willing participant in the process, which is very important to the success of the effort. The first four phases of the KPD&M process identified a feature that was not listed on the technical drawing or specification but significantly impacted safety and performance of all the 120 mm FOMs.

Incorporating this feature into the drawing and specification significantly reduced the performance and safety risks, and freed up resources for other areas of concern. The pilot project also revealed the increased costs resulting from a feature that did not have a significant impact on performance. This feature had very tight tolerances that made it very difficult to manufacture, reducing the potential supplier base and boosting its cost. Increasing the tolerance on this feature by twice its previous limits improved its producibility and cost-effectiveness. Eliminating seven nonessential inspections and reclassifying inspection levels for more than 57 percent of the major characteristics further reduced costs.

The KPD&M process also developed mature aerodynamic models that expedite the response to requests for variations, malfunction investigations and future design changes, using fact-based decisions. The risk of unforeseeable outcomes affecting performance or safety is present even during manufacturing or after the product has been accepted. The mature aerodynamic models provide helpful information to address those issues.

To reduce costs further, the engineering team supporting the project developed a new acceptance methodology that will reduce the number of inspections by more than 70 percent while ensuring objective and measurable evidence of product conformance through process and statistical controls.

FIGURE 1



PHASES OF KPD&M

In five phases encompassing 12 steps, KPD&M rigorously identifies the design factors (key parameters) that have the most influence on desired performance and the associated manufacturing parameters requiring process control, then translates these into a manufacturing and production plan. (SOURCE: Clyde Creveling, PDSS Inc.)

CONCLUSION

The U.S. Army Armament Research, Development and Engineering Center (ARDEC) has acknowledged the benefits of KPD&M and, like PM CAS, is committed to implementing the methodology. ARDEC is now developing the infrastructure to use KPD&M for all of its customers throughout the product life cycle.

PM CAS will be expanding the KPD&M portfolio in calendar years 2015 and 2016. Under the Conventional Ammunition Division, the 120 mm Mortar Insensitive Munitions Explosive, 60 mm Mortar Propelling Charges, 81 mm Mortar Fin Assemblies and 81 mm Mortar Ignition Cartridges will be the next set of programs to implement the KPD&M methodology. Under the Guided Precision Munitions and Mortars System Division, the 155 mm Artillery Precision Guidance Kit will be the first KPD&M project. In addition, there are plans to leverage the lessons learned from previous projects to enhance the effectiveness and efficiency of the KPD&M methodology.

For more information, contact the author at 973-724-5176 or ***shawn.m.dullen.civ@mail.mil****.*

MR. SHAWN M. DULLEN is the technical lead for mortar munitions quality, reliability and safety engineering, ARDEC Quality Engineering and Systems Assurance Directorate. He holds an M.Eng. in mechanical engineering from the Stevens Institute of Technology and a B.S. in mechanical engineering from the University at Buffalo, NY. He is Level III certified in production, quality and manufacturing.

AIMED AT EFFICIENCY

U.S. Army Rangers assigned to 2nd Battalion, 75th Ranger Regiment fire a 120 mm mortar Jan. 30, 2014, during a tactical training exercise on Camp Roberts, CA. PM CAS' first pilot project for the KPD&M process was the M31 Fin Assembly, which is used on the 120 mm Mortar FOM. It chose the fin assembly because of producibility concerns and industry buy-in. (U.S. Army photo by PFC Nathaniel Newkirk)

TEST BED FOR IMPROVEMENT

Mortarmen with 3rd Battalion, 116th Heavy Brigade Combat Team prep 120 mm mortar ammunition before live-fire training Aug. 21, 2014, at the Orchard Training Center, ID. PM CAS is using the 120 mm mortar and 105 mm artillery FOM to apply and refine the KPD&M process. (Photo by MAJ Wayne "Chris" Clyne, 115th Mobile Public Affairs Detachment, Oregon Army National Guard)

SPOTLIGHT:

Mr. Daniel Quinn

Career trifecta—Soldier, contractor, civilian—pays dividends

MR. DANIEL QUINN

COMMAND/ORGANIZATION:
Project Manager for Mission Command, Program Executive Office for Command, Control and Communications – Tactical

POSITION AND OFFICIAL TITLE:
Product support manager

YEARS OF SERVICE IN WORKFORCE:
8 (following 4 as a contractor)

YEARS OF MILITARY SERVICE: 20

AWARDS:
Civilian Achievement Medal, Global War on Terrorism Medal, NATO Service Medal; military honors include Meritorious Service Medal (4), Army Commendation Medal (4), Army Achievement Medal (3), National Defense Ribbon, Good Conduct Medal (6), Noncommissioned Officer Ribbon (3), Army Service Ribbon, Army Overseas Ribbon (4), Expert Infantry Badge, Air Assault Badge, Drill Sergeant Badge, Expert Marksmanship Badge. Selected as Regimental Noncommissioned Officer of the Year, Drill Sergeant of the Cycle (numerous occasions) and Battalion Drill Sergeant of the Quarter.

EDUCATION:
M.S. in information technology telecommunications and B.S. in information system management, University of Maryland University College; A.S. in general science, University of S.C.

In 1981, recent high school graduate Dan Quinn of Williamsville, NY, was "looking for a job that was different where I could hopefully make a difference." He found it in the U.S. Army's light infantry, where he served and retired after 20 years. But that was only the beginning.

"After I retired from the Army in 2002 as the S2 [intelligence/security] noncommissioned officer-in-charge with the 1-506th Infantry Regiment, 2nd Infantry Division in Korea, I returned to my duty station at Fort Monmouth, NJ, and accepted a contractor position with the Force XXI Battle Command Brigade and Below [FBCB2] program, overseeing the development of Army technical manuals," Quinn explained. "I eventually obtained a government civilian position with the program as a logistics management specialist in 2006." Now, after three degrees and a lot of hard work, Quinn is portfolio product support manager (PSM) for the Project Management Office for Mission Command in the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T).

Before assuming his role as a PSM in July 2014, Quinn served a six-month deployment to Afghanistan as a PEO C3T liaison officer (LNO). "I was directly responsible for the upgrade of C4ISR [command, control, communications, computers, intelligence, surveillance and reconnaissance] equipment to Capability Set 13, coupled with the disciplined workforce drawdown and equipment retrograde in support of the transition from Operation Enduring Freedom to Operation Resolute Support."

Quinn said that upgrading while Army forces retrograded was an exciting challenge. "We felt we were almost going against the stream." But for Quinn, the experience was also rewarding. "I got to see the capability in theater, being used by the warfighter. It wasn't a test environment, it wasn't a training environment—it was a combat environment. I believe that the Capability Set 13 upgrade has provided significant C4ISR enhancements to the warfighter."

Quinn said he has gained keen insights into the Army mission throughout his career. "By serving as a Solider, contractor and civilian, I have obtained different perspectives of how mission command technologies provide critical support to our Soldiers. Obviously a Soldier has a

different day-to-day experience, but in many ways we all have the same perspective: It's one mission."

What do you do, and why is it important to the Army or the warfighter?

I am a PSM for Project Manager Mission Command (PM MC), part of PEO C3T. The PSM is a new role within three of PEO C3T's organizations. My job is to develop product support strategies to enable the Army to sustain the C4ISR technologies that we field. Operations support represents approximately 70 percent of a product's life-cycle costs, so the earlier we look at product support, the less it costs when we reach the operations and support phase. Our objective is to leverage enterprise opportunities across U.S. Army programs and DOD components to develop and implement the best comprehensive product support strategies at the best value for the Soldier.

As a life-cycle manager, I collaborate with the project managers to make the right investments and decisions to keep our systems viable for the Army. If we make those necessary investments upfront, we reduce operational support costs down the road. In addition, PSMs are establishing greater cooperation between PEO C3T and the Army's Communications-Electronics Command (CECOM), the designated life-cycle management command, also located on the Aberdeen Proving Ground (APG, MD) C4ISR campus.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most, and why?

When I supported FBCB2, I was part of a standard paradigm where government funds supported all technology research and development in conjunction with a large contractor. We did not have a lot of commercial off-the-shelf (COTS) technology, at least not on a component level. The government was the configuration control and management authority, so we saw a little less flexibility with the acquisition framework, and development efforts moved more slowly in general.

I now see PEOs and PMs moving toward COTS, where you see more rapid technology evolution and more flexibility. This happens because the government doesn't have to make that upfront investment with research and development; commercial industries make this investment, and that's a good thing.

Now, the COTS software is very agile, but the hardware is not as much so, because it was developed as ruggedized with rigid government specifications and testing. Our challenge now is, how do we sustain COTS hardware that becomes rapidly obsolete? For example, you may have a laptop that is somewhat ruggedized today, but next year it may not be available to purchase, or the repair parts may become obsolete. Systems quickly become obsolete, which makes it very difficult to use the traditional organic sustainment mechanisms.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

We have dramatically increased our Soldiers' capabilities with the technology we develop and field. I have seen a major evolution of the equipment from the time I was a Soldier to last year, when I was the PEO C3T LNO in Afghanistan.

As a retired Soldier, I have the satisfaction of knowing that if we are successful in implementing a good sustainment strategy, we will implement a game-changer for our Soldiers. Our products will be sustained throughout their life cycles, whether through training products, technical manuals, supply support or repairs.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

The biggest change I see is how rapidly we are evolving our future technologies. I would like to see the acquisition framework—and specifically the sustainment support structure—be more flexible to be able to sustain that rapidly evolving technology.

In the mission command realm, we will see greater efficiencies with the Command Post Computing Environment, where we will use Web services and a single server in the cloud that reaches across programs of record at the tactical level. Hardware commonality will simplify logistics, which, in turn, will enhance our life-cycle support.

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

I get a lot of blank looks when I tell people about my job. Many don't understand mission command technologies, logistics or even the military as a whole. The biggest surprise to many is the scope and impact of our work within PM MC. They think I just provide support to units at APG, but in fact our support is critical to command and control throughout the entire U.S. Army and across the entire globe.

—MR. ROBERT E. COULTAS

ABOVE, BELOW, AND AROUND

JMC looks to solar, geothermal and wind to get to net zero energy for the Army

by Mrs. Patricia Huber, Mr. Tony Lopez and Mrs. Linda K. Loebach

Headquartered at the Rock Island Arsenal, IL, the Joint Munitions Command (JMC) operates a nationwide network of 11 industrial installations in 13 states for the production and storage of conventional ammunition.

Industrial base installations, such as those that JMC operates and manages, place a large demand on available energy. With the continual reductions in DOD's budget, the need to reduce energy consumption at Army industrial installations is ever more critical to hold down operating costs.

DOD has initiated an ambitiousgoal of producing 25 percent of its energy from renewable sources by the year 2025. Multiple executive orders and policy guidance mandate an increased focus on renewable energy for energy security, environmental and economical reasons. JMC is aware that as funding levels decrease, the cost of energy at its installations will become a significant challenge.

That's why JMC—a subordinate organization of the U.S. Army Materiel Command—made a commitment to renewable energy, which has produced significant savings for the Army. JMC's installations continue to work toward these goals to maintain and sustain the ammunition industrial base.

JMC produces conventional ammunition items for DOD and is the logistics integrator for life-cycle management of ammunition, providing a global presence of technical

CELEBRATING SOLAR POTENTIAL

BG Kristin K. French, center, JMC commanding general; COL Roger L. McCreery, center right, Tooele Army Depot commander; JMC CSM Anthony M. Bryant, center left; Royal Rice, second from left, Tooele energy manager; and other Tooele staff and contractor representatives stand in front of the Stirling Solar Array power dish project completed at the depot in 2013. The solar array project consists of 429 solar dishes using concentrated solar technology that will furnish 30 percent of Tooele's electrical energy. The dishes are scheduled to be activated by summer 2015. Over the course of a year, it is estimated that the solar array will produce electricity worth nearly $260,000. (Photo by Kathy Anderson, Tooele Army Depot Public Affairs)

support to U.S. combat units wherever they are stationed or deployed. Because JMC is the single manager for conventional ammunition for all the military services, its logistics operation is unique to DOD, and is critical to the industrial base supporting the warfighter.

JMC Headquarters and installations continue to accomplish renewable energy goals by using all opportunities, such as DOD's Energy Conservation Investment Program (ECIP) and energy savings performance contracts.

TOOELE LEADS THE WAY

Leading the renewable energy initiatives for JMC is Tooele Army Depot in Tooele, UT. Tooele is the DOD's conventional ammunition hub for the western region, supporting warfighter readiness through receipt, storage, issue, demilitarization and renovation of conventional ammunition. Tooele is also the Army's Center of Industrial and Technical Excellence for the design, manufacture, fielding and maintenance of Ammunition Peculiar Equipment (APE). The APE program provides equipment to support surveillance, demilitarization, maintenance, renovation, modification, packaging and preservation of conventional ammunition, safely, at U.S. military ammunition depots and ammunition supply points worldwide.

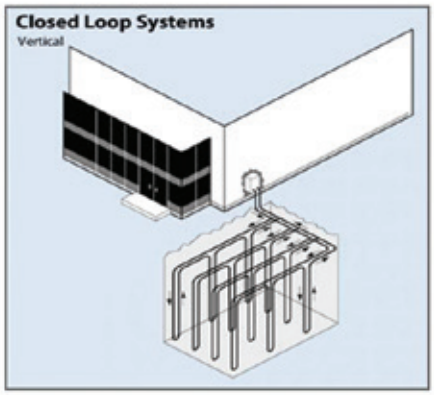
Tooele has replaced old oil-fired steam boilers, updated building control systems, and acquired new systems such as wind turbines, solar array dishes and solar walls to reduce its energy bill and make it more self-sufficient. The solar array dishes run on Stirling cycle engines, high-efficiency, closed-cycle regenerative heat engines that are compatible with alternative and renewable energy sources—in this case the sun. The solar walls, by contrast, are simple, passive systems in which black outer walls heat up from the sun's rays and fans blow the heat into a building.

In May 2010, Tooele commissioned its first 1.5-megawatt (MW) wind turbine, an ECIP project. ECIP, a critical element of DOD's strategy to improve the energy performance of fixed installations, traditionally has funded small projects that promise a significant payback in reduced energy costs. The wind turbine now generates 30 percent of Tooele's energy. Using the wind as an energy source rather than fuel oil has saved Tooele the expense of about 4 million kilowatt-hours per year. A second 1.8-MW wind turbine ECIP project, to be completed in June 2015, will generate yet another 30 percent of Tooele's electrical energy.

In addition to the wind turbines, Tooele is executing an ECIP project for a Stirling Solar Array. This project consists of 429 solar dishes using concentrated solar technology that also will furnish 30 percent of Tooele's electrical energy. The dishes are scheduled to be activated by summer 2015. Over the course of a year, it is estimated that the solar array will produce electricity worth nearly $260,000.

Tooele's goal is to go off of the grid and produce all of its own energy—a concept known as net zero energy consumption—by the year 2020, depot officials said.

FIGURE 1



GEOTHERMAL LOOP

This diagram demonstrates how a closed-loop geothermal system, like the one installed at IAAAP, works. In a vertical system such as this one, the vertical loops connect with horizontal pipes, and the system connects to the heat pump in the building. Iowa's vertical system required 117 holes, or wells, 182 feet deep. (SOURCE: U.S. Department of Energy)

UP FROM THE EARTH

Pipes coming from the underground geothermal system lead to the heating and cooling systems inside the administration building at IAAAP. By using geothermal energy, which is generated and stored in the Earth, the system reduces consumption of conventional energy sources. (Photo by Linda K. Loebach, JMC Public Affairs)

Tooele also installed solar walls on 11 buildings to provide heat. In contrast to solar cells, which absorb high ultraviolet rays from the sun and convert them into electricity, solar-wall air heating systems consist of perforated, corrugated metal sheets that warm when exposed to sunlight. A thermostat within the solar wall connects to a fan, programmed to activate at 65 degrees, which draws air through the perforations in the metal and sends heated or cooled air into the buildings, depending on the season.

Since it became operational on all buildings in March 2010, "the solar-wall air heating system has saved the depot approximately $153,000 annually, in comparison with the use of fossil fuels," said Royal Rice, Tooele's energy manager. "The solar wall project reduces Tooele's dependence on fuel oil, natural gas, propane and electricity."

HARVESTING ENERGY IN IOWA

Another JMC installation, the Iowa Army Ammunition Plant (IAAAP) in Burlington, developed geothermal and photovoltaic systems at its administration building. IAAAP received funding for this project through the American Reinvestment and Recovery Act's stimulus program. Congress awarded $1.46 million to convert the building's cooling system to a more energy-efficient one.

Geothermal refers to using the properties of the earth for either heating or cooling. In some cases, the earth can be a heat sink, storing solar heat from the summer for use in the winter; in others, near volcanic activity, it can be a direct source of heat; in still others, it can be used much like a wine cave by tapping into the naturally cool and constant temperatures of the ground below the frost line. This last option is the case with IAAAP, where the

PHOTOVOLTAIC ARRAY

The photovoltaic array system at IAAAP captures solar energy to create electricity, thus reducing power costs for the administration building. Together with a geothermal system, the photovoltaic system allows IAAAP to heat and cool its administration building exclusively with renewable energy sources. (Photo by Linda K. Loebach, JMC Public Affairs)

geothermal system is being used to cool the administration building.

The IAAAP geothermal system incorporates a vertical, closed, ground-loop system. (See Figure 1.) Vertical loops, used where the soil is too shallow for trenching, minimize the disturbance to existing landscaping. In a vertical system, holes approximately 4 inches in diameter are drilled about 20 feet apart and 100 to 400 feet deep. Two pipes are inserted into these holes and are connected at the bottom with a U-bend to form a loop. The vertical loops are connected with horizontal pipes—the manifold—then placed in trenches and connected to the heat pump in the building. Iowa's vertical system required 117 holes, or wells, which initially were intended to be drilled to 185 feet deep but ended up at 182 feet deep because of a hard layer of earth at the greater depth.

DOD HAS INITIATED AN AMBITIOUS GOAL OF PRODUCING 25 PERCENT OF ITS ENERGY FROM RENEWABLE SOURCES BY THE YEAR 2025.

Geothermal is clean and sustainable, and its potential is everywhere. At 20 feet below the ground, even cold earth contains heat.

IAAAP also installed a photovoltaic system that uses solar panels to convert sunlight into electricity. Both of these systems allow IAAAP to heat and cool its administration building exclusively with renewable energy sources.

"The completion of these projects starts Iowa on its first step of energy conservation using green technologies," said Leon Baxter, chief of the Operations Support Division at Iowa.

"Through these projects, Iowa is helping the Army gain ground in the net zero energy campaign," said Dennis R. Lacy II, energy execution project manager with the U.S. Army Corps of Engineers, who provided specialized support on the projects.

KENTUCKY SUN AND EARTH

Additionally, Blue Grass Army Depot in Richmond, KY, introduced geothermal heat source pumps and solar photovoltaic panels to the installation through a utility energy services contract (UESC), a third-party contract whereby utility companies execute energy-related projects or programs with little to no capital investment from the installation.

One of the UESC projects provides 30 tons of cooling load from geothermal ground-source heat pumps for the health clinic and the Morale, Welfare and Recreation golf pro shop and office space. This particular project will reduce British thermal unit consumption in these three facilities and is expected to save the installation $1 million during the next 10 years.

In April 2014, solar photovoltaic panels, which produce 31 kilowatts of electricity, were installed on the Armed Forces Reserve Center and Field Maintenance Shop. Blue Grass estimates its renewable energy to be nearly 4 percent for FY14.

SOAKING UP THE SUN

Eleven buildings at Tooele Army Depot have solar walls, which provide energy to reduce heating costs. They are simple, passive systems in which the black outer walls heat up from the sun's rays and fans blow the heat into a building. The solar-wall air heating system has saved the depot approximately $153,000 annually compared with the use of fossil fuels. (Photo by Kathy Anderson, Tooele Army Depot Public Affairs)

CONCLUSION

With these efforts, JMC continues to support the Army Energy Security mission to reduce energy demand, increase efficiency, seek alternative sources and create a culture of energy accountability. These energy initiatives sustain or enhance operational capabilities while providing America's joint forces with ready, reliable and lethal munitions at the right place and time to enable successful military operations.

Investing in opportunities to reduce energy consumption is a DOD priority; it allows any installation to reduce operating expenses while increasing mission efficiency.

As JMC continues to support renewable energy initiatives, it also hopes to provide a model that will encourage other organizations to take similar steps. With the Army advancing toward its net zero goal, JMC offers examples of alternative and renewable energy options for all DOD facilities to follow.

For more information, go to ***http://www.army.mil/news/energy*** *(Army Energy News);* ***http://www.asaie.army.mil/Public/ES/netzero/index.html*** *(the Army's Net Zero Initiative); or* ***http://www.asaie.army.mil/Public/ES/oei/index.html*** *(Army Office of Energy Initiatives).*

MRS. PATRICIA HUBER is deputy to the commander of JMC. A member of the Senior Executive Service since April 2011, she is the senior civilian in the command. She has a B.S. in industrial engineering from the University of Wisconsin. She is Level III certified in systems engineering, program management, and systems planning, research, development and engineering – program systems, and is a member of the Army Acquisition Corps.

MR. TONY LOPEZ is a public affairs specialist at JMC. He has a B.A. in journalism from the University of Iowa and is a graduate of the Defense Information School's Public Affairs Qualification Course.

MRS. LINDA K. LOEBACH is a congressional liaison and public affairs specialist at JMC. She has an M.A. in Spanish language and linguistics, a B.S. in business administration and a B.A. in Spanish from Illinois State University. She is also a graduate of the Defense Information School's Public Affairs Qualification Course.

THE ENERGY CIRCUIT

A roundup of projects and efforts to power change in Army energy

by Army AL&T Staff

Energy is one of the most important ways that the Army is going to get anywhere, much less to 2025 and beyond. The Army's goal to deploy 1 gigawatt of renewable energy projects by 2025 will help ensure that its installations achieve high levels of energy security in the event of conventional grid outages.

The military is also congressionally mandated to draw 25 percent of its energy from renewable sources by 2025, and the Army is the biggest single user of energy in the United States. Whether it's through reduction and efficiency or through secure renewable resources, the Army recognizes that it must cut energy usage, which is why its Energy Initiatives Task Force—now the Army Office of Energy Initiatives, within the Office of the Assistant Secretary of the Army for Installations, Energy and Environment—launched the Net Zero Energy Installations initiative in 2010. "Net zero" means that an installation uses no more energy than it produces. The Army partnered with the National Renewable Energy Laboratory and the U.S. Army Corps of Engineers to assess opportunities to increase energy security and, in a competitive application process, selected nine installations to pilot Net Zero Energy by 2020.

While challenges remain, there is exciting and creative work happening around the Army to increase reliance on renewables and reduce reliance on coal, gas, petroleum and other fossil fuels—not to mention reducing the Soldier's needs for power on the battlefield. Army AL&T

IN THE MARKET FOR RENEWABLES

COL Robert J. Ruch, commander of the U.S. Army Engineering and Support Center, Huntsville, AL, leads the Nov. 13, 2014, pre-proposal meeting for Redstone Arsenal's Renewable CHP project. (Photo by Julia Bobick, U.S. Army Engineering and Support Center, Huntsville)

WORKING WITH INDUSTRY ON PROJECTS TO PROVIDE ENERGY JUST MAKES SENSE, GIVEN THAT THE ARMY IS ALREADY BUYING POWER FROM INDUSTRY.

magazine reached out to learn more, and here's what we learned from Army organizations near and far.

SMART POWER, SMART PARTNERSHIPS

A fourfold increase in power interruptions on Army installations over the last 10 years has accelerated the Army's efforts to get smarter—much smarter—about how it acquires the energy that powers its facilities. The interruptions occurred as a result of such events as Hurricane Katrina, Superstorm Sandy and the tornadoes that tear across the country's midsection each year, including the 2011 tornadoes that knocked out power to Redstone Arsenal, AL, for nine days.

Such disruptions, disasters and other threats to Army operations—including the attempted sabotage of a substation in San Jose, CA, in 2013 and the looming concern that cyberattacks could take down the nation's electrical grid—have grown in intensity and unpredictability, said Amanda Simpson, executive director of the U.S. Army Office of Energy Initiatives (OEI), which transitioned from the Energy Initiatives Task Force in October 2014. So OEI is working on a variety of renewable energy projects with industry to help reduce the risk to installations' energy supplies and reduce the Army's energy footprint at the same time.

OEI, she said, is "set up like a little mini-PEO [program executive office], being that we have dozens of projects under development in various stages, but in every case we're doing third-party financing, working with the installations to leverage renewables to bring energy security to our installations." Before leading OEI, Simpson was special assistant to the Army acquisition executive, the Hon. Heidi Shyu, and acted as her principal adviser.

Reducing the energy footprint and bringing generation capability within the fence line increases the security of the installations, Simpson said. And working with industry on projects to provide energy just makes sense, given that the Army is already buying power from industry.

"We're just getting our first plants online. We have a dozen projects that are either actively under construction or currently somewhere in the procurement cycle," she said. "The first project that was under construction is at Fort Huachuca [AZ]. They go operational this month [December 2014]. It's a solar array. It will, over the course of the year, provide 25 percent of the power to Fort Huachuca, but it's owned and operated by Tucson Electric Power, which has been providing electricity to the fort for 73 years. It's amazing to see almost 100 acres of solar panels."

Another is "a solar project at Redstone [Arsenal] that will provide 18,000 megawatt hours per year," about 5 percent of the installation's power demand. A second project there, when complete, will provide "a little over 50 percent of the power from on-site generation," she said. That project combines heat and power.

"Those who have been down to Redstone know that there are steam pipes running all over the place. They provide steam for heating and cooling for about half the facilities there."

The City of Huntsville, AL, owns the generation capacity, which turns solid municipal waste into steam. That contract, Simpson said, has been in place for nearly 30 years; through it, "the Army buys a set amount of steam whether they use it or not." The current solicitation "is either to convert that plant or build a new plant that would take the excess steam that the Army doesn't need for heating and cooling, and run it through a turbine and generate electricity." That is expected to be fully operational by the end of 2016 or early 2017, she said.

These OEI projects are breaking new ground for the Army. "There are different types of projects," Simpson said. "We're going to have to see how they work out over time." One groundbreaking aspect is working in different jurisdictions with different rules and with agencies that have never done this kind of contracting before, being accustomed to the traditional acquisition of products. "We can move a lot faster, but we're using procurement agencies that aren't necessarily experienced in doing that. The Army hasn't done things like that before." For example, Simpson said, "We work with DLA, Defense Logistics Agency, who normally goes out and buys bulk fuel or buys electricity and things overseas. It's a different process to do it here in the States."

DESIGNER POWER
Conformal Wearable Batteries are thin, lightweight, flexible batteries that form to the body and integrate seamlessly into a Soldier's body armor. The conformal wearable batteries of Future Force 2025 will be lighter and provide more power than current versions. (Photo by Edric V. Thompson, U.S. Army CERDEC)

REDSTONE RENEWABLES

For Redstone Arsenal, AL, the spring of 2011 was a turning point. That's when tornadoes blasted the Huntsville region and the power went out at Redstone Arsenal for nine days, despite having multiple power plants to supply electricity. That outage has resulted in the Renewable Combined Heat and Power (CHP) Project, a renewable-energy generation facility that will provide both steam and electricity exclusively to the installation. It will be constructed on five acres in the northeast portion of the installation. The project is now open to bidders.

"We believe that this is going to benefit the greater Huntsville community, as well as the Tennessee Valley as a whole," said Erich Kurre, project director with OEI.

Through the CHP project at Redstone, the Army aims to obtain local steam and 25 megawatts of electricity to enhance energy security. There will be no cost to the Army—the contractor will finance, design, build, operate, own and maintain the CHP renewable-energy generation facility.

Currently the arsenal's power is supplied entirely by the Tennessee Valley Authority, but that number is to drop to 48 percent in the future, as the CHP is expected to provide an estimated 48 percent of the power. Solar power will provide the remaining 4 percent.

TACTICAL POWER INITIATIVES

The Command Power and Integration (CP&I) Directorate of the U.S. Army Communications-Electronics Research, Development and Engineering Center

UNTETHERED
Military researchers are experimenting with wireless power as a way for Soldiers to charge their equipment without the need to be tethered to a power supply source. Current projects are exploring the use of magnetic and electric resonant coupling to achieve wireless power transfer over short to moderate distances, focusing on vehicle and tactical operations center applications. (U.S. Army photo)

(CERDEC), an element of the U.S. Army Materiel Command's Research, Development and Engineering Command, creates interoperable power solutions that maximize Soldier and small unit mission effectiveness, reduce the power burden on the Soldier, and enable energy independence—power at any location with minimized resupply.

CP&I is actively contributing to addressing the Army's future needs in support of Force 2025 and Beyond initiatives, with efforts that reflect the Army's goals of maximizing demand reduction and enhancing expeditionary capabilities. Its Energy Informed Operations (EIO) and Tactical Power Generation projects work to provide more expeditionary, efficient and lightweight power sources for a scalable force structure.

The EIO project focuses on providing optimized and customizable power with increased efficiency and reduced logistical demands. EIO enables more effective use of available power on the battlefield by examining the introduction of tactical microgrids and developing two key concepts: the automation of power resources to more closely match supply with demand, and the communication of power situational awareness to inform and be informed by mission needs.

The emerging technology of microgrids, a localized grouping of electricity generation, distribution and loads that operate apart from a traditional centralized power grid, allows for more efficient use of energy resources compared with the legacy technique of spot generation. Deploying microgrids enables users to consolidate loads and more closely match supply with demand,

NOVEL GENERATION
DOD scientists and engineers strive to lighten the Soldiers' battery load and power-generating needs by leveraging kinetic and solar energy harvesting techniques. Warfighters in 2025 and beyond may power their equipment through their own motion and with solar panels on their uniforms and equipment. (U.S. Army photo)

thus decreasing the amount of wasted energy. Under EIO, the Army is developing open standards interface specifications that would allow new, more efficient power sources to be incorporated into the system easily without a large integration effort. Furthermore, these open standards allow companies to innovate to create more powerful, lightweight systems while maintaining compatibility with existing equipment. These standards will allow interconnectivity between different platforms—vehicle to grid, for example, or Soldier to vehicle.

In addition to developing open standards, the project envisions an EIO-compatible application that will update Soldiers on their power levels and consumption so they can better allocate their power sources. The intelligent systems will provide data to power software that can display the status of a system in an easy, intuitive manner and provide users with an artificial-intelligence-type knowledge base that will help them understand how to fix problems and will guide them through fixes on the fly. These intuitive features can increase operational efficiency by easing the training burden and manpower requirements for the future force. Finally, the EIO will provide users with planning capabilities that allow the best use and deployment of resources.

Advances in the component technologies developed under CP&I's Tactical Power Generation program for integration with the EIO framework also play an important role in supporting the future force.

In addition to the power management technologies being developed under the EIO project, CP&I is applying research,

ENERGY REFORMING
The Reformer Test Bed is used for evaluation of fuel reforming—a new technology that could transform jet propellant into a fuel that Soldiers could use and generate on the battlefield. (U.S. Army CERDEC photo)

development and systems engineering to provide the lightest, most fuel-efficient and cost-effective power sources in terms of tactical power generation, storage and the application of alternative and renewable energy technologies. These efforts will lighten the Soldier's load and logistical burden by providing lightweight and high-energy-density, compact power sources, while also supporting expeditionary maneuvers through power options with longer runtime.

Several key components of the Tactical Power Generation efforts that support Force 2025 include fuel reformation, robust mission extenders, energy harvesting and wireless power. Fuel reforming is a leap-ahead Force 2025 technology that could allow jet propellant 8 (JP-8) to be transformed into valuable fuels that Soldiers use and generate on the battlefield. CP&I wants to reform JP-8 locally instead of shipping propane, methanol, kerosene and gasoline.

In addition to fuel reformation, CP&I is working to synthesize fuel in the field via catalytic processes that use materials organic to military operations, in combination with alternative energy sources. The goal is to assemble a hydrocarbon fuel from available waste streams that provides value to the Soldier at or near the point of use. For example, Soldiers could use carbon dioxide from engine exhaust and hydrogen from water electrolysis, via solar power, to synthesize a hydrocarbon fuel.

Robust mission extenders include conformal batteries, which are thin and flexible, to reduce the burden of batteries on the Soldier. One possible solution developed by CP&I to decrease that burden includes the Conformal Wearable Battery (CWB), a thin, lightweight battery that conforms to the body and integrates seamlessly into a Soldier's body armor. The CWB can be worn in either the side, chest or back pouches with the ballistic protective plates, where it is virtually invisible and transparent to the Soldier. This power solution significantly reduces battery swaps as well as the variety of battery quantities the Soldier has to carry.

The Future Force 2025 goal for the CWB is to incorporate it with extremely light, next-generation, lithium-based electrochemical robust materials. This will significantly increase energy content and further reduce weight, enabling CWB to provide Soldiers in austere environments with continuous power for more than 72 hours.

Another option being explored is kinetics: harvesting energy from the Soldier's own movements and surroundings. CP&I is researching and developing kinetic and solar energy harvesting efforts to prove out new materiel solutions for charging on-the-go, and is developing test methodologies to evaluate prototype systems during program development. Currently, CP&I and its partner organizations are looking at an electricity-generating assault pack and a mechanical insole that could be used inside a boot or shoe to help harvest Soldiers' kinetic energy.

As in the high-tech industry, military researchers are also looking for ways to recharge devices wirelessly. Currently they are experimenting with magnetic and electric resonant coupling to achieve wireless power transfer over short to moderate distances, focusing on vehicle and tactical operations center applications. One such effort looks at allowing the Soldier to recharge wirelessly from any military vehicle seat configured with a transmitting coil. This effort pairs inductive coupling with e-textiles, or conductive fabric, routed through a protective vest or load carriage to demonstrate a future Soldier capability that will eliminate the need for cabling to recharge electronic devices.

Research will continue to optimize the efficiency and the range of power transmission. Related efforts are experimenting with the current operational limitations of the technology as well as applying the new technologies to tabletop electronics and long-term storage requirements. The intent will be to develop longer-range wireless power transmission technologies that are both safe and suitable for military operations, including laser and microwave power transmission for extended-range recharging.

USAMMDA BRANCH GOES GREEN

The Regulatory Operations (RO) Branch of the U.S. Army Medical Materiel Development Activity (USAMMDA) at Fort Detrick, MD, is saving money and time by going paperless. RO has saved thousands of reams of paper annually by eliminating the paperwork for its U.S. Food and Drug Administration applications—which can range from 200 to 2,000 pages—and discontinuing hard copies of the files related to the organization's 80 active products.

The office is saving time, space, money and manpower by using the Electronic Common Technical Document, an initiative that reduces RO's carbon footprint and streamlines its entire submission process. The electronic document allows RO to reference source documents from its Electronic Document Management System (EDMS), which maintains version control so that even documents created in the earliest stages of development are incorporated into the submission process before finalization. The system also saves man-hours by eliminating the need to verify mountains of paper, page by page, against the EDMS and the sponsor's electronic regulatory file.

RO is also saving money by scanning and cataloging all of its archives electronically, eliminating the costs related to storage space.

ANALYZING OPERATIONAL NEEDS

According to DOD estimates, operational energy (OE)—the energy required to train, move and sustain forces, weapons and equipment for military operations—accounted for 75 percent of all energy the agency used in 2012. The U.S. Army Training and Doctrine Command (TRADOC) is trying to get a better handle on its OE figures by creating a task force to analyze such capabilities with the same degree of rigor that

SIGNING ON FOR RESEARCH
Mark P. Huston, left, president of Constellation Retail, joins with MG Peter D. Utley, ATEC commanding general, in signing a cooperative research and development agreement between Constellation and ATEC Aug. 4, 2014. The agreement is to explore geothermal power and other sustainable, secure energy solutions at APG. (Photo by Andricka Thomas)

GOING PAPERLESS
USAMMDA's RO Branch began enforcing its self-imposed mandate to become a paperless office in early 2013, eliminating the paperwork for its U.S. Food and Drug Administration applications and discontinuing hard copies of the files on 80 active products. The RO staff is working to electronically archive vast amounts of documentation dating back to the 1900s. (USAMMDA photo)

it traditionally has applied to assessing combat power.

Created in March 2013, the OE Analysis Task Force (OEATF) is headed by the TRADOC Analysis Center (TAC) and also includes the U.S. Army Materiel Systems Analysis Activity and the U.S. Army Center for Army Analysis. Led by TAC's Maurice Hayes and Bonnie McIlrath, the task force plans to develop a robust analytical capability to conduct OE analyses that will inform acquisition, force design and structure, concept development and investment decisions. It is working to identify gaps in Army data, scenarios and methods, models and tools (MMT), and to propose improvements that could mitigate those gaps.

The OEATF is also working to identify relevant sustainment and operational metrics. By leveraging operational plan-based scenarios to establish conditions and reflect threats to maneuver and sustainment assets, the OEATF is developing a baseline fuel consumption analysis that accounts for air, ground and Soldier systems as well as contingency bases. These analyses identify the key OE drivers and tipping point issues associated with supportability and mission effectiveness.

A long-term OEATF effort, scheduled for completion in the 2nd quarter of FY15, will produce a theater-level baseline analysis that integrates the MMT and scenarios to provide the Army's total fuel consumed over a campaign for an entire theater.

Also involved in the OEATF are the Program Executive Office for Combat Support and Combat Service Support, the U.S. Army Logistics Innovation Agency and the Office of the Deputy Assistant Secretary of the Army for Cost and Economics. The task force has engaged a handful of other stakeholders from DA and the Office of the Secretary of Defense (OSD), including representatives from the U.S. Army Sustainment and Maneuver Support Centers of Excellence, the Office of the Assistant Secretary of the Army for Installations, Energy and Environment, the Office of the Assistant Secretary of Defense for Operational Energy Plans and Programs, and the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics.

SEEKING RENEWABLES WITH A GLOBAL REACH

A long-term cooperative research and development agreement between the U.S. Army Test and Evaluation Command (ATEC) and Constellation Energy is designed to help Aberdeen Proving Ground (APG), MD, boost the use of renewable energy and increase energy security while producing technology that can be deployed to the battlefield or to Army installations.

ATEC oversees Army testing centers throughout the country, including the U.S. Army Aberdeen Test Center (ATC) at APG. Its partnership with Constellation includes several lines of effort, including the development of a geothermal power

plant that could be deployed in low geophysical temperature regions. Most of the United States east of Texas is considered to have low geothermal temperature resources, along with most of the African continent, northern Europe and the interior continent of Asia. One of the goals of this initiative is to leverage energy sources and strategies to make projects in these regions economically and technically viable, said Dr. Melissa Steffen, a chemist and strategic planner for ATC.

The research effort is also looking at ways to leverage existing commercially available geothermal energy technology to deliver sustainable, lightweight and secure power. ATC will use its designation as a lead power system tester for DOD to determine the right combination of technology to make geothermal energy production at APG viable.

Most of the surface equipment used for geothermal energy has been used in commercial power production for decades. The primary goal of this effort is that it be portable and deployable operationally or to other Army installations, Steffen said. "We are also looking at ways to leverage commercial smart grid technology to provide tactical energy efficiency, security and resilience to the Army," she added.

So far, Steffen and the ATEC team have finished the initial desktop review of existing literature on the deep geology at APG. They're getting ready to start geophysical testing of the bedrock beneath the installation to determine the geothermal resources available there. At the same time, they are beginning discussions to move an average of 1 million kilowatt hours per year of electricity generated during DOD power system testing back onto the power grid. That's the equivalent of powering an average of 100 homes per year and would save the Army roughly $70,000 annually.

CONTRACTING FOR EFFICIENCIES

The U.S. Army Installation Management Command (IMCOM) collaborates with the U.S. Army Corps of Engineers, Defense Logistics Agency Energy and the U.S. Army Mission and Installation Contracting Command (MICC) Energy Acquisition Office to implement cost-saving measures to meet established DOD energy goals. IMCOM's utility and energy expenditure is $1.4 billion annually.

Its goals to reduce energy usage include:

- Reduce energy intensity by 3 percent per year to reach a total reduction of 30 percent from the 2003 baseline by 2015.
- Increase use of renewable energy to at least 3 percent of total electricity consumption for FY07-09, 5 percent for FY10-12 and 7.5 percent for FY13 and beyond.
- Reduce potable water consumption by 2 percent annually, for a total reduction of 26 percent from the 2007 baseline by FY20.
- Divert 50 percent of the nonhazardous solid waste from the waste stream by FY15.

MICC Energy Acquisition supports IMCOM's goals in various ways. MICC, a subordinate command of the U.S. Army Contracting Command, administers more than 170 utility and energy-related contracts supporting IMCOM, valued at more than $300 million. These contracts normally have long-term performance periods ranging from five to 50 years. The contract types include utility commodity, utility services, energy savings performance contracts (ESPCs), utility energy service contracts (UESCs), utility privatization and renewable energy. Generally, the utility and energy contracts fall into a handful of categories:

- **Conservation:** Reduce energy usage, decrease the carbon footprint and make the installation a community partner.
- **Facility efficiency:** Drive efficiency across the installation and enterprise.
- **Resiliency, redundancy and distribution security:** Build resilience and redundancy, and provide energy security.

The MICC Energy Acquisition Office helped IMCOM to develop and issue an IMCOM enterprisewide energy awareness and conservation assessments contract, which is intended to help installation energy managers conduct assessments to identify potential energy-saving projects. MICC also helped IMCOM develop and issue an enterprise resource efficiency management contract, which aims to help the installation energy managers develop and implement local energy programs.

Since 2010, the Energy Acquisition Office has conducted centralized price redetermination for all utility privatization contracts. This consolidation allowed senior specialists to negotiate the prices, which saved IMCOM over $50 million. In addition, the office has supported a wide array of Net Zero projects, ESPCs and UESCs that have reduced IMCOM's energy and water usage costs.

MICC Energy Acquisition is also supporting renewable energy projects at Fort Bliss, TX, and at Fort Benning, Fort Gordon and Fort Stewart in Georgia. These projects will help IMCOM meet its renewable energy goals and will provide the installations with energy security and redundancy.

WATCHING THE TANK

A Soldier assigned to 173rd Brigade Support Battalion, 173rd Airborne Brigade Combat Team monitors a fuel servicing truck at the Joint Multinational Readiness Center in Hohenfels, Germany, Aug. 28, 2014. Meeting power and water demands drives a substantial amount of resource requirements, with the Army spending nearly twice as much buying gas for DOD in FY12 as it did on transitioning Army S&T. (U.S. Army photo by SPC Brian Chaney, Viper Combat Camera Team, U.S. Army Europe)

TOOTH *to* TAIL

PEO CS&CSS works to sharpen the Army's teeth while trimming its tail

by Ms. Munira Tourner and Mr. Michael Clow

As the Army postures to succeed and win in this complex world, its Force 2025 and beyond campaign plan outlines the need to design and build a force that is more lethal, expeditionary and agile than today's. At the same time, the new "U.S. Army Operating Concept: Win in a Complex World, 2020-2040," spearheaded by the U.S. Army Training and Doctrine Command (TRADOC), acknowledges that success in our complex world may well involve more than just firepower. Since Force 2025 emphasizes speed and lethality, significant opportunities exist to shape and influence the future force across the sustainment acquisition community.

The Army's role as the "foundational force" often requires it to provide substantial support to its sister services, coalition partners and even nongovernmental organizations. No matter where the Army goes, today or tomorrow, whether it intends to employ combat power or render assistance, the Army must move scalable formations into and out of a wide range of operating environments. Once in place, Soldiers and those they support will need shelter, water, transportation, power, engineering equipment and a host of other capabilities.

Today's Army faces a zero-sum proposition in many areas. So while the equipment provided by the Program Executive Office for Combat Support and Combat Service

REDUCING DEMAND
PV2 Emily Baker, a transportation specialist with the 16th Sustainment Brigade (SB), prepares to unhook a fuel tank at a forward operating base at the Joint Multinational Readiness Center in Hohenfels, Germany, May 13, 2014. PM E2S2 is pursuing technologies that reduce the need to transport fuel and water across the battlefield, including intelligent power management and distribution, renewable energy and energy storage systems. (U.S. Army photo by 1LT Henry Chan, 16th SB, 21st Theater Sustainment Command Public Affairs)

Support (PEO CS&CSS) might seem like an unlikely place to find the Army's future combat edge, if we want to maximize resources in the Army's "tooth" then we must look at optimizing the sustainment "tail." In a world of fiscal constraints and uncertainty, an Army seeking to expand its combat power, lethality, flexibility and agility must unburden Soldiers by reducing convoy manning requirements, logistical footprints, fuel and water requirements, weight and other factors. It is imperative, in other words, that we change the tooth-to-tail ratio.

PEO CS&CSS is pursuing technological and analytical solutions in several critical areas to help make that change. As a part of TRADOC's overall Army 2025 planning, we provide a critical acquisition perspective and realism, collaborating with our requirements and science and technology (S&T) partners in a series of recurring working group meetings and senior-level forums to examine and prioritize technology-specific focus areas. This process includes assessing technology readiness and affordability, and identifying program insertion opportunities.

Transferring those same messages to critical discussions such as the Army's Long-range Investment Requirements Analysis not only synchronizes these key activities but also improves the likelihood for transition of advanced S&T projects. Finally, by employing new analytical tools, we have improved our ability to make choices about equipment's useful life, affordability and other factors shaping investment decisions. Together, these actions will continue improving the efficiency of the Army's tail and help shape the leaner, more capable and more expeditionary force we need. A couple of important examples follow.

INCREASING AUTONOMY

In recent conflicts, improvised explosive devices killed or injured thousands of troops riding in ground vehicles. Improving Soldier safety required vital and effective—though also tremendously expensive—survivability programs such as the Mine Resistant Ambush Protected vehicle and armor kits for tens of thousands of other tactical wheeled vehicles (TWVs).

Though the Army will always need Soldiers to conduct certain missions, another way to improve survivability is to reduce the number of Soldiers exposed to future threats. Part of that equation is reducing supply demands. Additionally, emerging technologies can help make those vehicles that are needed safer, smarter and less Soldier-dependent—substantially improving the safety and efficiency of the Army's logistics process.

Under the broad umbrella of "autonomy," technologies are both available today and expected to emerge that will help us move toward these objectives, carefully considering cost and technological maturity. We don't have to start with the self-driving Google car. In fact, many of us own personal vehicles with driver assistance and safety enhancement technologies that tell us if we're getting near another vehicle or offer similar warnings.

PEO CS&CSS is mapping out an incremental acquisition strategy to deliver similar levels of autonomy to today's TWV fleet, while focusing on building autonomy-enabled capabilities into future acquisition programs.

Obviously there is a lot of technological ground to cover between vehicles with driver assistance and fully autonomous convoy operations. Technology needs to be available, secure from cyberattack and affordable, and ride on a flexible architecture. In addition to achieving the required technical performance goals, Soldiers will need operational training, which will help to provide feedback on the future tactics, techniques and procedures that will make autonomy suitable in a military environment. Ideally, this will someday enable autonomous ground resupply operations, but it begins with the driver-assist and leader-follower capabilities that are today a focus of the requirements, acquisition and S&T communities.

MANAGING POWER AND WATER

Meeting the Army's power and water demands drives a substantial amount of resource requirements. For example, in FY12, DOD consumed an estimated $16.4 billion in liquid fuels, with more than 60 percent of it purchased outside the United States. Not all of that fuel went to the Army. But by comparison, in the same fiscal year, the Army's entire base budget request for research, development, test and evaluation was $9.7 billion. In other words, the government spent nearly twice as much buying gas for DOD as we did on transitioning Army S&T.

Put another way, the "fully burdened" cost of a gallon of fuel sitting on a forward operating base in Afghanistan was about $7. That's the total cost of buying the fuel and getting it to where our troops can actually use it. Not only does all of this fuel pose a tremendous fiscal challenge, but transporting it puts more Soldiers' lives at risk and removes them from combat duties.

OPERATION DYNAMO

A team moves an Improved Environmental Control Unit into place as part of Operation Dynamo, a PM E2S2 initiative designed to standardize generators and usage practices at combat outposts in Afghanistan. The effort saved 77,500 gallons of fuel per month, and reduced ground and air resupply needs at more than 50 combat outposts. (U.S. Army photo)

A noteworthy achievement over the past few years was the effort by PEO CS&CSS' project manager for expeditionary energy and sustainment systems (PM E2S2) called Operation Dynamo, which standardized generators and usage practices at combat outposts in Afghanistan. That effort saved 77,500 gallons of fuel per month—31 times the capacity of the Army's Heavy Expanded Mobility Tactical Truck Tanker—substantially reducing ground and air resupply needs at more than 50 combat outposts of various sizes.

As we look toward Army 2025, PM E2S2 is continuing to aggressively pursue technologies that reduce the need to transport fuel and water across the battlefield. This includes a new shower water reuse system and numerous efforts to examine water sourcing, intelligent power management and distribution, renewable energy and energy storage systems, all of which hold great potential for reducing the number of troops moving across the battlefield and the troops needed to operate sustainment systems once in place.

ANALYZING THE PORTFOLIOS

Beyond new technologies, more rigorous analysis is also central to shaping our equipment portfolios to meet Army 2025 objectives. PEO CS&CSS is deploying a Capability Portfolio Analysis Tool (CPAT) to help optimize investment and fielding decisions by using data about fleet sizes and mixes, composition, procurement costs, operations and sustainment costs, and other factors.

CPAT improves investment decisions by allowing program managers to model and examine the costs—and impacts—of numerous different decisions, providing insights into how single modernization

SHRINKING THE FOOTPRINT
A contracted forklift driver prepares to load a customer's truck at Camp Leatherneck, Afghanistan, July 22, 2014. No matter where the Army goes, it must move scalable formations into and out of a wide variety of operating environments, and it is vital to unburden Soldiers by reducing convoy manning requirements, logistical footprints and fuel and water requirements. (Photo by SGT Michael K. Selvage, 10th Sustainment Brigade Public Affairs)

programs can affect an entire fleet. From the results, program managers can form and implement modernization strategies that most effectively balance cost, schedule and performance in pursuit of specific objectives.

Like any analysis, the results are only as good as the data, and for some details of equipment fleets or portfolios, the data we have today are insufficient. In many cases, detailed data for smaller systems are just not tracked. However, the TWV fleet represents a great opportunity to explore CPAT's benefits. Admittedly, data for the fleet are incomplete, due in part to the large volumes of trucks used in different theaters and the high number of individual variants for both military and commercially based trucks.

The TWV fleets are generally young and the product of valuable lessons learned from decades of war. Starting with their mature technology and relatively healthy state, CPAT provides a powerful tool to begin understanding the timing, scope and cost of potential modernization decisions—especially those that improve the fleet's fuel efficiency, force protection, network connectivity and other desired attributes in the future force.

CONCLUSION

No one knows exactly where the Army will be in the year 2025 and beyond, but we can reasonably expect that it will need to do more—in more places—than it has in the past. Whether called upon for major contingency operations or a range of smaller actions, anything we can do to strengthen the Army's tooth, whether in combat power or assistance missions, will make that force a more capable and successful one.

Everywhere the Army goes, it takes with it at least a small part of the CS&CSS portfolio to build, move, maintain or otherwise sustain itself. The need for that capability won't go away, but to the extent we can reduce its impact and the Army's footprint, PEO CS&CSS is committed to incorporating Army 2025 attributes into our programs and the way we do business.

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

MS. MUNIRA TOURNER serves on the PEO CS&CSS staff, currently leading the Systems Engineering and Capabilities Management Team. She has more than 23 years of Army systems engineering and program management experience in S&T and acquisition, and is Level III certified in systems planning, research, development and engineering and program management. She holds an M.S. degree in electrical and systems engineering from Oakland University and a B.S in electrical engineering from the University of Michigan. She is a member of the Army Acquisition Corps.

MR. MICHAEL CLOW serves on the PEO CS&CSS staff with responsibilities for organizational strategy and engagement. He holds a B.S. in political science from Albion College and is completing graduate work in international relations at Creighton University.


PROGRAM EXECUTIVE OFFICE
COMBAT SUPPORT & COMBAT SERVICE SUPPORT
350+ SYSTEMS
1 CUSTOMER
SUPPORTING OUR JOINT WARFIGHTER,
FIRST TO THE FIELD ... LAST TO LEAVE
http://peocscss.army.mil
PROGRAM EXECUTIVE OFFICE
CSCSS
First to the Field... Last to Leave
COMBAT SUPPORT & COMBAT SERVICE SUPPORT

SPOTLIGHT:

MAJ SCOTT WILLENS

A change in global affairs leads to a change in careers

MAJ SCOTT WILLENS

COMMAND/ORGANIZATION:
Office of the Deputy Assistant Secretary of Defense for Chemical and Biological Defense

POSITION AND OFFICIAL TITLE:
Deputy medical director

YEARS OF SERVICE IN WORKFORCE: 13

AWARDS:
Meritorious Service Medal, Army Commendation Medal with three Oak Leaf Clusters, Army Achievement Medal, National Defense Service Medal, Iraq Campaign Medal, Global War on Terrorism Service Medal, Military Outstanding Volunteer Service Medal, Army Service Ribbon

EDUCATION:
Ph.D. in comparative biomedical sciences (pharmacology) with a minor in zoology from North Carolina State University College of Veterinary Medicine; diplomate of the American College of Veterinary Preventive Medicine; D.V.M. from University of Minnesota College of Veterinary Medicine; B.S. in animal science with high honors from Rutgers College of Environmental and Biological Sciences

On the night of Sept. 10, 2001, veterinarian Scott Willens stayed up late studying for his preliminary exams. At the time, he was working toward a Ph.D., focused on skin absorption of pesticides in amphibians, at North Carolina State University College of Veterinary Medicine. The next day, 9/11, "I kind of woke up late and all of the major events had already happened. I was watching it in rerun," he said.

"I'd had my senior prom at the top of the World Trade Center in 1988—I'm from that area." His immediate concern was for friends and family who worked in and around the World Trade Center. "I hadn't heard from some but, thankfully, everyone I knew had made it out." As a result of the 9/11 attacks, Willens decided to join the Army and serve his country.

Willens had looked into joining the Navy right out of vet school because he thought it would be interesting to work with marine mammals, but at the time he didn't realize that it was actually Army veterinarians who worked with the Navy marine mammals. He talked to recruiters, who tested him. "They thought I'd be ideally suited to be a Navy SEAL based on my scores, and I said, 'I want to work with seals, not be a SEAL.' And so I went into private practice for a couple of years, followed by an internship at Mystic [CT] Aquarium and then graduate school." Until 9/11, his career was moving toward working with zoo animals, but 9/11 changed everything.

Willens was 30 years old, and joining the military at that age wasn't something he'd contemplated, but he joined and went to officer basic training, then finished up his doctorate. Until recently, he worked on countermeasures to chemical and biological warfare agents, except for a deployment to Iraq in 2007 and various details to work on congressionally mandated health programs and other research, which has run the gamut of medical concerns facing military families.

Willens specializes, in part, in veterinary preventive medicine, which, he said, deals with "infectious and parasitic diseases, epidemiology and biostatistics, public health administration and education, food safety and environmental health." It relates to what he described as the "greater One Health concept of interrelated humans, animals (domestic and wildlife) and environmental health with globalization in all arenas, as we're seeing with Ebola spreading," he said, adding, "It's a very holistic approach in the macro sense to medicine, as

opposed to focusing just on the human angle."

Currently he's working "a lot with Ebola issues. The Global Health Security Agenda, biosurveillance, medical countermeasures to chemical agents, biosurveillance and antimicrobial resistance are some of the big pushes of the office." Willens is departing in January for West Africa for a three-week voluntary rotation as an operations officer in support of Operation United Assistance. He volunteered, he said, because "I don't want [Ebola] getting here any more than I want ISIS"—the so-called Islamic State—"getting here. I've got three kids. I'd rather fight it there than fight it here," a theme that runs through Willens' service.

What do you do, and why is it important to the warfighter?

I recently became deputy medical director in the Office of the Deputy Assistant Secretary of Defense for Chemical and Biological Defense. Before this post, I was the deputy chief of the Analytical Toxicology Division, and chief, Neurobehavioral Toxicology Branch [in the U.S. Army Medical Research Institute of Chemical Defense], where I supervised and mentored scientists and technical staff involved in state-of-the-science multidisciplinary research to develop medical countermeasures against chemical agents. I was also a co-investigator for a Commander's Innovative Research and Discovery Program to noninvasively characterize cyanide toxicity in mice through imaging techniques, representing a clinically relevant means to track progression of cyanide pathology in the brain, heart and lungs, and potentially prevent or reverse damage by medical countermeasures. As lead surgeon for the institute, I developed a novel technique for implanting telemetry transmitters for physiologic monitoring in Goettingen minipigs, and I trained veterinary surgeons from several DOD laboratories in the technique to augment studies examining adverse respiratory, neurologic and cardiovascular effects of biological or chemical agents.

NOVEL TECHNIQUE

Willens demonstrates the surgical implantation of a telemetry device measuring electrocardiographic and electroencephalographic activity in a guinea pig. Willens trained veterinary surgeons from several DOD laboratories in a technique he developed to implant the telemetry transmitters to augment studies examining the adverse effects of biological and chemical agents. (U.S. Army photo)

I established the collaborative interagency Access to Troops initiative for clinical trials and investigations as deputy director for grants management at Congressionally Directed Medical Research Programs (CDMRP) from 2010 to 2011, and proactively managed the life cycle and transition of $10.7 million in peer-reviewed Orthopedic Research Program grants as a science officer.

While deployed to Babil province, Iraq, in 2007 with the 4th Brigade Combat Team (Airborne), 25th Infantry Division's Embedded Provincial Reconstruction Team, I conceived and planned the Central Euphrates Farmers Market, which brought video teleconferencing capability, equipment, collection animals and continuing education and training to the Baghdad Zoo veterinarians as critical components of the counterinsurgency mission of the surge.

I've attained Level III certifications in science and technology management and program management, as well as Level I certification in test and evaluation.

I'm currently serving in a one-year detail assignment that began Oct. 1, 2014, at the Office of the Deputy Assistant Secretary of Defense for Chemical and Biological Defense, which draws on my background

PROVINCIAL RECONSTRUCTION

Willens, rear, and CPT Timothy Hammer, U.S. Army Civil Affairs officer, pose in 2007 with the grandchildren of the sheik who headed the agricultural organization that Willens helped stand up, one of four agricultural unions involved in the creation of the Central Euphrates Farmers Market. (U.S. Army photo)

and experiences in medical chemical and biological defense, acquisitions, preventive medicine and public health.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most and why?

What has surprised me most is the ability of such a multidisciplinary workforce of scientists and other professionals to collaborate rapidly during a crisis, such as Ebola, expediting medical capabilities, countermeasure research, training and knowledge solutions to accomplish the mission under austere conditions and with compassion for the host nation(s). The fiscal crisis of sequestration, compounded by furloughs and a hiring freeze, has underscored the resilience of the acquisition workforce to succeed despite historically unprecedented setbacks.

Particularly with my experience with medical acquisitions, I've noticed greater strides to obtain feedback from the end user in the field. The Field Assistance in Science and Technology teams in Iraq and Afghanistan were able to glean and report back on the efficacy and shortcomings of medical capabilities in the operational environment. During my experience at CDMRP, I was also impressed with the unique involvement of consumers (individuals or families affected by the particular medical conditions captured by the programs) during peer and programmatic review processes as they provided their personal perspectives and brought a sense of urgency and relevance to the research.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

I would like to see more early engagement, not only with end users of medical capabilities but with the scientists and technical staff involved in the solutions. Scientists have to submit proposals with staffing, training and equipment needs for programs that may last for several years, yet the funding is for one to two years. When funding agencies shift their focus and research priorities, often mission-related and unavoidable, there is some upheaval of resource management at the laboratory level. Also, with the expanded chemical, biological, nuclear and radiological medical countermeasure mission beyond the warfighter to national defense, receipt of funds from agencies outside DOD is often out of phase with project schedules. The synchronization of funding streams with schedule and performance will improve laboratory efficiency and ensure that milestones are met for deliverables.

What's something most people don't know about your job? What surprises outsiders most when you tell them about your job?

Most people don't know what veterinarians do in the Army. Some may know the historic mission of the Army Veterinary Corps, which dates back to World War I Cavalry, and others may know that we treat military working dogs, Navy marine mammals, service members' pets and even the greater public health mission. However, a significant component of the Veterinary Corps is directly involved in research and development, including laboratory animal veterinarians, veterinary pathologists and comparative medicine veterinarians who hold Ph.D.s in a variety of disciplines. People are surprised at our expanded scope outside animal medicine with significant contributions to human and environmental health initiatives, as well as policy.

—MR. STEVE STARK

Want to

IMPROVE PERFORMANCE

of your

LASER TARGET LOCATOR?

USE LITHIUM BATTERIES

U.S.ARMY

PROGRAM EXECUTIVE OFFICE SOLDIER

PRODUCT MANAGER SOLDIER PRECISION TARGETING DEVICES

peosoldier.army.mil #PowerUpProperly

Hybrid *Threats*, *Hybrid* Thinking

Integrated sensor architecture looks to keep pace with commercial technology

by Ms. Susan Harkrider and Ms. Christine Moulton

Sensors are everywhere: They are smaller than ever, more ubiquitous and are changing the world dramatically. Take a look around. How many sensors are currently on your person? (Here's a clue: your smartphone probably has more than a dozen by itself.) In your room? In your home? Most of us would give up counting before we know the answer. Sensors likewise have become a common thread for the Army, woven into many of the global trends that will shape the next generation of warfare for 2025 and beyond.

In 2013, Deputy Assistant Secretary of the Army for Research and Technology Mary Miller sponsored "Science and Technology Trends 2013-2043: A Review of Leading Forecasts," designed to aggregate trend analysis from multiple published sources and identify, at a macro level, those trends that are common across the intellectual and strategic communities. In total, the study identified 16 megatrends. including items such as robotics and autonomous systems, human augmentation, big data, additive manufacturing (3-D printing), the Internet of things and ubiquitous nanotechnology.

One observation from the report was how sensors—including detection technologies, measuring tools and self-aware feedback mechanisms, and their supporting technology development areas, such as data fusion, algorithm development, energy harvesting and networking—were consistently identified as key science and technology (S&T) enablers across most of these trends. It is imperative to the Army's future effectiveness and efficiency to accept and adapt to the rapid pace of change driven by these global,

COMMON-SENSE ARCHITECTURE

ISA identifies the critical capabilities to be adopted for sensor interoperability. Adopting the common architecture enables program management offices to refresh their programs instantly with the latest technology and adapt existing Army portfolio assets to this new environment. (SOURCE: U.S. Army CERDEC)

commercial trends: augmented human performance, robotics, autonomous systems, the Internet of things and much more.

The challenge for the Army S&T community is adapting to the rapidly changing technological culture of the commercial world while addressing the military's own evolving requirements to ensure that our Soldiers are well-positioned to respond to new hybrid threats, a fusion of conventional, irregular and cyberwarfare requiring a highly flexible response enabled by disruptive technologies.

As the Army's premier S&T center of excellence for electro-optical and infrared sensor development, the Night Vision and Electronic Sensors Directorate (NVESD) of the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC), a subordinate organization of the U.S. Army Materiel Command's Research, Development and Engineering Command (RDECOM), is developing a foundational architecture for how the Army will immediately and cost-effectively integrate emerging sensor advances into the traditionally longer development cycles of conventional military platforms and systems. This strategic approach focuses on partnering with industry to establish common standards and protocols for new sensor integration, thus ensuring that, as the Army modernizes, it will be able to take immediate advantage of new sensor developments.

Known as the Integrated Sensor Architecture (ISA), this framework identifies the critical capabilities to be adopted for sensor interoperability. This strategic approach enables program management offices to instantly refresh their programs with the latest technology and adapt existing Army portfolio assets to this new environment. Thus the Army could leverage the often very fast development cycle of cheap commercial sensor technologies (like those on cellphones) and integrate them into cross-domain solutions with existing, expensive and unique military sensors (like those on satellites and military platforms). To accomplish this task, CERDEC NVESD has developed a five-step strategy.

IDENTIFY A CATALYST

The Deployable Force Protection Technical Focus Team (DFP TFT), a joint service working group led by the Army, provided the necessary catalyst for the ISA. The DFP TFT participates in quarterly technical support operational analysis (TSOA) assessment events. These events provide an opportunity for representatives from government research and development organizations, academia and industry to interact with operational personnel and determine how their efforts might support capability gaps and high-priority mission deficiencies.

The DFP TFT needed a mechanism by which sensor technologies from industry and government developers could quickly be integrated into a common operating picture. This need became the impetus for NVESD to develop ISA. While DFP TFT had a specific focus of base protection, the ISA pursued a broader architecture approach that is extensible to all Army sensor interoperability needs.

ESTABLISH THE END STATE

The second step was establishing a demonstrated vision of the ISA end state. The value of this step is well understood by industry, and government organizations increasingly recognize it as imperative when trying to influence a common view across a diverse community. One such example is the National Geospatial-Intelligence Agency (NGA) Map of the World Initiative, which provides easy access to the agency's most complete and spatially accurate geospatial intelligence (GEOINT) data. NGA established a working, functional vision of its desired end state, a centralized, dynamic visual interface to explore GEOINT data and link natural and man-made features on, above and beneath the Earth to intelligence observations, using only a small portion of representative data. NGA then challenged the geospatial intelligence community individually to build an integration path toward that goal.

NVESD began working hand in hand with a small subset of carefully picked sensor developers from industry and government to create the first vision of a working integrated sensor architecture and what interoperability capabilities would be developed. The vision that emerged was an interoperable, plug-and-play environment where information could be shared automatically between sensors and systems using common telecommunication languages that operate in disadvantaged networks without major modifications to the sensors or systems themselves. It was important that this vision would show a value proposition for the sensor development community (i.e., what's in it for me?) that would encourage voluntary adoption of sensor integration standards and protocols. Moreover, this value proposition must be clearly understood and communicated, as it would be the foundation for the desired cascading effects associated with the next strategic step.

NVESD carefully constructed an initial ISA demonstrator, which consisted of sensors dynamically communicating on a tactical network using an intuitive visual interface that enabled operators to share sensor data and cross-cue other systems. The demonstrator successfully showcased the following features:

- Open source products and industry standard protocols.
- Fast and simple integration process for sensor developers.
- "One-and-done" integration process with no follow-on requirements for updates. Once a sensor is deemed ISA-compliant, it can interoperate with any other ISA-compliant sensor.
- Consistent and trustworthy dynamic

THE EXPERIMENTATION AND DEMONSTRATION COMMUNITIES CONTINUE TO VOLUNTARILY ENCOURAGE THEIR PARTICIPATING SENSOR DEVELOPERS TO ADOPT ISA COMPLIANCE AS PART OF ENGAGEMENT IN THESE GOVERNMENT-SPONSORED ACTIVITIES.

communication, data sharing and cross-cueing between systems.
- Dynamic and automatic security authorization management.

DEMONSTRATE THE VALUE PROPOSITION

NVESD determined that the best method for influencing change and building consensus within the commercial and federal sensor communities was to prove the value through demonstrations. NVESD developed a campaign for engaging with DOD-sponsored experimentation and demonstration activities that started with small, focused technical events and incrementally increased into much larger, holistic Army experimentation activities.

The quarterly TSOA events, the first demonstration activity for the ISA framework, became the starting point for NVESD's engagement campaign, and enabled sensor developers to see the value that the ISA interoperability provided. The sensors that were integrated with ISA were able to provide real-time, positive feedback to the other sensor providers at the TSOA event regarding the ease of integration and the overall value it provided. This provided a platform of positive engagement that NVESD was able to leverage to build voluntary adoption in subsequent quarterly TSOA activities. That, in turn, quickly developed into overwhelming support. The feedback continues to be a key element of TSOA activities.

To further expand voluntary user adoption through experimentation and demonstrations, the NVESD ISA is supporting the Army Expeditionary Warrior Experiments scheduled for the first half of 2015 and sponsored by U.S. Army Training and Doctrine Command (TRADOC). It is also in discussions regarding involvement in the 2017 Network Integration Evaluation.

SENSORS = SURVIVABILITY

SGT Shetara Hailey, a human resources NCO with 8th Special Troops Battalion, uses night vision goggles to navigate her vehicle through a night convoy during sergeants training July 28, 2014, at Schofield Barracks, HI. Sensors increase the odds of survivability by limiting unnecessary casualties and targeting threats. (U.S. Army photo by SPC David Innes, 8th Theater Sustainment Command Public Affairs)

BUILD CONSENSUS THROUGH FORUMS

NVESD began building broader, formal consensus through domestic and international acquisition and scientific forums, in parallel to expanding the informal, voluntary adoption of the ISA standards within the government and commercial sensor development community. This parallel (and slightly staggered) approach enabled NVESD to leverage the results, metrics and user feedback generated by the demonstration and experimentation venues for the forum discussions. NVESD observed that its efforts to influence the forum discussions were far more effective and efficient when it could support recommendations with real data and results from the demonstration events.

Forums such as the Sensor Computing Environment are helping to promote and formalize the ISA within the Army's acquisition and S&T communities, while the NATO Modeling and Simulation Group is helping to formalize ISA concepts within the international community. These forums provide NVESD with a valuable platform for positive discussion, building toward formal agreement among stakeholders as part of the overall ISA implementation plan. More importantly, interacting with other sensor experts throughout RDECOM and the acquisition community is enabling ISA to identify and incorporate lessons from other communities.

DISSEMINATE THE ARCHITECTURE

The final step was to disseminate the demonstrated and vetted architecture to industry through the "front doors" of government. NVESD identified three key front doors where opportunities existed to post and formalize the ISA framework with government and industry:

NIGHT INTO DAY

In complete darkness and from a significant standoff, Soldiers use medium-wave infrared technology to turn night into day. Researchers at NVESD who are developing sensors for these and other night vision systems look for every opportunity to make them smarter, lighter and smaller, as part of their mission to ensure that Soldiers are well-positioned to respond to new hybrid threats. (U.S. Army photo)

- The formal requirement process, which guides and shapes the standards to which program executive offices (PEOs) and project managers (PMs) build with industry.
- Experimentation and demonstration events, which encourage integration activities among their participants.
- Federal discovery Web portals, which collect ideas and capabilities from industry and academia around the world.

NVESD is working with TRADOC, the U.S. Army Intelligence Center of Excellence and the PEO and PM community to establish the necessary language to promote ISA compliance as part of future requirements developed by the Army in support of tactical equipment and capabilities for 2025 and beyond. By helping the Army adopt a dynamic requirements framework that supports the acquisition community's ability to rapidly respond and adopt new and emerging sensor technologies, the ISA helps ensure that the Army's requirement process remains agile in areas of emerging technology driven by the commercial sector.

NVESD continues to leverage experimentation and demonstration events. ISA has become a key component in enabling such events to integrate and coordinate sensor systems in support of the event mission, goals and objectives. As a result, the experimentation and demonstration communities continue to voluntarily encourage their participating sensor developers to adopt ISA compliance as part of engagement in these government-sponsored activities.

Lastly, federally sponsored innovation Web portals and discovery engines provide an easy entry point to communicate ideas and capabilities with the government. Web platforms such as the Open Innovation Gateway of the Intelligence Community Information Technology Enterprise and the Defense Innovation Marketplace (***http://www.defenseinnovationmarketplace.mil/***) provide excellent means for disseminating the protocols and standards adopted in the ISA framework to the broader S&T community. These Web portals help

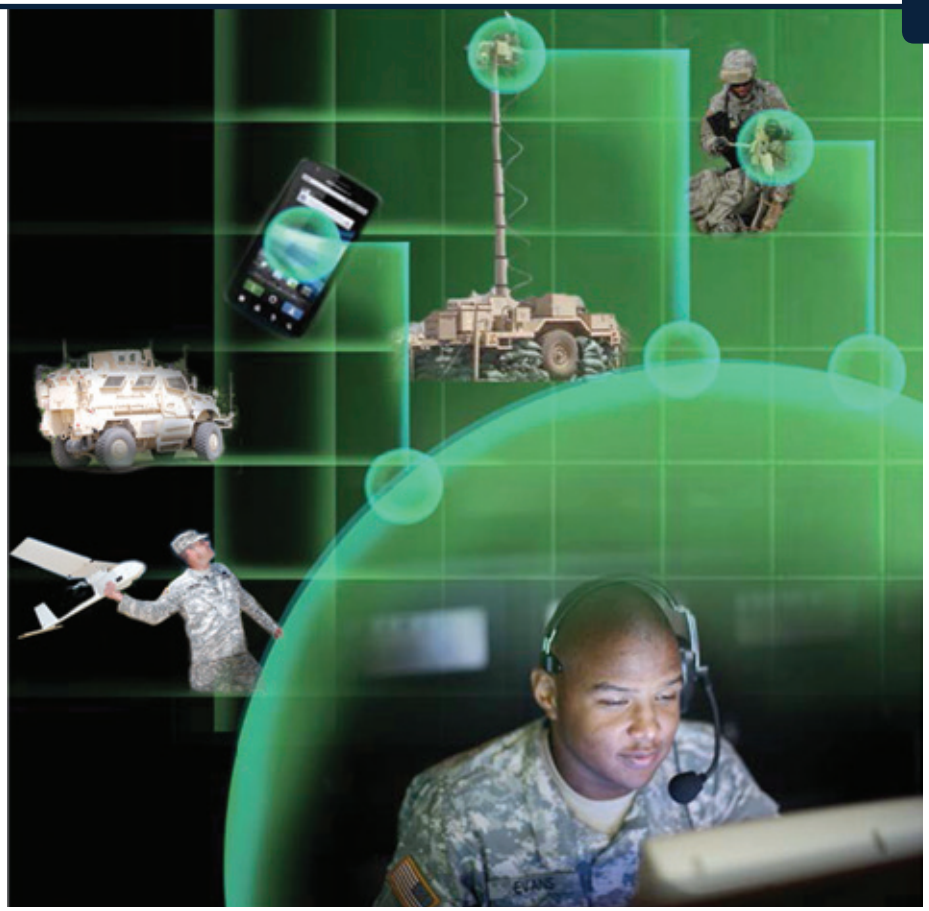
identify industry partners who actively desire to share their technologies in support of military and federal needs.

CONCLUSION

Sensors will be the glue that enables the Army to embrace the global trends shaping warfare in 2025 and beyond. How the Army chooses to embrace global changes and commercial trends will determine in many ways how successful it is in maintaining technical superiority.

Concepts like ISA are but one approach to helping the Army maintain agility in a rapidly changing world. Establishing the adoption of common standards and protocols can be very challenging when working with so many different communities, all of which have different opinions on what "right" looks like.

The five-step approach used to expand and support the ISA framework is a strategic model for incremental adoption. It has enabled the Army to overcome the challenge of adapting to the rapidly changing technological culture of the commercial world while addressing evolving military requirements and positioning the Army to embrace those emerging trends that will provide long-term overmatch capabilities for our Soldiers.



FOUNDATION FOR EMERGING TECHNOLOGY

CERDEC is developing a foundational architecture that will help the Army integrate emerging sensor advances into the traditional development cycles of conventional military platforms and systems. Its approach focuses on partnering with industry to establish common standards and protocols for new sensor integration. (SOURCE: U.S. Army CERDEC)

For more information, contact the authors at ***usarmy.apg.cerdec.mail.cerdec@mail.mil****. To learn more about CERDEC NVESD, go to* ***http://www.cerdec.army.mil/inside_cerdec/nvesd/****.*

THE CHALLENGE FOR THE ARMY S&T COMMUNITY IS ADAPTING TO THE RAPIDLY CHANGING TECHNOLOGICAL CULTURE OF THE COMMERCIAL WORLD WHILE ADDRESSING THE MILITARY'S OWN EVOLVING REQUIREMENTS.

MS. SUSAN HARKRIDER is the deputy director for CERDEC NVESD's Modeling, Simulation and Netted Sensors Division, Fort Belvoir, VA. She holds M.S. and B.S. degrees in industrial engineering from the University of Central Florida. She is a member of the Army Acquisition Corps.

MS CHRISTINE MOULTON is a lead engineer in CERDEC NVESD's Modeling, Simulation and Netted Sensors Division. She holds M.S. and B.S. degrees in mechanical engineering from the Rochester Institute of Technology. She is Level II certified in systems planning, research, development and engineering.

THE FUTURE OF
Aircraft Survivability

Building an intelligent, integrated survivability suite

by Mr. Mark Calafut

The interconnected world of electronic systems—in which it is common for a person to own several advanced devices, including a laptop computer, tablet, smartwatch and smartphone, all wirelessly networked to one another and the Internet—provides an opportunity and a challenge for Army Aviation. As the Army develops its next-generation survivability systems, it has the opportunity to cost-effectively leverage advanced commercial electronics and integration technologies. However, it also faces the challenge of maintaining its technological edge, because many of those same commercial electronics are available to potential adversaries.

Currently, Army aircraft are protected by a collection of survivability technologies, including onboard electronic survivability systems. Each onboard survivability system is designed to be independently effective at detecting or defeating a specific class of weapon systems, such as electro-optic and radio-frequency guided missiles or ballistic munitions. When adversaries employ these weapon systems against Army aircraft, the appropriate onboard survivability system automatically detects and defeats the threat, protecting the aircraft and crew.

Historically, onboard survivability systems were designed and developed independently. As technology matured and new weapon systems emerged, the Army upgraded existing survivability systems, or in some cases, added entirely new survivability systems to the aircraft. Instead of a truly integrated survivability suite, the result is a piecemeal approach whereby modern aircraft are protected by a collection of proprietary systems,

NETWORK IN THE SKY
An AH-64 Apache helicopter patrols the skies over eastern Afghanistan as Regional Command – East and Combined Joint Task Force – 10 Commander MG Stephen J. Townsend and CSM Ray Lewis travel to Observation Post English Sept. 16, 2014, to visit troops. Interoperability of aircraft survivability solutions will make every helicopter an asset in a ground and sky network that should significantly change the scope of situational awareness. (U.S. Army photo by MSG Kap Kim, Combined Joint Task Force – 10 Public Affairs)

often developed by different contractors and generally not built with open architectures that would much more readily enable their interoperability.

The lack of integration presents disadvantages. Although many onboard systems require common components, the independent design and development of the systems prevents components from being centralized and shared. The independent designs came from systems not developed from a systems-of-systems approach with an open standard that established a technical vision for interoperable systems. In many cases, this leads to duplication of components, such as processors or displays that would be unnecessary if the systems were integrated. However, the present lack of integration also prevents onboard systems from communicating with one another and operating cooperatively, which limits reliability and adaptability. For example, if a single protection system fails or is destroyed, the other onboard systems cannot intelligently compensate for that loss.

SMART ALGORITHMS

The potential benefits of integration are striking and go beyond merely addressing existing limitations. Modern networked electronics can implement cutting-edge intelligent algorithms to coordinate activities and adapt to new environments. Similar intelligent algorithms already are in use commercially, enabling smart devices to recommend activities and products by combining information from multiple sources and then connecting a particular combination of characteristics to a product. These algorithms use all available information and systems to make smarter decisions for the user.

For example, if your smartphone recommends that you try dinner at a popular new restaurant, it may have "considered" elements of your personal history, such as your current location, recent searches on your laptop and shows you watched on your smart TV, as well as external information, such as the current weather forecast and restaurant reviews from other customers. Intelligent algorithms then make the connection between your particular combination of attributes and the new restaurant. If Army survivability systems were appropriately integrated, similar intelligent algorithms would enable networked systems to combine and share data across platforms, calculate and assess risk, and autonomously coordinate the best response to a threat.

Although the potential benefits of integration are significant, implementation

FIGURE 1

THE HIERARCHY OF SURVIVABILITY

Aircraft survivability relies on a series of stages to return the aircraft to service. If an aircraft cannot avoid detection by an adversary, it should try to avoid engagement. If the aircraft is engaged, it should then try to avoid or absorb damage and, if all else fails, at least attempt to avoid destruction. A variety of survivability systems and technologies address each stage of this progression. (SOURCE: U.S. Army CERDEC)

faces many challenges, the first of which is technical. Existing systems were not designed to be integrated and do not share common interfaces and standards. The second challenge is programmatic: Developing electronics in a piecemeal fashion is less complex and requires less coordination between organizations. The last of these challenges is systemic: The Army acquisition process does not provide an overarching technical framework that would require different program offices and technical areas to develop systems in concert with one another, using common components and open architectures, and transferring and sharing technologies that should be used together in disparate systems.

To overcome these challenges, the Army science and technology (S&T) community is redefining the concept for survivability from a systems level to a holistic or system-of-systems perspective. From this broader perspective, the S&T community envisions a next generation of intelligent systems that work together to protect the aircraft and provide Army Aviation with a powerful opportunity to reduce costs, increase effectiveness and enhance survivability. These systems employ modular and open architectures that simplify integration and enable rapid component upgrades as technology advances.

THE VISION

Through its Intelligence and Information Warfare Directorate (I2WD), the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC), a subordinate organization of the U.S. Army Materiel Command's Research, Development and Engineering Command, has established Integrated Air and Ground- Survivability as a strategic focus for its S&T programs.

That strategic focus optimizes total platform survivability through the integration and coordination of individual systems, groups of systems and platforms. The effort's long-term vision establishes an intelligent survivability suite capable of coordinating all survivability systems' activities on the battlefield, with the ultimate intention of coordinating distributed platform-agnostic systems to implement the optimal countermeasure.

The integrated air and ground survivability concept allows CERDEC to overcome implementation challenges and plan unified S&T efforts in the electronic warfare and aircraft survivability domains. Although some S&T programs focus explicitly on integration objectives, many programs focus instead on specific systems or technologies. The integrated framework allows the Army S&T community to categorize and conceptually orient programs with respect to the greater aircraft survivability picture, and allows decision-makers in turn to better assess how well current investments address long-term objectives.

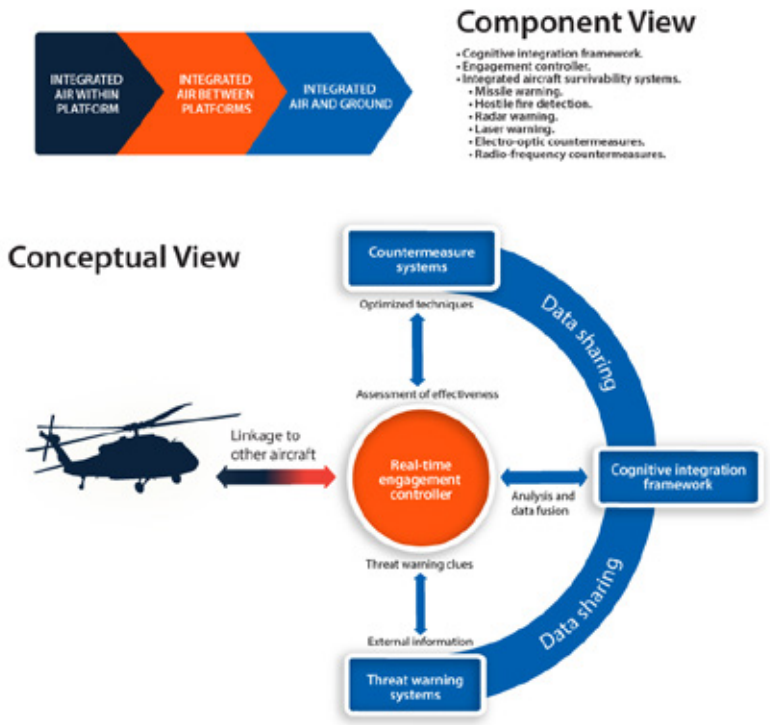
A BETTER DEFENSE

Soldiers load an AH-64 Apache with 2.75 inch rockets during a Forward Arming and Refueling Point exercise with the 642nd Aviation Support Battalion, 42nd Combat Aviation Brigade, New York Army National Guard (NYARNG), on Jan. 15, 2014, near Camp Buehring, Kuwait. Although such rockets can be defensive weapons, a better defense is situational awareness that means they never have to be used that way. (NYARNG photo by SPC Harley Jelis)

Historically, survivability in the presence of a threat has been characterized as a series of stages. (See Figure 1.) The first stage is to avoid detection by the threat. If the aircraft cannot be detected by the threat, survivability is ensured. However, if it is impossible to avoid detection, the next stage is to avoid engagement. If the aircraft can be detected by the threat but not engaged, survivability is again ensured. When it is impossible to avoid engagement, the next stage is to avoid or absorb damage to the aircraft. Finally, when it is impossible to avoid damage, the last stage is to avoid destruction of the aircraft. A variety of survivability systems and technologies address each stage of this hierarchy.

Rather than seeing survivability systems as independent entities, I2WD's integrated approach envisions battlefield survivability systems holistically, as a distributed, coordinated network of capabilities. When Army aviation encounters threats, every networkable asset on the battlefield would leverage information across distributed sources to autonomously collaborate to avoid detection and engagement and subsequently avoid damage and destruction. The network would employ intelligent

FIGURE 2



INTEGRATED AIR WITHIN PLATFORM

At the platform level, the future integrated air suite is coordinated through an integration framework and an intelligent engagement controller. The integration framework provides the connections between onboard systems and the central processing capability to correlate and analyze data. (SOURCE: U.S. Army CERDEC)

algorithms at each stage to access information from all survivability systems on the battlefield, as well as from the intelligence enterprise across the Army, DOD and intelligence community. If detection cannot be avoided, the intelligent network would use all available information to locate and identify the threats. The intelligent network would then prioritize the threats, consider available resources and implement optimal countermeasures for each threat. Getting to that holistic capability will be incremental. The first stages are to share information and coordinate between the survivability systems on the aircraft. The next stage is to bring in information from other on-board sensors. Subsequent stages are to share information and coordinate between platforms and different assets. So, the initial software architecture is intended to be extensible to build the foundation for this long term vision.

HIGH-LEVEL ARCHITECTURE

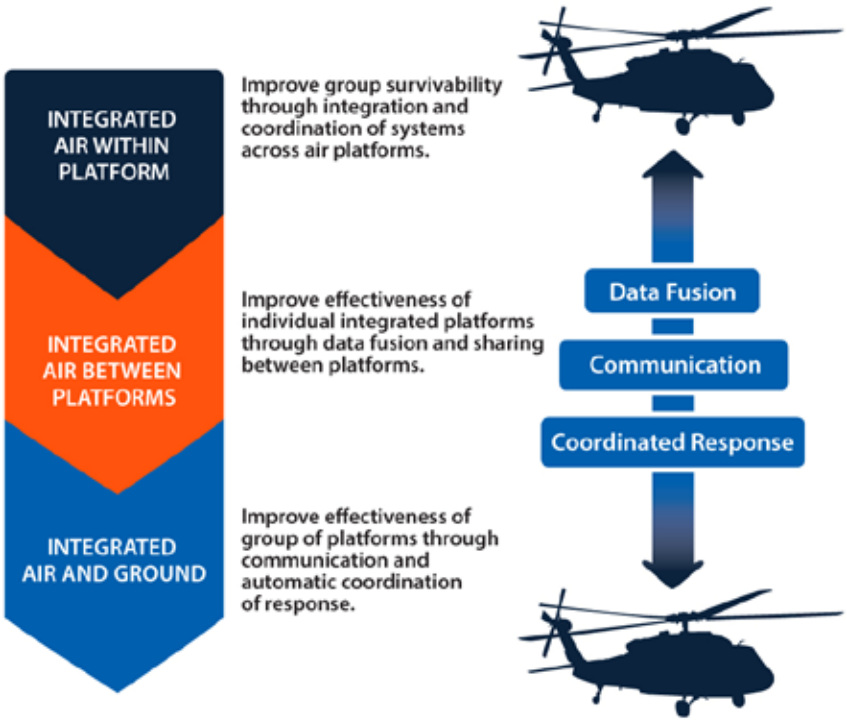
Under the integrated air and ground survivability concept, the future survivability suite is no longer a collection of stove-piped capabilities, but instead a distributed and integrated network of systems across individual air and ground platforms. These systems communicate autonomously with other onboard systems as well as with systems on other platforms.

At the single platform level, the future integrated air suite is coordinated through an integration framework and an intelligent engagement controller. (See Figure 2 on Page 77.) The integration framework provides the physical connections between onboard systems and the central processing capability to correlate and analyze data. The intelligent engagement controller is a software application that operates on top of the integration framework and serves as the "brain" of the distributed survivability suite. It has access to data from all onboard survivability systems, including missile warning systems, hostile fire detection systems, laser-warning receivers, radar-warning receivers and electro-optic and radio-frequency countermeasure systems. The application continuously assesses data from the onboard survivability systems to detect potential threats; it is implemented with an open software architecture that enables new data sources to be incorporated easily into the existing framework.

As the platform encounters threats, the intelligent engagement controller uses advanced cognitive algorithms to locate and identify threats; it then designs optimal countermeasures. In effect, the algorithms identify and implement the sequence of actions that maximize the survivability of the platform, given the unique parameters of the engagement.

At the platform level, individual survivability suites are integrated into a network that continuously shares information and access to resources. (See Figure 3.) The intelligent engagement controller on each platform incorporates information from other platforms when assessing and locating potential threats. Following the identification of threats, the individual suites collaborate to implement a coordinated countermeasure

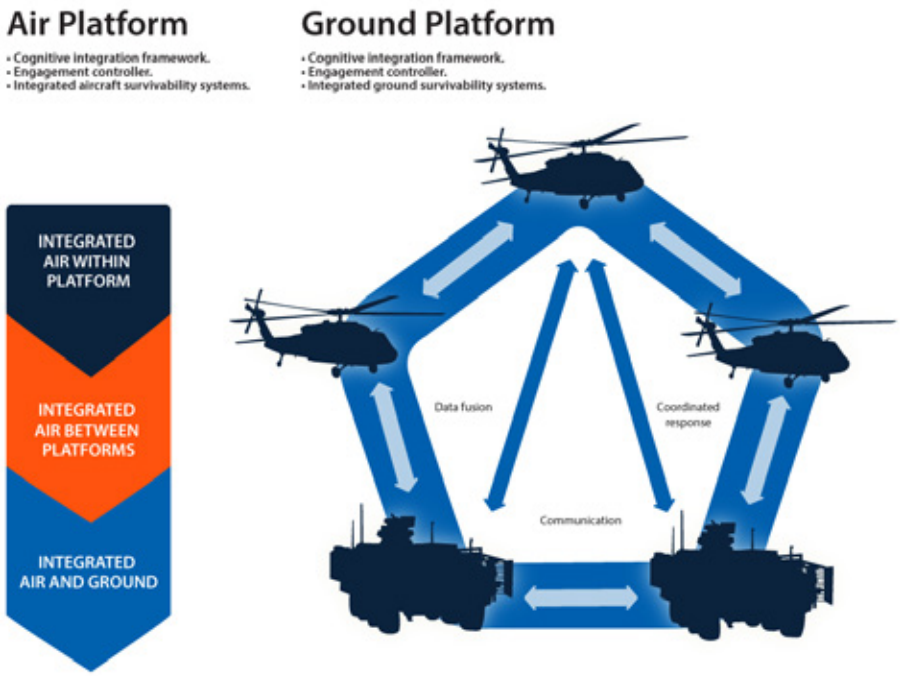
FIGURE 3



INTEGRATED AIR BETWEEN PLATFORMS

Individual platform suites are integrated into a network that continuously shares information and access to resources to improve the effectiveness of individual platforms and groups of platforms. (SOURCE: U.S. Army CERDEC)

FIGURE 4



INTEGRATED AIR AND GROUND SURVIVABILITY

In the future, the network of integrated air systems will also integrate with a corresponding network for an integrated ground survivability system. This will better allow air and ground survivability systems to collaboratively detect, identify and defeat threats on the battlefield. (SOURCE: U.S. Army CERDEC)

response, leveraging assets from all available platforms.

In the long term, the network of integrated air systems is also integrated with a corresponding network of integrated ground survivability systems. (See Figure 4.) The overall network is connected to external resources, including assets from the intelligence enterprise, enabling air and ground survivability systems to collaboratively detect, identify and defeat threats encountered on the battlefield.

CONCLUSION

Developing the future survivability suite involves continuously balancing investment priorities. With potential threat weapons and technologies, the Army must decide how to invest most effectively in these systems and technologies to affect overall survivability with given budgets and resources. Over the next decade, CERDEC I2WD and the S&T community will continue to stay ahead of threat weapon systems by investing in critical component technologies and integration efforts, such as those that are establishing common interface specifications and common control software.

But what do we do with our systems once they are interoperable? How do we intelligently coordinate these systems—whether they are on the same aircraft or distributed across the battlefield—to make better real-time decisions? And what benefit can this "intelligent integration" ultimately have for platform survivability? That's what we, as an S&T community, are trying to build toward and demonstrate over the next several years. A major part of that path is interoperability, but it's almost a step in the vision rather than the vision itself.

Over the next five years, CERDEC I2WD and the S&T community are expected to reach a major milestone, completing a new generation of cutting-edge intelligent algorithms and technologies that have never been used in this application. This milestone marks a major first step in establishing an integrated survivability suite, demonstrating the powerful benefit of intelligent algorithms for aircraft survivability. Overall, CERDEC I2WD's focus on integrated air and ground survivability will ensure that the next generation of Army survivability systems remains at the forefront of capability and technology.

For more information about CERDEC and its work to support the Soldier, visit ***http://www.cerdec.army.mil/*** *or contact* ***usarmy.apg.cerdec.mail.cerdec@mail.mil****.*

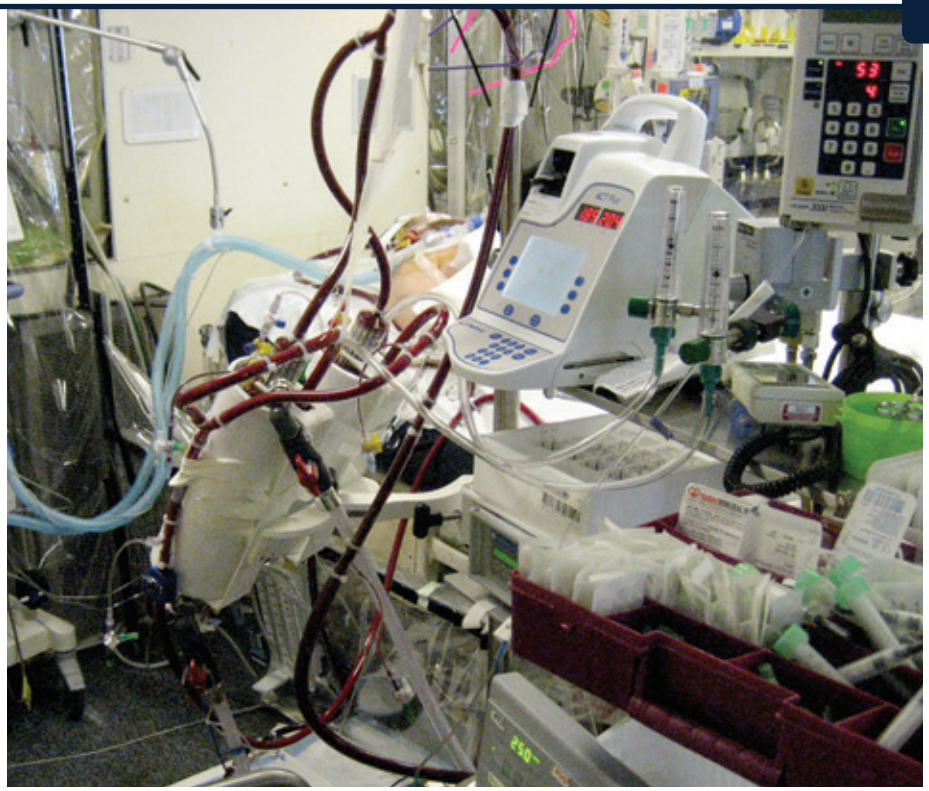
MR. MARK CALAFUT has an M.S. in electrical engineering from Stanford University and a B.S. in economics from Swarthmore College. He is Level III certified in engineering and is a member of the Army Acquisition Corps.

In the 'Golden Hour'

Combat Casualty Care Research drives innovation to improve survivability and reimagine future combat care

by Col Todd E. Rasmussen, Dr. David G. Baer, RADM Bruce A. Doll and MG Joseph Caravalho Jr.

ADVANCING EN ROUTE CARE
Knowledge and materiel solutions from military-specific, requirements-driven trauma research promise to improve survival and recovery after combat injury. Part of this effort will be to innovate for Level II and III care aboard transport vehicles on land, air or sea or within local structures of opportunity. (Photo courtesy of USAMRMC)



LUNG SUPPORT

Extracorporeal (i.e., outside the body) membrane oxygenation (ECMO) technology provides a circuit to replace lung function in severely injured casualties, such as the one shown here. ECMO support machines exist or are being developed through combat casualty care research. Older versions of these artificial organ support machines were much larger and more invasive, and required more personnel to operate them. Discovery and innovation in this area of research will support the use of even smaller, more autonomous units in forward, out-of-hospital environments, including field and en-route care. (Photo by Lt Col Jeremy Cannon, M.D., U.S. Air Force Medical Corps)

The burden of injury among U.S. service personnel during the wars in Afghanistan and Iraq confirmed the benefit of requirements-driven medical research aimed at reducing combat-related mortality and improving survival. While elements of trauma research existed before these wars, they were small, service-focused and not fully coordinated. The wars also exposed the often overlooked fact that, unlike research in the areas of cancer, cardiovascular disease and behavioral health, the nation has no federal institutes or private foundations dedicated to funding trauma research. The sacrifices of our men and women in uniform have re-emphasized the lesson that combat casualty care research is a military-specific imperative; there is no safety net in this endeavor.

With this in mind, the U.S. Combat Casualty Care Research Program (CCCRP) is charged with driving innovation in trauma care to support Force 2025 and Beyond. Central to this effort is a reappraisal of the time between injury and life-sustaining medical treatment—known as the "golden hour" standard. In the past, the end of the golden hour was marked by the time a patient arrived at a fixed facility or traditional echelon of care. Now that advanced resuscitative capability can be pushed closer to the point of injury, regardless of setting or location, we must redefine the golden hour end point. (See Figure 1 on Page 82.)

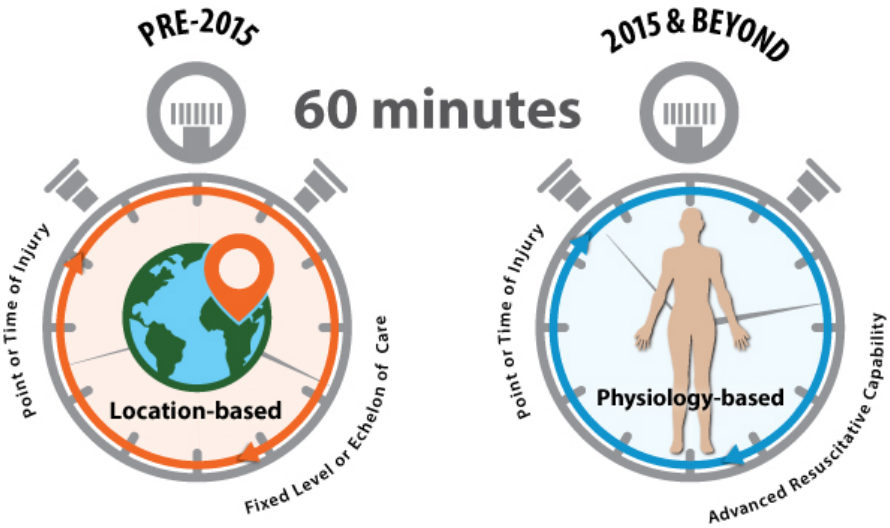
CCCRP PS AND QS

The CCCRP guides the nation's rejuvenated investment in requirements-driven military trauma research. The program, co-located at Fort Detrick, MD, and the Defense Health Headquarters, Falls Church, VA, plans, programs, budgets and oversees the execution of approximately $300 million in requirements-driven research aimed at producing knowledge and materiel solutions for the full spectrum of military trauma care, including at the point of injury, en route in rotary and fixed-wing transport, and in Level II through Level V facilities.

The CCCRP's primary task is the oversight and management of science and technology elements of funding. However, its staff and processes are integral to the life cycle of research, including the advanced development and acquisition of knowledge and materiel and their relevant implementation in the practice of combat casualty care. The mission of the CCCRP is to produce solutions that improve survival and recovery from combat-related injury, and thereby empower and sustain the fighting force.

The program staff resides within the Research Area Directorate – 2 (RAD-2) of the U.S. Army Medical Research and Materiel Command (USAMRMC) and the Research, Development and Acquisition Directorate of the Defense Health Agency (DHA).

FIGURE 1



EVOLUTION OF THE GOLDEN HOUR

The traditional (pre-2015) concept of the golden hour is based on movement of the injured person to a fixed location or echelon of care within 60 minutes. The evolved concept for 2015 and beyond involves delivering advanced resuscitative capability to the injured person within one hour, regardless of location or echelon of care. (SOURCE: Col Todd E. Rasmussen, USAMRMC CCCRP)

FIGURE 2

'BOOKENDS' TO RESEARCH

The JTS provides "bookends" for the CCCRP. On the left side, the JTS and clinical community provide observations and questions that the research program endeavors to answer with knowledge and materiel solutions. On the right side, the JTS and clinical community take, hone and integrate the results of that research to develop best practices and clinical guidance for combat casualty care. (SOURCE: Col Todd E. Rasmussen, USAMRMC CCCRP)

In this construct, the CCCRP guides and advises the investment of core Army appropriations and Defense Health Program (DHP) research, development, test and evaluation (RDT&E) dollars.

Research takes place at two of USAMRMC's subordinate laboratories—the U.S. Army Institute of Surgical Research at Joint Base San Antonio, TX, and the Walter Reed Army Institute of Research in Silver Spring, MD—and at civilian academic institutions and medical centers across the country, which conduct most of the work funded by the DHP.

The CCCRP's blended Army RAD-2 and DHA staff is positioned to maximize coordination of effort among the Army, Navy and Air Force and to create synergy among the different contributors to the medical RDT&E investment. Through active program management, the CCCRP also aims to leverage trauma-related research dollars stemming from congressional special interest programs to maximize the Army and DHA investment. This multifaceted funding supports the advancement of groundbreaking trauma research through a requirements-driven, coordinated program structure.

A THREE-PART DYNAMO

The effectiveness of the nation's investment in combat casualty care research is evident in the 50 percent decline in case fatality rates among U.S. service personnel in Afghanistan between 2005 and 2013. Evidence also exists that the research funded by the CCCRP has been effective in narrowing gaps established by DOD's 2008 Guidance for the Development of the Force, meeting the high-level strategic goals of the military. Additionally, the impact is expanding beyond the military, as lifesaving advances in trauma care increasingly are being translated to

HELO HOSPITAL

SPC Giles Dunlop, a crew chief, raises a simulated casualty into his aircraft June 19, 2014, during a personnel recovery exercise in Kuwait involving a UH-60 Black Hawk of 1st Battalion, 214th Air Ambulance, 42nd Combat Aviation Brigade (CAB) and a Kuwaiti Air Force SA 330 Puma helicopter. The CCCRP's research spans the full spectrum of military trauma care, including at the point of injury, en route in rotary and fixed-wing transport, and in Level II through Level V facilities. (New York Army National Guard photo by SGT Harley Jelis, 42nd CAB)

the civilian setting, benefiting trauma patients across the country.

These successes have been made possible by integrating the CCCRP with its user communities, chief among them the U.S. Joint Trauma System (JTS). The JTS is DOD's "go-to" entity for coordinating and optimizing trauma care in the operational environment. Formalized as a Defense Center of Excellence, the JTS also maintains the DOD Trauma Registry, the largest repository of combat injury and injury management information in history. In this capacity, JTS and the processes it supports generate many of the clinical questions or requirements that need answers from research, and document the efficacy of innovations in care.

Conceptually, experts have referred to the JTS as "bookends" holding up either side of the medical research program. (See Figure 2.) On one side is the JTS' ability to identify and feed relevant gaps in treatment into the research program, which then endeavors to provide knowledge and materiel solutions to resolve those gaps. The other is JTS' ability to receive, vet and integrate outcomes from the research program, be they knowledge or materiel solutions. The result has been that JTS has established, and now maintains, more than 30 evidence-based clinical practice guidelines.

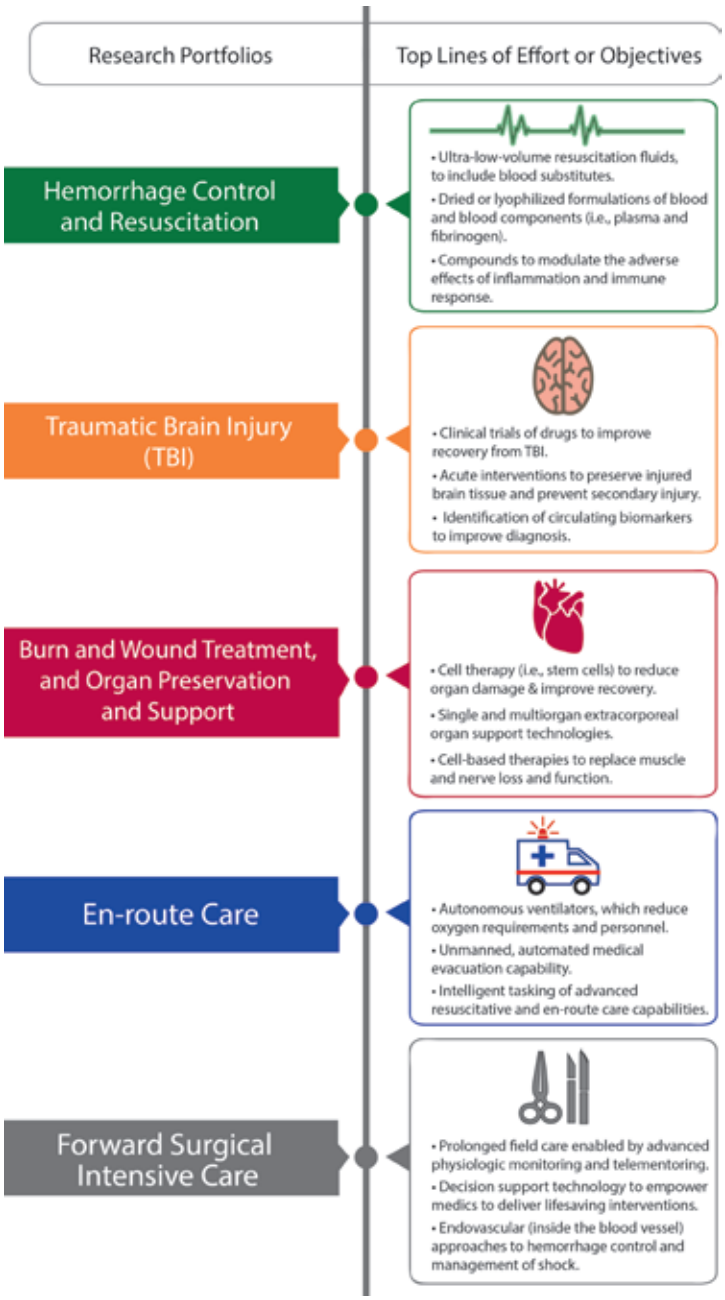
The relationship between CCCRP and JTS is an important construct and a lesson from the wars. The requirements-driven RDT&E program bridges the chasm that otherwise would exist between the bookends of clinical questions or needs on one side, and evidence- and materiel-enabled clinical practice on the other. The swift translation of evidence from this sizable research program through JTS to the battlefield represents a first in military history.

REDEFINING THE GOLDEN HOUR

While no one can predict the future of combat casualty care, it is prudent to assume it will play an important role in U.S. national security in the years ahead. Just as the world has become more complex from a geopolitical standpoint, anticipating the future of combat casualty care has also become more complex. In 2015, the CCCRP finds itself pressed from three sides to consider and develop solutions in a variety of combat injury scenarios, including:

- A limited number of troops executing counterinsurgency operations in remote locations.
- Large, conventional troop formations conducting operations in a Pacific theater.
- Troops deployed and conducting combat operations in large urban areas (i.e., mega-cities).

FIGURE 3



DIRECTING INNOVATION

These portfolios and lines of effort in which the CCCRP aims to drive medical innovation are intended to produce solutions that will not only transform the golden hour and improve survival, but also lessen the medical logistical requirement for the future joint force. (SOURCE: Col Todd E. Rasmussen, USAMRMC CCCRP)

Looking ahead to potential scenarios, CCCRP must ensure that medical innovation rises to the challenge by providing flexibility to combatant commanders regardless of operational complexities—for example, anti-access and area denial, prolonged field care, long-distance medical evacuation or large volumes of casualties.

In this effort, the program must be willing to turn the doctrine of fixed or traditional echelons of care on its side and innovate for scenarios in which Level II and III care is performed aboard transport vehicles (land-, air- or sea-based) or within local structures of opportunity. In such circumstances, field care may be prolonged, lasting for days or even weeks. Combat casualty care research with these complex scenarios in mind promises to enhance resuscitative capability for injured service personnel regardless of environment, leveraging communications networks (i.e., telementoring) and targeted resupplies of materials. In the future, CCCRP must focus on transforming the concept of the golden hour into one bound not by the time to reach traditional echelons of care or fixed facilities, but the time until enhanced resuscitative capability can be delivered to the injured troop, regardless of location or need for transport.

Within CCCRP are five portfolios with lines of effort that aim to drive medical innovation. (See Figure 3.) In these, the program works to provide solutions to transform the golden hour and improve survival, lessen the medical logistical requirement and afford agility to the future joint force.

The medical RDT&E planned in these portfolios is aimed at re-establishing and sustaining optimal physiology, regardless of the location of care. The resulting

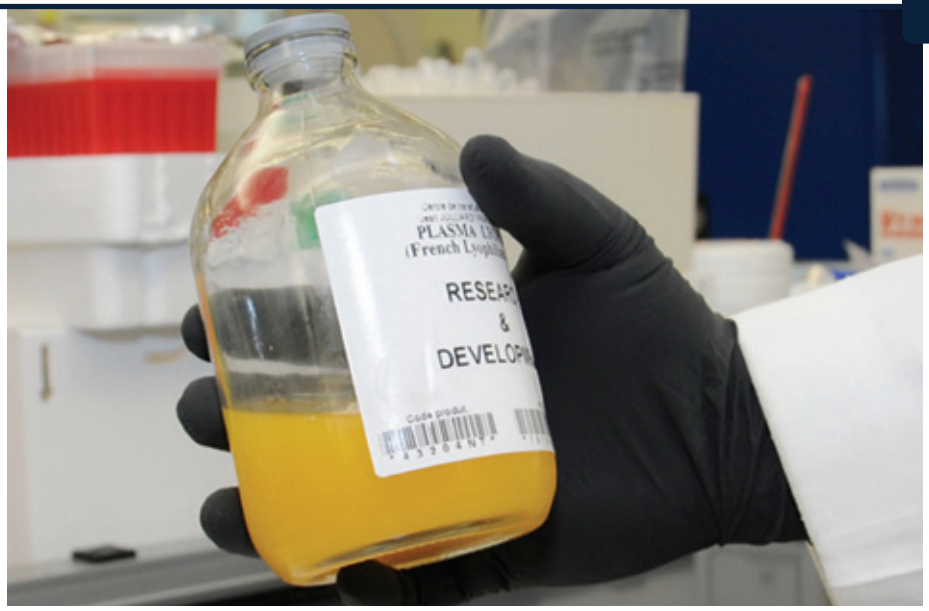
solutions aim to provide continuous resuscitative, intensive, definitive and recovery care that is mindful of, but not constrained by, complexities of the operational environment. Military trauma research, development and acquisition play a vital role in responding to the unique needs of injured U.S. service personnel in current and future combat scenarios. They empower and sustain the fighting force and improve the flexibility of combatant commanders while augmenting national security.

CONCLUSION

The CCCRP's uniquely "top-down," requirements-driven medical research is recognized nationally as an effective alternative to other federal entities that fund investigator-initiated research without specific urgency. CCCRP is essential, as no other entity—federal or private—funds trauma research. As the program sets its eyes on 2025 and beyond, including reappraisal of the golden hour, its efforts will continue to be patient- and physiology-focused, aimed at developing solutions to meet warfighters' needs and enable an agile joint force in future combat missions.

For more information, review the following journal articles and links:

- *"Where do we go from here?"—Journal of Trauma and Acute Care Surgery (**http://journals.lww.com/jtrauma/**), Vol. 75, Issue 2.*
- *"Military trauma system in Afghanistan: lessons for civil systems?"—Current Opinion in Critical Care (**http://journals.lww.com/co-criticalcare/**), Vol. 19, Issue 6.*
- *"Implications of combat casualty care for mass casualty events"—The Journal of the American Medical Association (**http://jama.jamanetwork.com/**), Vol. 310, No. 5.*
- *JTS & CCAT [critical care air transport] Clinical Practice Guidelines, **http://www.usaisr.amedd.army.mil/clinical_practice_guidelines.html**.*



THE STUFF OF LIFE

French lyophilized plasma, a freeze-dried product developed by the French military with U.S. military technology, has helped to successfully resuscitate critically injured U.S. Special Forces combat casualties. Such innovations can transform the meaning of the golden hour. (Photo by Steven Galvan, USAISR Public Affairs)

COL TODD E. RASMUSSEN (USAF) is director of the CCCRP, Fort Detrick, MD. He has an M.D. from Mayo Medical School and a B.S. in pharmacy and premedical studies from the University of Kansas. He has American Board of Surgery certification in general surgery and vascular surgery. He served as deputy commander of the U.S. Army Institute of Surgical Research (USAISR) from 2010 to 2013.

DR. DAVID G. BAER is deputy director of CCCRP. He holds a Ph.D. in genetics and molecular biology from the University of Hawaii and a B.S. in biology from Trinity University. His previous assignments include active-duty Army service as a research scientist at USAISR, where his work focused on improving treatment for combat-injured Soldiers. He is Level III certified in science and technology management and is a member of the Army Acquisition Corps.

RADM BRUCE A. DOLL is deputy commander of USAMRMC, Fort Detrick, MD, and director of the Research, Development and Acquisition Directorate of the DHA, Falls Church, VA. He has a D.D.S. degree from the State University of New York at Buffalo School of Dentistry, an executive MBA from the Naval Postgraduate School and an undergraduate degree from Colgate University. He is a diplomate of the American Board of Periodontology.

MG JOSEPH CARAVALHO JR. is the deputy surgeon general and deputy commanding general of the U.S. Army Medical Command, Washington, DC. He has a Master of Strategic Studies from the U.S. Army War College, an M.D. from the Uniformed Services University of the Health Sciences School of Medicine and a B.A. in mathematics from Gonzaga University. He holds current certification in nuclear cardiology. Before assuming his current role, he served as commanding general of USAMRMC.

Assured PNT

A path to resilient positioning, navigation and timing

by Mr. Kevin Coggins

Positioning, navigation and timing (PNT) has been at the foundation of military capability for centuries, required for functions ranging from navigating the seas to coordinating actions on the battlefield. Instruments such as the sextant, sundial, pocket watch and compass—using the reliable properties of celestial objects, mechanical springs and the Earth's magnetic fields—have been critical in the battles that have shaped our history.

These instruments were ingenious discoveries that continue to prove useful today, with a certain degree of skill and training required to maintain proficiency. The sextant, first built in 1757 and still in use today on Navy warships, and the Davis quadrant, invented in 1594, allowed us to use the stars for navigation, the stars providing an extremely reliable positional reference. The map and compass, a staple of land navigation, are still used by some in the Army. The requirement is, and has always been, access to PNT information that you can trust—assured PNT.

A revolutionary change in PNT occurred with the invention and fielding of satellite-based navigation systems. Scientists at Johns Hopkins University, monitoring radio transmissions from Sputnik in 1957, ascertained a method to pinpoint an object's location based on radio transmissions. Years of hard work ensued, and the first satellite navigation system, Transit, was tested by the Navy in 1959 and became operational in 1964. Transit eventually provided position accuracy of 200 meters and time accuracy of 50 microseconds—an amazing capability used by thousands of warships and seagoing vessels until 1991. This technology matured into the present-day GPS, one of the most complex technological innovations the world has ever seen. GPS, with a position accuracy of better than 1 meter and time accuracy better than 100 nanoseconds, has become a ubiquitous technology in consumer electronics and the U.S. critical infrastructure, from cellphones to the power grid, and is the PNT gold standard for military and civil users worldwide. GPS has become so prevalent and easy to use that most forget its underpinning enablers—and their vulnerabilities.

The next version of military GPS capability, known as Military Code (M-code), is presently in development, undergoing technology maturation and risk reduction. The M-Code signal is much improved over the present P(Y)-code precision military signal, offering additional signal power and a new signal structure. Under Public Law 111-383, Section 913, effective Jan. 7, 2011, procurement funds cannot be used after FY17 to purchase GPS receivers that are not capable of receiving the M-code signal, unless granted a waiver by the secretary of defense. The Chairman of the Joint Chiefs of Staff Instruction 6130.01E, "Master Position, Navigation, and Timing Plan (MPNTP)," effective May 1, 2013, requires the use of M-code-capable user equipment by the time the 24th M-code-capable GPS satellite is declared operational, which is estimated to occur in a five- to seven-year time frame.

In the Army, we have recognized that PNT is a critical enabler of our warfighting capability, and that GPS is the predominant materiel solution that we rely upon. The Army has integrated GPS receivers into most technology-based warfighting systems, such as Stryker, Nett Warrior, Rifleman Radio, the M777 howitzer and many others. These systems depend on PNT to varying degrees for some aspect of their functionality, from precise time to enable communications networks to precise positioning for targeting. The challenge presented to the product director for PNT (PD PNT), under the project manager for terrestrial sensors in the Program Executive Office for Intelligence, Electronic Warfare & Sensors (PEO IEW&S), is to ensure the integrity of PNT and access to it for these dependent systems. Thus the Army can be confident of a resilient PNT capability as technological threats continue to increase—in other words, assured PNT.

POSITIONED FOR ACTION

A Fairchild Republic A-10 Thunderbolt II banks toward Air National Guard joint terminal attack controllers and Soldiers assigned to the 5th Squadron, 1st Cavalry Regiment, 1st Stryker Brigade Combat Team, U.S. Army Alaska, training at Yukon Training Area, AK, Aug. 20, 2014, during the Red Flag-Alaska 14-3 exercise. PNT SoSA is a key part of the Army strategy to achieve assured PNT, which underpins navigation and battlefield communication. (U.S. Air Force photo by Justin Connaher)

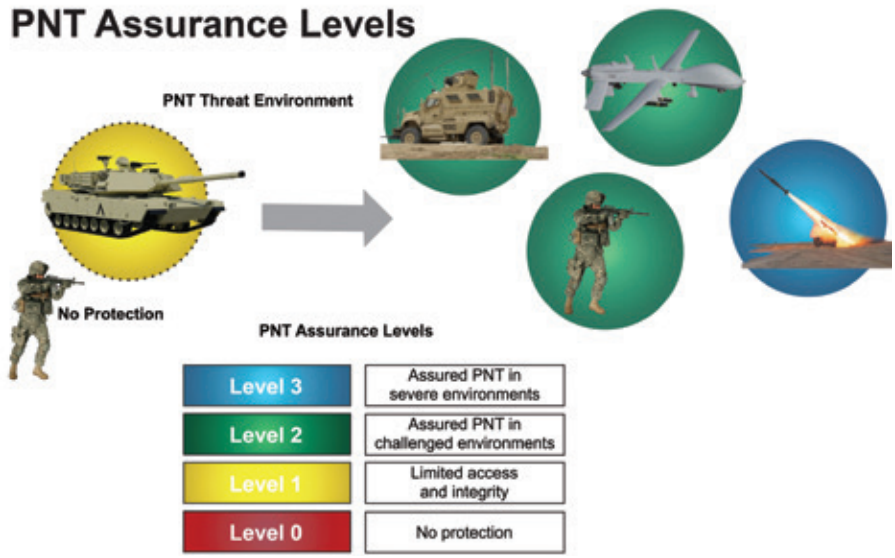
PNT SYSTEM-OF-SYSTEMS ARCHITECTURE

The establishment of the Army PNT System of Systems Architecture (SoSA) is a key part of the Army strategy to achieve assured PNT. The Hon. Heidi Shyu, the Army acquisition executive, directed the establishment of the PNT SoSA and the accomplishment of three objectives:

1. Stay ahead of the PNT threat.
2. Increase efficiencies and eliminate redundancies.
3. Provide an affordable migration path to M-code.

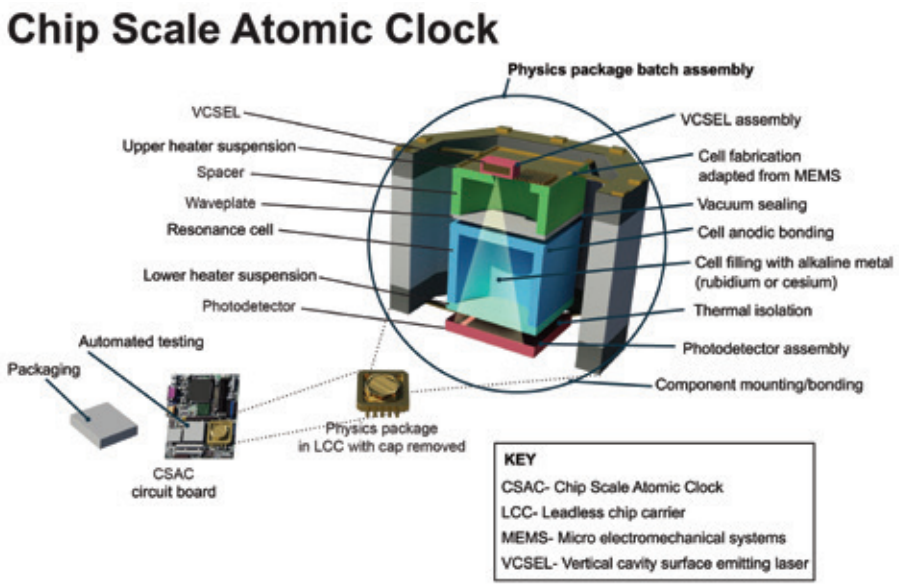
The first objective is focused on enabling an affordable, open systems architecture that is flexible enough to accommodate additional capabilities without incurring expensive system or platform integration and certification costs—a framework that enables a pathway for future innovation. An analogy is the "IT box" concept, with a framework to add additional hardware and software in the future without impacting interfaces and end functionality. An example of this is the PNT Hub, under development in the Assured PNT program—a capability that allows the Army to control the level of PNT assurance through software and hardware configurations, seamless to the platform. The PNT Hub will enable integration of innovative technologies such as the Chip Scale Atomic Clock (CSAC), which harnesses the stable oscillations of the cesium atom to preserve precise time, even in the absence of GPS. In the future, when an engineer creates a novel means to determine positioning and timing, there will be an affordable pathway to insert this technology into a PNT SoSA compliant product.

The second objective—increase efficiencies and eliminate redundancies—is simple, using the Stryker platform as an analogy. Each of the 10 different functional variants of the Stryker employs a mix of supporting electronics, from the Force XXI Battle Command Brigade and



PRECISE PROTECTION

Assured PNT focuses on providing resilient, robust PNT in a scalable architecture that can span various levels of protection. (SOURCE: PD PNT)



TIMING IS EVERYTHING

The PNT Hub will integrate innovative technologies such as the Chip Scale Atomic Clock, which uses the oscillations of the cesium atom to provide precise timekeeping, even in the absence of GPS. (SOURCE: PD PNT)

Below/Blue Force Tracker to the AN/PRC-155 HMS Manpack Radio. Some Stryker vehicles have up to eight GPS receivers, which means eight antennas and up to eight devices that require a cryptographic key for access to the secure military GPS signal. The PNT SoSA addresses this through the concept of platform distribution of PNT—providing the platform with a PNT source that is then distributed to each of the client systems requiring PNT data.

Data networks such as VICTORY (Vehicle Integration for Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance/Electronic Warfare Interoperability) are great enablers of platform distribution. The benefits are a decreased burden on the Soldier, as there are fewer devices to manage, and decreased cabling and weight on vehicles. The consolidation also enables the platform to shift affordably to a single antijam antenna, and enables the next objective, an affordable migration path to M-code.

The benefits of M-code are best achieved when every platform and system for a warfighting element, such as a brigade combat team (BCT), uses M-code. The challenge is that this requires retrofitting and changing out the present receivers with M-code-capable receivers. Under the current approach, in which we lack a PNT SoSA, we have too many receivers to replace for this to be feasible. The third objective of the PNT SoSA addresses this by purposely reducing the number of GPS receivers and the number of form-factors of GPS receivers to a minimum.

LEADING THE CHARGE

The assistant secretary of the Army for acquisition, logistics and technology's System of Systems Engineering and Integration Directorate is leading the charge

to develop the architecture, supported by PD PNT, the HQDA chief information officer/G-6, the U.S. Army Training and Doctrine Command and many others, including participants in the Common Operating Environment (COE). Assured PNT spans each of the COE's computing environments. Army programs will undergo a compliance assessment and evaluation as part of the entrance criteria for milestone decisions starting in FY16.

There are various materiel solutions under development that incorporate the PNT SoSA, including the Defense Advanced GPS Receiver (DAGR) Distributed Device (D3) and the Assured PNT program. The D3, a functional replacement for the DAGR, replaces up to eight GPS devices on a platform and is upgradable to M-code. The advantages of the D3 include both platform distribution and an affordable upgrade path to M-code. The D3 on Stryker, the Army's lead platform for the Military GPS User Equipment program, is scheduled to be installed on multiple ground platforms, including the Stryker and Armored Knight.

The Assured PNT program focuses on providing resilient, robust PNT in a scalable architecture that can span various levels of protection, or PNT assurance levels. This scalable architecture enables the Army to avoid overbuying the capability, as a BCT can be scaled to the required level of PNT assurance; only certain units will require the highest levels of resilience. The Assured PNT program consists of four subprograms that comprise a family of systems required for resilience:

- Pseudolites, or pseudo-satellites, which provide an alternate signal that can be used to increase resilience for area protection.
- Mounted PNT, which provides a scalable architecture for mounted platforms, with technology enablers including GPS, CSAC for accurate time, inertial measurement units for self-referenced position, and an open architecture that allows the integration of other PNT enablers at any time.
- Dismounted PNT, which follows the same concept, except for the Soldier platform.
- Antijam, which includes technologies and devices that allow for blocking of threat signals while enabling a focus on valid PNT signals.

Each of these subprograms is leveraging competitive prototyping and structured testing to drive innovation as the Army shifts to assured PNT solutions.

SETTING COURSE

SPC Christopher Quimbaya, a paratrooper assigned to 1st Battalion, 503rd Infantry Regiment, 173rd Infantry Brigade Combat Team (Airborne), uses the DAGR during a combined-arms live-fire exercise at Grafenwoehr, Germany, March 28, 2014. The DAGR D3, a replacement for the DAGR, is one of several solutions under development that incorporate the PNT SoSA. (U.S. Army photo by Markus Rauchenberger)

CONCLUSION

Ingenuity and innovation are returning to the forefront for PNT, from tapping into the dynamics of the atom with CSAC for self-referenced timing to financial economies from platform distribution of PNT information. The implementation of the PNT SoSA will provide a framework for efficiencies and resilience across Army systems, and the fielding of Assured PNT capabilities will provide the best PNT service to our most important customer—the Soldier.

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

MR. KEVIN COGGINS is the PD for PNT, with PEO IEW&S. He has a B.S. in electrical engineering from the University of Florida and is pursuing an M.S. in program management from the Naval Postgraduate School. He is Level III certified in program management and in systems planning, research, development and engineering, and is a member of the Army Acquisition Corps.

NET BENEFIT

A new way of doing business gets industry into development process earlier

by Mr. John F. Hedderich III

Leading-edge technologies developed in government laboratories are effective, beneficial and relevant if the capabilities can be delivered into the hands of the warfighter. That process of moving technologies from the laboratories to the acquisition and DOD communities, called technology transition, is a complex approach that involves considerable effort from the science and technology (S&T) and acquisition communities.

As DOD faces reduced budgets, it is becoming even more imperative to align all S&T investments with appropriate gaps in user technology and to establish viable transition opportunities early in the program. It is no longer an acceptable acquisition practice to spend limited funds to develop technologies without a strong potential for transition to programs of record.

The U.S. Army Armament Research, Development and Engineering Center (ARDEC) Fuze Division, the Program Executive Office (PEO) for Ammunition and members of the DOD Fuze Integrated Product Team (IPT) partnered to implement an innovative way to improve the transition process for a particularly challenging category, component technology. ARDEC is an element of the U.S. Army Research, Development and Engineering Command.

TRANSITION CHALLENGES

While it is often possible to identify an opportunity for transition, executing the transition itself can be very difficult, especially for component-level technology development efforts. System-level technology efforts usually respond to a direct capability need from the user, but at the component level, efforts usually focus on enabling technologies that are meant to be a single part of a system or multiple systems to address specific user capability needs. Therefore, advances in component technologies can influence or inform system-level requirements as well as producibility and life-cycle cost. For example, an advance in a fuze technology that can be integrated into a system can positively influence the requirements for a specific capability in a specific system against certain target sets.

There are multiple challenges with component technology, including timing of the end-item program, gaining commitment from a project manager (PM) of a program of record via a technology transition agreement, and risk aversion from an industry contractor that has little or no experience with the developed component technology. These challenges are exacerbated when the technology is developed in-house by a government laboratory or research center.

FROM LAB TO RANGE

Soldiers serving with the 2nd Battalion, 77th Field Artillery Regiment, 4th Infantry Brigade Combat Team, 4th Infantry Division shoot a round downrange from their M777A2 howitzer at Kandahar Airfield, Afghanistan, Aug. 22, 2014. A new approach developed by ARDEC and PEO Ammunition in partnership with the DOD Fuze IPT aims to help move new technologies more readily from the laboratory to the acquisition and DOD communities, and eventually to the warfighter. (U.S. Army photo by SPC Ariel Solomon)

To date, the common practice for S&T acquisition strategies has been to develop the technology and demonstrate a maturity level so that it can be handed off to a PM, with the hope and expectation that an engineering and manufacturing development program will complete the development, or that an industry partner will present itself to accept the technology in its respective system design. History has shown that this strategy has a low transition success rate, which often meant that component technologies sat on the shelf at the expense of valuable S&T investment dollars.

A NEW APPROACH

In an effort to boost the potential for component technology transition, ARDEC's Fuze Division, PEO Ammunition and members of the DOD Fuze IPT together set out to increase transition opportunities for component-level technology developed in-house. The DOD Fuze IPT has developed and is executing a strategic plan with the goal of advancing and maintaining a healthy U.S. technology and industrial base for fuzes, which is important for current and future production.

PEO Ammunition and ARDEC representation on this IPT is significant in size, making substantial contributions to execution of the strategic plan. One of the strategic plan actions was to develop acquisition best practices, specifically to increase industry involvement in government in-house development earlier in the product life cycle. Specifically, a proposal was made to develop a pilot approach for fuze component technology initially designed in-house at ARDEC.

According to Vince Matrisciano, PEO Ammunition representative to the IPT and originator of this concept, the main thrust of this pilot process was to involve industry in a substantive way during the

STRENGTH IN NUMBERS

With the goal of increasing the potential to transition component technology to programs of record, ARDEC's Fuze Division has partnered with PEO Ammunition and members of the DOD Fuze IPT in an innovative approach to involve industry earlier in the development process. Historically, standard practice has been to develop the technology and hope that an industry partner will accept it. (Image courtesy of U.S. Army Acquisition Support Center)

design phase, as opposed to waiting until the end of the S&T program, when typically it would be handed off to a PM for a program of record.

The expectation was that involving industry during the design phase would increase industry's knowledge of requirements development as well as its understanding of the technology's fundamental functions and the rationale used to make technical decisions and system trades. In turn, industry would provide valuable feedback on the design to reduce life-cycle cost and producibility risks.

With this knowledge, industry members would be more inclined to accept transition of the government component technology when the opportunity arose—for example, as a subcontractor to a system prime contractor. In this way, the potential transition opportunities multiply many times over, with multiple industry partners involved. This approach also allows for a crossover to other munitions applications outside the purview of PEO Ammunition, to other Army applications and to other service applications.

IMPLEMENTATION

To execute this approach and increase industry involvement, ARDEC and PEO Ammunition, with the support of the DOD Fuze IPT, reached out to the National Armaments Consortium (NAC) to help establish the pilot process. The NAC was a logical partner, as many of the fuzing industry manufacturers were NAC members. The opportunity to participate was advertised within the NAC membership and through Federal Business Opportunities to ensure that all interested parties could take part. The result of these discussions was a plan to establish a cooperative research and development agreement (CRADA) between ARDEC and NAC, with each respective NAC industry partner agreeing to the CRADA.

As anticipated, the industry partners with an interest in this technology all responded, and all signed the CRADA, participating at their own expense. The expectation is that the industry participants will attend all technical reviews and demonstration testing, and provide value-added, individual feedback on the design at a time in the life cycle when it is easiest to change.

In exchange for their contribution, industry participants get a detailed look at the government in-house design as it happens and can include the potential future transitions in their business planning and forecasts. Industry provides no proprietary information in its feedback. Nor is feedback attributed to the specific partner that submitted it, to encourage a free exchange of information. All feedback, including the government's response, is shared with all of the CRADA partners.

So far, the government has executed this pilot process in a preliminary design review. Industry partners received read-ahead packages and attended two days of technical presentations. These interactive sessions generated additional feedback that was documented and shared with

all of the CRADA partners. Other major milestone events, such as critical design review, test readiness review and Technical Readiness Level 6 demonstration testing, will provide additional opportunities for industry participation.

THE FINE PRINT

Engaging industry in technology development efforts before Milestone B is not without challenges. While the government does not provide funding to any contractors under this CRADA arrangement, the government must maintain fairness in competition by not providing a competitive advantage to one or a few contractors.

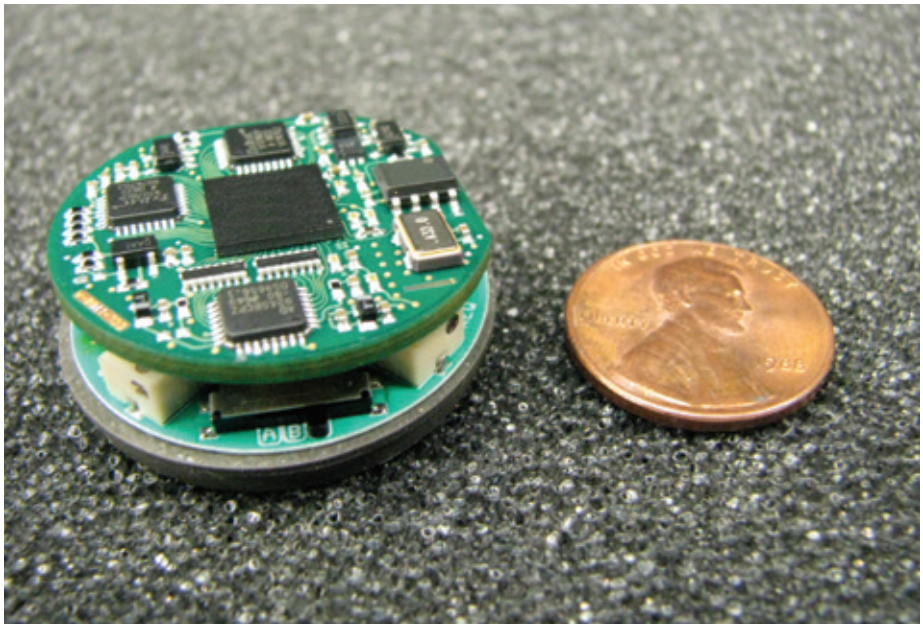
To maintain fairness, the ARDEC IPT vetted its approach through multiple legal reviews and put safeguards in place. For example, any interested and qualified industry partner was invited to participate to ensure that competition was full and open, although security and data distribution restrictions applied. Additionally, the ARDEC IPT provides government design data and non-attributed comments to all participating partners at the same time. These and other safeguards are meant to ensure that no one has an advantage, and that the approach is fair to both industry and the government.

CONCLUSION

This pilot is being executed for a fuze development effort, and the team will continue to look for ways to refine and improve the process. Should this process prove successful, it would be another mechanism not just for ARDEC, but also for other government organizations to increase the transition opportunities for in-house development of component technologies.

Investment in component-level technologies has the potential to enable technologies that cross multiple systems, with the possibility for a very high return on investment. ARDEC has a talented cadre of engineers and scientists who are capable of in-house design work that can deliver new capabilities to the warfighter. The only way that those capabilities get to the warfighter, however, is if the technology transitions into programs of record and production by industry.

ARDEC and PEO Ammunition are attempting to break the mold of targeting one future program of record and expecting industry to pick up a technology with which it has no prior experience. Teaming early with industry not only helps proliferate the technology, but also allows for a collaborative effort between subject-matter experts in government and industry to develop the best products for our warfighters.



SMOOTHING THE TRANSITION

A pilot program executed for the development of small-form factor fuze technology components like this one, integrated into munition systems to provide advanced capability for the warfighter, emphasizes the value of early teaming with industry to increase transition opportunities. (U.S. Army photo)

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

MR. JOHN F. HEDDERICH III is acting director of ARDEC at Picatinny Arsenal, NJ. Previously, he was executive director of ARDEC's Munitions Engineering and Technology Center and the senior technical executive for enterprise management. He was responsible for ARDEC's technology base and manufacturing technology programs, strategic planning, and portfolio and knowledge management. A member of the Senior Executive Service since November 1998, he holds a B.S. in mechanical engineering from Fairleigh Dickinson University and is a graduate of Harvard University's Senior Executive Fellows Program.

TECHNICALLY SPEAKING

Simple *is* Hard

Explaining science plainly can lead to new insight—and a challenge

by Dr. Roberto Trotta

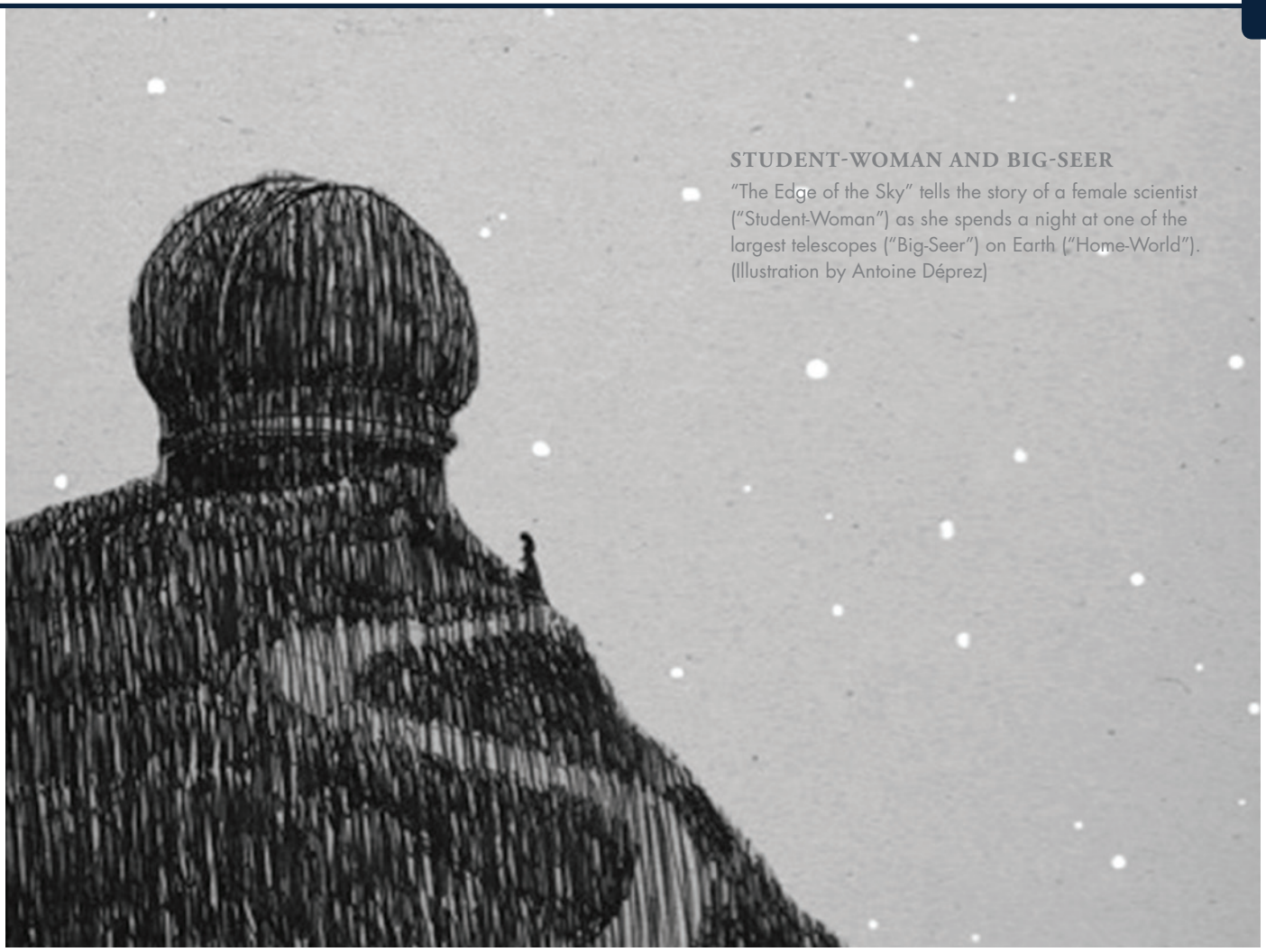
Technically Speaking is a new column for Army AL&T magazine. Its title is frankly ironic, because its aim is to challenge subject-matter experts to explain a highly technical job, a system or a concept in the plainest language possible. The point is that, as Dr. Jacques Gansler and many other former and present defense dignitaries have noted, DOD science and technology (S&T) experts often do not do the best job of explaining what they do and why it's important.

Every work specialty—from short-order cooking to high-rise construction to nuclear research—has its own language, which often is shorthand for something that would be laborious or time-consuming to say in plainer language when probably everyone around the "office" knows what you're talking about. Jargon can also be aspirational—learning it can be a rite of passage for people on their way to becoming highly skilled professionals. But a significant gulf remains in this society between the actual work of S&T and the public's understanding of it.

For DOD and the Army, there are potentially very real consequences to this inability to explain clearly what the work is and why it's important. If Capitol Hill doesn't understand the value of a program, or if it is open to ridicule because it is poorly explained, that makes the case for funding much more difficult. Complicating the technical jargon are the additional levels of government jargon.

From Alan Alda's Center for Communicating Science to the Ten Hundred Words of Science Challenge, there are many efforts to challenge highly technical people to speak plainly about their work. Through this column, Army AL&T is joining them with our own challenge to the Army S&T community.

For this inaugural column, we reached out to perhaps the most accomplished explainer of hard-to-understand concepts, Dr. Roberto Trotta, a British astrophysicist and author of the book "The Edge of the Sky." Trotta agreed to be our inaugural explainer.



STUDENT-WOMAN AND BIG-SEER
"The Edge of the Sky" tells the story of a female scientist ("Student-Woman") as she spends a night at one of the largest telescopes ("Big-Seer") on Earth ("Home-World"). (Illustration by Antoine Déprez)

A MOMENTOUS DISCOVERY ... OR IS IT?

On July 4, 2012, Joe Incandela, the spokesperson for the CMS [Compact Muon Solenoid] experiment at Large Hadron Collider in Switzerland, the largest particle accelerator in the world, announced to a packed auditorium: "If we combine the ZZ and gamma-gamma, in the region of 125 GeV they give a combined significance of 5 standard deviations!"

As everybody cheered (and Peter Higgs shed a few tears), it was not immediately obvious to anybody but the particle physicists in the room what the significance of this was. What Incandela was saying was that they had discovered the Higgs boson, the "God particle" that gives mass to all other particles.

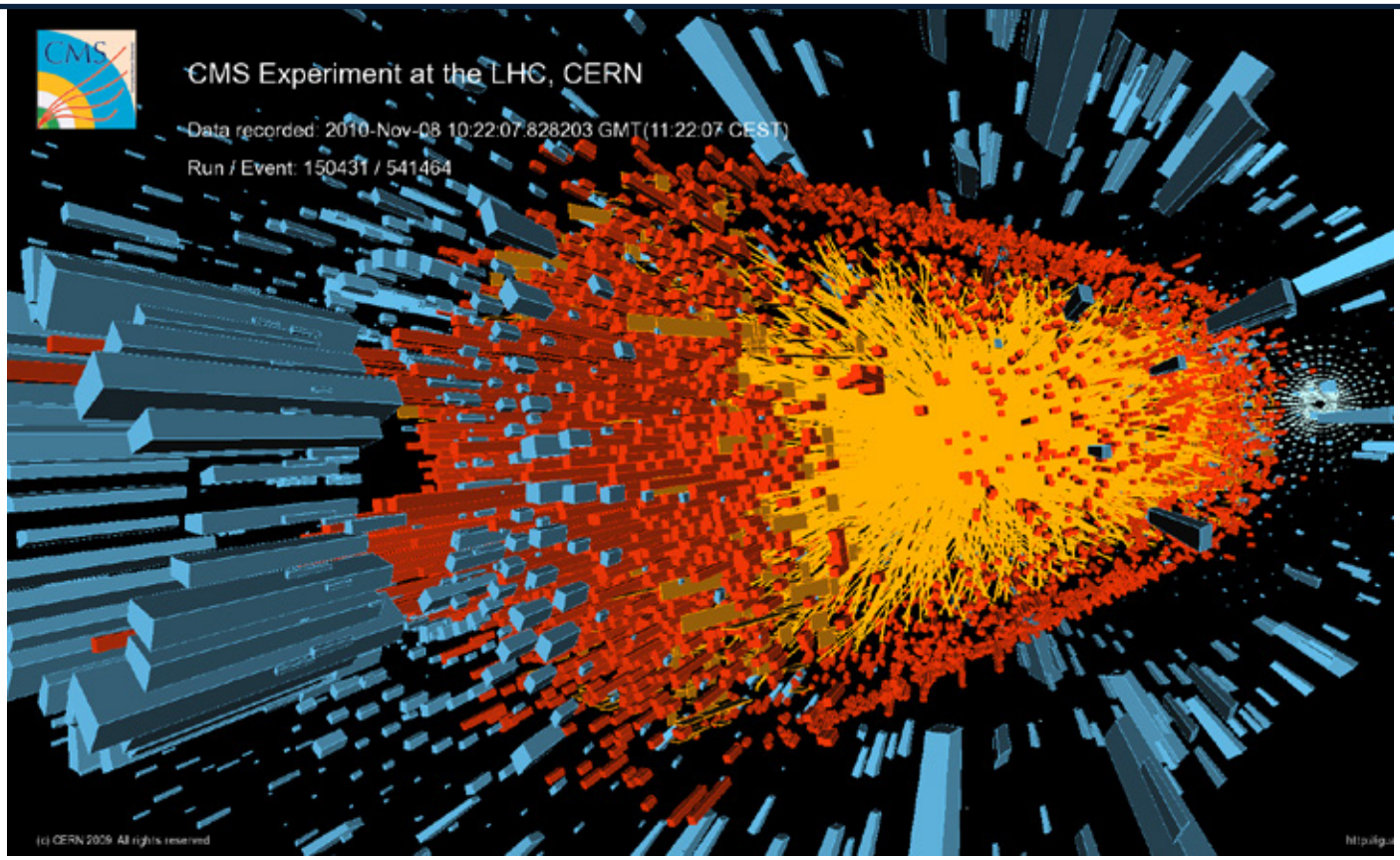
For the public at large, nothing short of a translation would do.

JARGON: PUBLIC ENEMY NO. 1

The obvious enemy to clear communication with the public is jargon. Whether it's scientists talking about their work to nonspecialists, or Army acquisition officials making their case with defense undersecretaries, we are all guilty of slipping into jargon all too often, sometimes involuntarily.

But fundamental science is funded with taxpayers' money, and I believe it is a duty for the professional scientist to engage the public in a two-way discussion about their work, its objectives and the very reason of its being. The first obstacle to this aim is jargon.

As an astrophysicist with a passion for communicating with the public, for the last decade I have been looking for novel ways of engaging new audiences with my science. All this time—I now realise—what I was searching for was a language to translate in a more pictorial, immediate way the often complex and abstruse cosmological concepts my research is about: dark matter, dark energy, the Big Bang and the fundamental nature of the universe. A language capable of overcoming the barrier that is the technical knowledge gap between the science professionals and the public.



BIG RING

Student-people take normal matter drops and make them fly around the Big Ring almost as fast as light. (Image courtesy of CMS Experiment/CERN)

LESS IS MORE

Then one day in January 2013, I stumbled on the Ten Hundred Words of Science challenge—a website collecting people's descriptions of their jobs written using only the most common 1,000 words in English.

The format was inspired by a cartoon by Randall Munroe, the creator of the XKCD website. This is a humorous site with geeky sticklike cartoons, often revolving around physics, maths, computer science and other technical subjects. Randall had drawn a picture of the Saturn V moon rocket (or "Up-Goer Five"), and labeled its parts using only the 1,000-words list.

That got me thinking: Perhaps this was the new language I had been looking for! And perhaps it could be used to talk about everything in the universe, not just my job.

IN SO MANY WORDS ...

"The Edge of the Sky" is the result of that small eureka moment: a short book that follows a female scientist ("Student-Woman") as she spends one night at one of the largest telescopes ("Big-Seer") on Earth ("Home-World"), and recounts the tale of how we got to understand the universe ("All-There-Is") and of its many outstanding mysteries. All of it using only 707 words out of the allowed 1,000.

In the simple, straightforward language of my book, this is how the Higgs boson was discovered:

There is a city in a land full of safe places to put your money in. People there know how to make sweet, dark bars that make your mouth water. They build tiny wood houses that tell the time with the song of a little flying animal, also made of wood.

Near that city, student-people have built a large ring under the ground. It would take you over five hours to walk around that Big Ring.

Student-people take normal matter drops and make them fly around the Big Ring almost as fast as light.

Then they pick a point where they make the normal matter drops hug each other, and they look at what kind of other drops come out of their hot kisses.

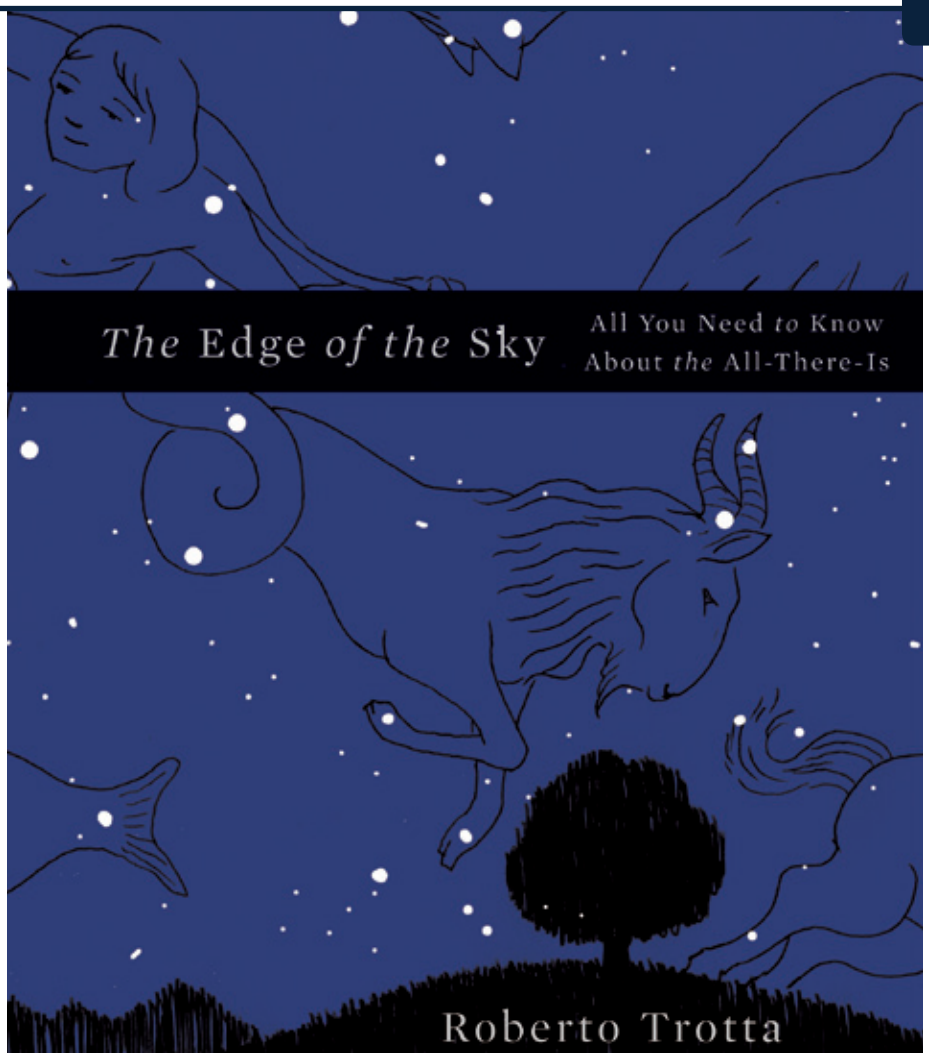
This way, student-people have already found a new type of drop that no one had seen before, but that Doctor Higgs had a long time ago said should be there.

Dr. Higgs was very happy about this.

One thing I learnt from my foray into experimental literature with "The Edge of the Sky": Limiting our lexicon to such a drastic extent forces us to rethink concepts and ideas we thought we were familiar with. The result was for me a refreshingly new perspective on my subject—and one that I hope my readers will enjoy.

Writing with only those simple 1,000 words was harder than I thought. I'd like to invite you to take the 1,000 words challenge and try to explain your own work by visiting my website, ***http://robertotrotta.com/1000-words/***. I'd be delighted to hear from you.

DR. ROBERTO TROTTA is a theoretical cosmologist at Imperial College London, where he studies dark matter, dark energy and the Big Bang, and a Science and Technology Facilities Council Public Engagement Fellow. He is the recipient of numerous awards for his research and outreach, including the Lord Kelvin Award of the British Association for the Advancement of Science and the Michelson Prize of Case Western Reserve University. "The Edge of the Sky" was published in September 2014 by Basic Books. Publisher's Weekly said, "…in Trotta's hands, this beautifully written book, with its limited vocabulary, soars."



'THE EDGE OF THE SKY'
Trotta's book is an adventure in describing the universe and astrophysics using only the most common 1,000 words in English. He ended up using only 707 of them.

How did he do? Go to the U.S. Army Acquisition Support Center's Facebook page at Facebook.com/usaasc and let us know how you think Dr. Trotta did with his explanation. You, too, can take the challenge. Send your explanation of a complex technical or scientific concept, system or job , using only the 1,000 most commonly used words in the English language, to ArmyAlt@gmail.com. Each issue of Army AL&T will feature a new explanation.

SPOTLIGHT:

SSG Eliud Temblador

From the front lines to behind the scenes

SSG ELIUD TEMBLADOR

COMMAND/ORGANIZATION:
413th Contracting Support Brigade, 729th Contracting Center, Schofield Barracks, HI

POSITION AND OFFICIAL TITLE:
Contract specialist

YEARS OF SERVICE IN WORKFORCE: 2

YEARS OF MILITARY SERVICE: 8

AWARDS:
Army Commendation Medal (6); Army Achievement Medal (5); Army Good Conduct Medal (2); Noncommissioned Officer Professional Development Ribbon (2); Overseas Service Ribbon (3)

Before moving to contracting, SSG Eliud Temblador spent six years as a signal support specialist with the 4th Stryker Brigade Combat Team, 2nd Infantry Division, deploying twice to Iraq. A desire to earn a college degree led him to Army acquisition, where he now serves as a contract specialist with the 413th Contracting Support Brigade (CSB). "The business aspect of the MOS [51C military occupational specialty] really appealed to me, as did the advancement opportunities that it provided for NCOs and the chance to do something totally different from being a signal support specialist," said Temblador.

"The biggest challenges initially were getting used to being behind a desk and learning the policies and procedures behind contracting and acquisition," he said. "But over time, it became second nature—almost like muscle memory, really."

Does he miss his days in the infantry? "Not really. For me, working in contracting is very rewarding. We have a hand in making sure the warfighters have what they need to accomplish the mission, and seeing them use what we provide is very gratifying."

Although he now spends a good part of his day in an office, he keeps his skills sharp by participating in Soldier competitions. Last year, Temblador beat 11 other Soldiers to win the U.S. Army Contracting Command's Best Warrior competition. He was also named the U.S. Army Expeditionary Contracting Command Best Warrior. The four-day Best Warrior contest included an appearance before a board of command sergeants major, battle drills, an urban orienteering course, an 8.2-mile road march and weapons qualification. The win qualified Temblador to compete in the U.S. Army Materiel Command's Best Warrior competition in July, where he was the runner-up.

"I've competed in events like these for about five years now, and I really like it. Win or lose, I love to compete, and I like being out there matching my skills against Soldiers who are the best in their fields," he said.

What do you do, and why is it important to the Army or the warfighter?

I am currently a contract specialist and contingency contracting officer with the 413th CSB's 729th Contracting Center. My job is to support United States Army Pacific by providing installation contract support and being a good business adviser to the units we support. We also provide contract support for missions overseas in the U.S. Pacific Command area of responsibility.

How did you become part of the AL&T Workforce?

I heard about the MOS in 2010 and saw it as a good opportunity to provide the warfighter with a different type of support. Coming from an infantry brigade, I didn't know how things ended up in a forward operating base—everything from showers to comms equipment was there when we needed it, and we didn't give much thought to how it got there. [Working for the CSB] opened my eyes to all the behind-the-scenes work it takes to support a mission of that magnitude.

During your career with the acquisition workforce, what changes have you noticed that have impressed you the most? How do you see it continuing to change in the future?

Many things have been streamlined to make our everyday jobs a little easier. I have been most impressed with all the advances that have been made regarding tools that we use while being deployed—e.g., communications equipment, vehicles and weapon systems, as well as apps for smartphones and tablets. Going forward, I see the acquisition world continuing to leverage the experience of the commercial industries by learning their business practices and implementing them throughout DOD.

A SOLDIER'S DRIVE TO COMPETE

Then-BG(P) Theodore C. "Ted" Harrison, commanding general, U.S. Army Contracting Command (ACC), congratulates Temblador on his victory at the ACC's Best Warrior competition in 2014. Temblador relishes the challenge of matching his skills against those of Soldiers who are the best in their fields. (Photo by Larry D. McCaskill, ACC)

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

Most uniformed military members still don't really understand everything that must be done to support a base or a deployed unit. They are mainly surprised by the number of small businesses that work with the Army and how important they are to day-to-day operations on any base.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

My greatest satisfaction is being able to work with so many highly skilled civilians and Soldiers. Our staff is about 30 to 40 people, most of whom have been doing this for years. We have people who served in the Air Force and Marine Corps, and others who have served as civilians in a lot of different agencies. We're fortunate that we can access those backgrounds and skill sets to support the warfighter, and there is not a day that goes by when I don't learn something new from someone in my office. The wealth of knowledge is amazing and makes it a very enjoyable work environment. I can't see myself doing anything else, really. I think I'll be here [in the Army] until they ask me to leave.

— MS. SUSAN L. FOLLETT

"FOR ME, WORKING IN CONTRACTING IS VERY REWARDING. WE HAVE A HAND IN MAKING SURE THE WARFIGHTERS HAVE WHAT THEY NEED TO ACCOMPLISH THE MISSION, AND SEEING THEM USE WHAT WE PROVIDE IS VERY GRATIFYING."

LEAN THINKING

Applying lean business practices to single-award task and delivery order processing

by CPT Sean Dunstan, CPT Craig Falk and MAJ Jeremy Gottshall

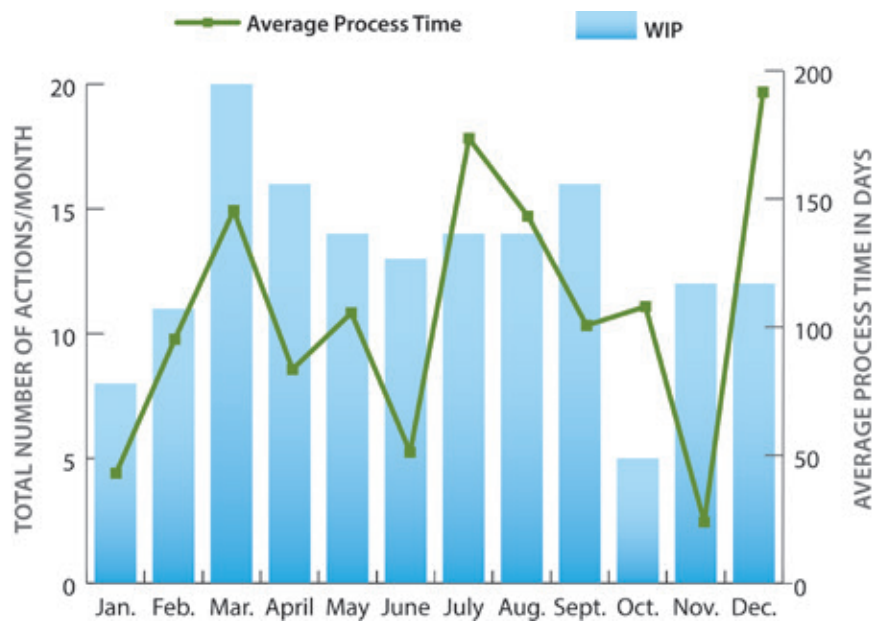
In the summer of 2014, we three Army logistics officers participated in the MG James Wright Graduate Business Fellowship and examined process time for single award indefinite delivery, indefinite quantity task and delivery orders based on a perception by the chief customer that orders were taking too long to award. That customer was the the U.S. Army Communications-Electronics Command (CECOM), supported by U.S. Army Contracting Command – Aberdeen Proving Ground, MD (ACC-APG). Like all Army life-cycle management commands, CECOM relies on ACC for acquisition support.

Interviews with more than 20 process stakeholders at APG, a review of business intelligence data and subsequent statistical modeling revealed that current task and delivery order process times were characterized by a high degree of statistical variation.

Almost immediately we discovered that variability in process time is not related to the dollar value of an action, despite the conventional wisdom that higher-value actions should take longer because they warrant more compliance reviews. Instead, our research showed that a contracting officer's workload at a given time and the length of time it takes to process contract actions correspond significantly. Figure 1 shows that as the amount of work-in-process actions or workload in a given month increases, so, too, does the average processing time for those actions.

Ultimately, lean-thinking analysis enabled successful classification of the forms of waste that characterized the task and delivery order process, including redundant steps that spur overprocessing, discordant views of cycle time and unproductive use of military personnel.

FIGURE 1



WORKLOAD AFFECTS PROCESS TIME

While the dollar value of contract actions failed to evince a statistically significant impact on order process time, the authors' research indicated that workload affects the length of time to complete a task or delivery order. As the number of work-in-process (WIP) actions increases—shown by the count of orders processed in a given month—so does the average cycle time for those actions. (SOURCE: ACC-APG)

PROCESS REDUNDANCIES

The task and delivery order process is replete with redundancies, many of which can be addressed at the local level. An acquisition strategy is required for all contract actions estimated at $10 million or more. If a strategy is not done on the base contract, one must be completed for every subsequent task or delivery order. Developing an acquisition strategy, which outlines acquisition objectives, resourcing constraints, evaluation metrics and project-critical milestones, is a significant undertaking. Contracting officers are often tasked with conducting their own research and coordinating with program managers and other third parties to successfully define these elements and prepare a contract action for initiation. While it may seem expedient to bypass this step during the development of a base contract, creating the acquisition strategy at the base saves time and has the added benefit of reducing future workload. Completing an acquisition strategy for each individual order can significantly increase process lead time, adding anywhere from 10 to 45 days for each order.

Contracts not prepriced in the base award are negotiated each time a task or delivery order is prepared. Before the contracting officer can certify cost or pricing data, the data require consent from the customer, who, in turn, must obtain these particulars from the contractor. Prepricing, which is in essence agreeing to terms in the base contract, shaves from 15 to 60 days off the order process.

Even requirements of a materially technical or sensitive nature, for which only major defense contractors possess the necessary capabilities, still warrant approval from the ACC-supporting small business office. When the customer's requirements unquestionably exceed the capability of small businesses, contracting officers can request an individual waiver for a solicitation. Completing a waiver while developing the base solicitation eliminates the need to revisit small business office compliance reviews throughout the task or delivery order process, and eases the workload on the sole small business representative servicing the respective ACC component. Obtaining a small business waiver when applicable can reduce order cycle time by three days to two weeks or more.

Incorporating options into task or delivery orders can expedite the process for subsequent orders, as the process to exercise an option has seven steps typically completed in approximately 30 days, as opposed to the 20-plus-step baseline process that takes between 100 to 270 days to award. The expedited procedure facilitates staff continuity and promotes streamlining of the overarching process by eliminating work-in-process inventory at needless steps. Figure 2 on Page 102 compares the use of options to the standard order process.

WHAT DEFINES ACTIONABLE?

A pervasive lack of consensus exists among process participants as to what comprises an actionable requirements packet, legally and sufficiently. Some contracting officers and contract specialists wait until customers submit complete, error-free requirements packages before further processing contract documents. However, this behavior is not limited to contracting officers or contract specialists.

The complexity of contract actions is often compounded by their lengthy life spans

and the increasing number of stakeholders they employ as a result. This exposes certain aspects of the process, such as legal reviews or statements of work, to diverse individual interpretations, which heightens the propensity for contracting office and legal staff to accept contract administration responsibilities that extend beyond their skill sets or, from a supervisory standpoint, are not part of their nominal duties. Such actions increase the necessity for document rework, and increase workload as a result.

To avoid redoubling efforts and mitigate the ill effects of personnel transitions, the U.S. Army Corps of Engineers (USACE) employs multidisciplinary groups known as project delivery teams (PDTs). The PDT, which integrates key process players, including contracting officers, project managers, attorneys and even customers, ensures that stakeholders have a shared vision of project goals, and fosters a climate of process improvement by garnering the customer's perspective at routine intervals throughout the process. These cross-functional teams are highly effective at streamlining information sharing while removing barriers from the process, such as unclear customer requirements or needless compliance reviews.

DEFINING PROCESS TIME

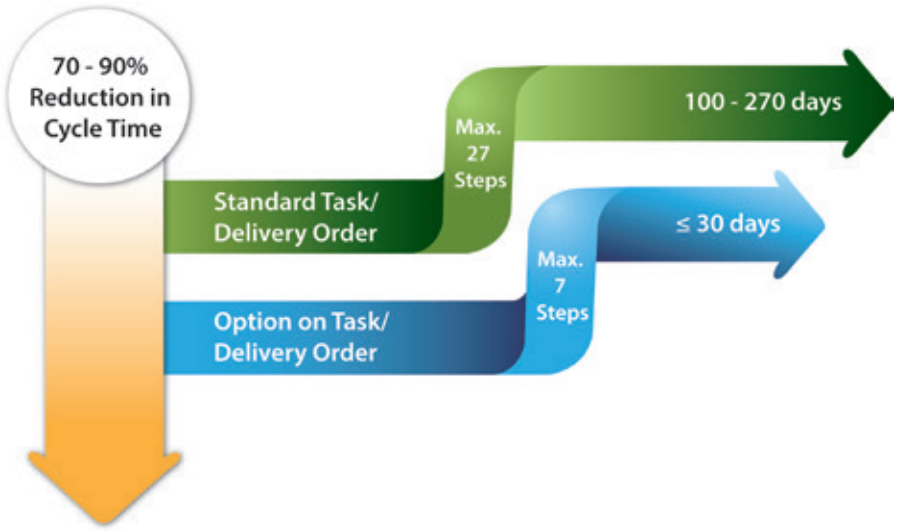
Our interviews revealed a perceptual discrepancy between contracting officers and customers as to when a contract request is considered actionable, which leads to disagreement regarding the calculation of total process time. Customers typically start clocking contract action time immediately upon submitting a request, whereas contracting officers postpone tracking cycle time until they possess a completed acquisition requirements package. From the customer perspective, acquisition lead time continues to accrue regardless of any rework required to make the package actionable. Contracting officers and customers consistently reported that this phase, known as requirements development, ranges from two to 30 days. Failure to recognize the voice of the customer results in disparate perceptions of process lead times and leads to disruptions in the customer-contracting office relationship. Figure 3 depicts how customers and contracting office personnel each interpret acquisition lead time.

THE UTILITY OF TEMPLATES

Templates of requirements documents, such as those detailed in the ACC-APG desk book, are available to aid customers in successfully developing requirements packages. However, contracting officers frequently demonstrate an aversion to providing customers with templates. This reluctance stems from concerns that customers will blindly copy and paste blocks of text into their documents instead of adequately researching requirements.

USACE contracting authorities strongly encourage the use of templates, often providing customers with previously approved products to better enable timely and thorough requirements development. Moreover, the Sept. 14, 2010, memorandum titled "Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending," from then-Undersecretary of Defense for Acquisition, Technology and Logistics Dr. Ashton B. Carter, strongly encourages the acquisition workforce to promote and use templates in developing solicitations. Templates save time and reduce the possibility of rework that increases work-in-process inventory

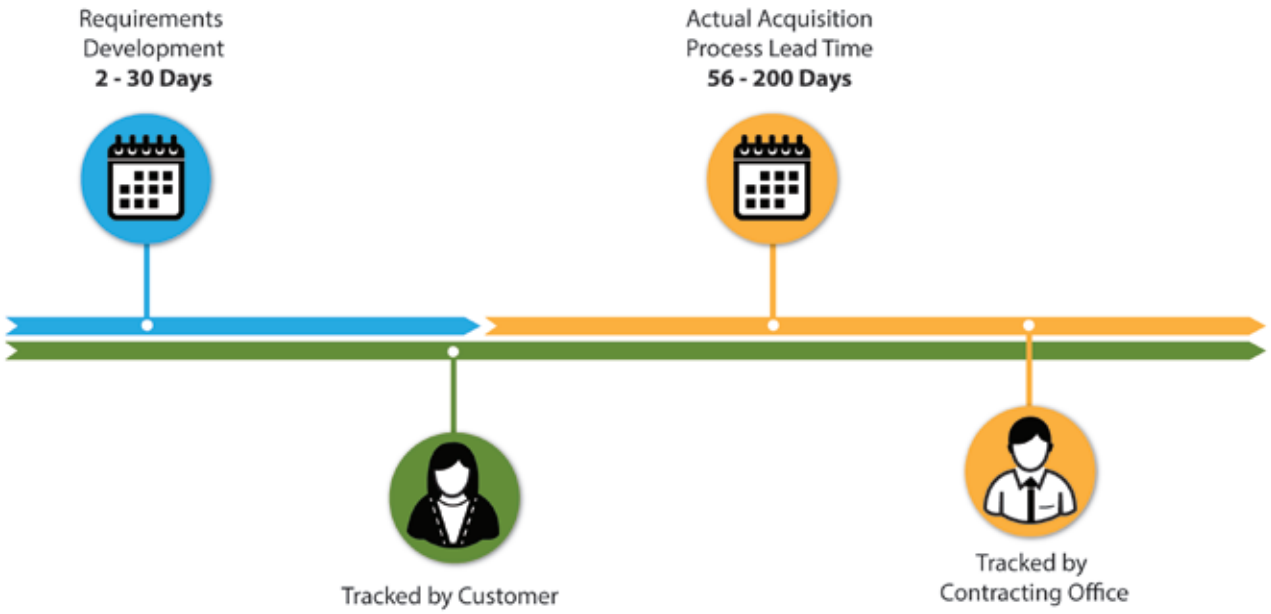
FIGURE 2



HOW TO CUT CYCLE TIMES

Incorporating options into orders reduces cycle time by anywhere from 70 to 90 percent, significantly enhancing the contracting officer's ability to respond to customer requirements. This also reduces workload on the acquisition workforce, enabling them to address other contracting needs. (SOURCE: ACC-APG)

FIGURE 3



DIFFERENT STARTING POINTS

The requirements development phase begins when a customer identifies and relays a bona fide need to the contracting officer. This phase consistently takes between two and 30 days to complete because developing the initial acquisition requirements package typically entails rework. Customers count the requirements development phase toward actual acquisition lead time, skewing their perception of the process. (SOURCE: ACC-APG)

among the acquisition workforce as well as process lead time.

VCE-AM IS UNDERUSED

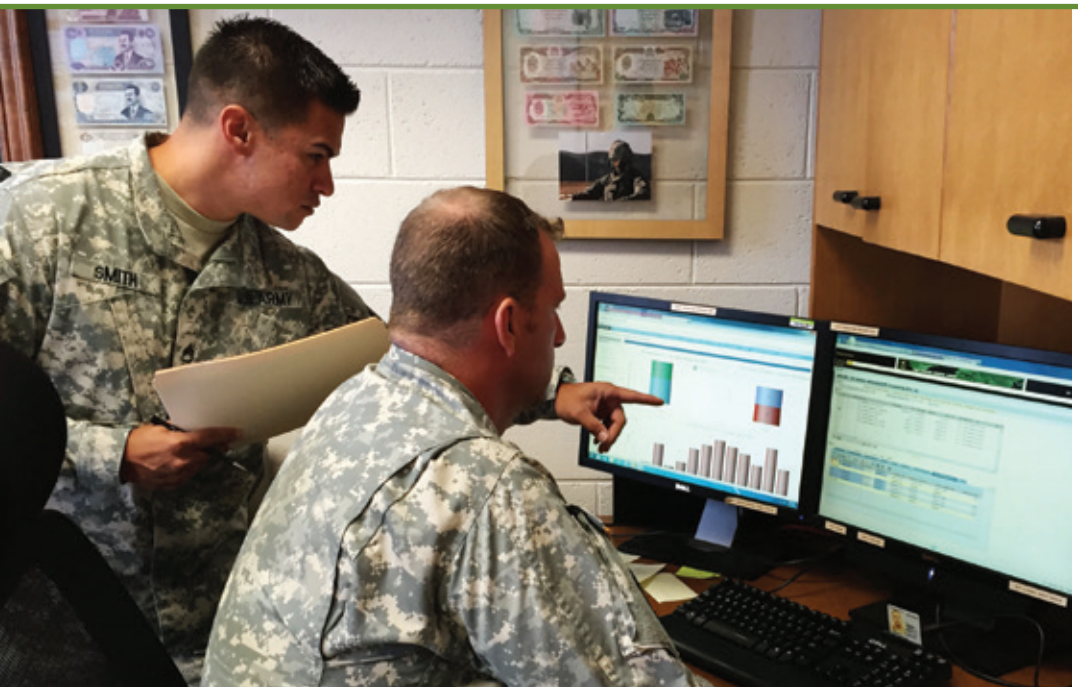
Contracting officers and contract specialists, responsible for maintaining contract documents and files in Virtual Contracting Enterprise – Acquisition Management (VCE-AM), the Army's digital system of record, are not submitting data with the prescribed regularity. The lack of discipline and consistency in collecting data for VCE-AM, particularly the annotation of times between process milestones, has fostered potentially detrimental nonstandard work practices among contracting officers and resulted in irregularities in or outright paucity of data.

A recent data call of non-prepriced single award orders in the $10 million to $50 million range revealed more than 25 observations with process times of fewer than 14 days. Because customer negotiations alone typically take anywhere from three weeks to three months, this raises questions about the accuracy of VCE-AM data. Furthermore, interviewees consistently admitted to routinely backdating milestone data in the system in order to avoid taking flak from their supervisors when milestones were missed. This seems to indicate a challenge at the supervisory level with properly incentivizing acquisition workers to record data in a timely fashion, to avoid ultimately undermining the benefits of the system.

By incorporating consistent use of VCE-AM into performance evaluation criteria, acquisition leaders can expect to standardize consistent use of the system among their subordinates. With more complete data at their disposal, supervisors must also endeavor to employ business analytics—such as statistical control charts—to monitor, identify and address anomalous process lead-time observations in real time. At present, investigative or corrective action is done either retroactively or not at all.

MANAGING MILITARY PERSONNEL

In 2007, the Gansler Commission Report detailed myriad challenges impacting the defense acquisition workforce. Some of these issues, such as the lack of technical expertise among military acquisition workers, persist today. For instance, officer assignments to garrison acquisition positions are nominally up to three years in duration. However, these postings are



CONTRACTING TEAM

SSG Vincent Smith and CPT Christian Hasbach research contract payment history using the General Fund Enterprise Business System at Fort Carson, CO. Hasbach is the 724th Contingency Contracting Team leader, and Smith is a contract specialist. (Photo by CPT Jerrick Hunter)

frequently cut short by overseas tours, such as those supporting the Worldwide Individual Augmentation System (WIAS). While WIAS deployments are designed to address emergent acquisition needs in strategic hot spots such as the U.S. Central Command and U.S. Africa Command areas of responsibility, they often have the unintended consequence of interrupting the officer's experiential development, particularly when junior officers are involved. The Gansler Commission warned of the dangers inherent in sending junior military contracting personnel into remote combat or contingency operations, where they are often expected to operate seamlessly and independently, without first tending to their professional and experiential development in a garrison environment. Frequent military deployments or transitions also hurt the customer-contracting office relationship, as they disrupt the continuity of contract actions.

To develop a more experienced and competent military acquisition workforce, senior acquisition leaders must pursue assignments of at least three uninterrupted years for military personnel. Moreover, they should look to recruit junior officers who are naturally more receptive to institutional training and better positioned to start their acquisition career by learning the tradecraft earlier in their development. Within their sphere of influence, contracting commanders should assign military personnel to specific focus areas within the contract action spectrum, rather than frequently transitioning them throughout the command, which appears to be the rule rather than the exception. Witnessing a single action from requirements development through award and eventually to closeout better prepares military acquisition personnel for a career in contracting.

CONCLUSION

To achieve greater consistency in single-award task and delivery order processing while facilitating waste elimination, consider instituting the following process improvements: work standardization, specifically the use of templates for customer requirements; consistent and accurate use of the contracting data management system of record; tighter management of military acquisition personnel; and elimination of redundant actions between base contracts and task orders. Lastly, incorporating cross-functional teams, such as those employed by USACE, to manage individual contract actions enables acquisition workers to address challenges during requirements development.

For more information, contact the authors at ***sean.p.dunstan.mil@mail.mil, craig.a.falk.mil@mail.mil*** *or* ***jeremy.c.gottshall.mil@mail.mil****.*

CPT SEAN DUNSTAN recently earned his MBA from the Mason School of Business at the College of William and Mary, where he was a MG James Wright fellow. He earned his B.S. in psychology and counseling at Old Dominion University. He currently serves as a watch officer on the Army Staff, G-3/5/7.

CPT CRAIG FALK recently earned his MBA from the Mason School of Business at the College of William and Mary, where he was a MG James Wright fellow. He earned his B.S. in police administration from Eastern Kentucky University. He is currently assigned to the Command Planning Group of the Combined Arms Support Command.

MAJ JEREMY GOTTSHALL recently earned his MBA with honors from the Mason School of Business at the College of William and Mary, where he was a MG James Wright Fellow. He earned his B.S. in engineering technology from Texas A&M University. He currently serves at the Combined Arms Support Command's Capabilities Development and Integration Directorate.

ARMY

CHESS

COMPUTER HARDWARE,
ENTERPRISE SOFTWARE AND SOLUTIONS

PONDERING THE BEST WAY TO PROCURE COTS IT?

Sign up for CHESS Training and Find Out!

US ARMY PEO EIS
PEO Enterprise Information Systems

Plan your strategy at https://chess.army.mil

For a full listing of FY15 training, click on Events Calendar under Resources.
For a personalized training session or briefing, contact Joanna Corcoran at joanna.m.corcoran.ctr@mail.mil.

'WIN IN A COMPLEX WORLD'—
BUT HOW?

TRADOC CG GEN David G. Perkins discusses meaning and challenges of new Army Operating Concept

A generation of Army officers grew up knowing exactly who the enemy was. Clear lines divided the world into enemy and ally, closed and open, communist and free. The United States made a move, and the Soviet Union countered; the Soviets designed one kind of weapon system, and the United States differentiated its systems accordingly, constantly seeking an edge—until the stalemate cracked and the Soviet bloc walls came down, taking with them the assumptions underpinning Army doctrine.

A younger generation knew another, more amorphous enemy, harder to pin down on a map: terrorism. The dividing lines were blurrier, complicated by the leaps-and-bounds evolution of technology to both sides' benefit. The enemy didn't necessarily have a state—or even a headquarters—and purposely sought to avoid confronting the United States' strengths while seeking to exploit its vulnerabilities. Another battle plan emerged: Attack the governments that gave shelter to terrorists who threatened the United States. That pattern has driven the Army's planning and equipping of its Soldiers for the past 15 years or so.

Changes pile on fast and furiously these days—that much is clear. The technology used by Soldiers five years hence is likely to be unrecognizable to today's Soldiers. If a chessboard was ever an accurate analogy for the global security environment, the board has been upended. Tomorrow's Soldiers will play a different game.

Who will the next generation's enemy be? The new "U.S. Army Operating Concept: Win in a Complex World, 2020-2040" (AOC) doesn't attempt to predict the future—nor, necessarily, to answer that question directly. It does assess the current threat climate and extrapolates from there to help the Army plan for an unknown future. The AOC is a chance to break free of the constraints that often narrow our vision (budget, bureaucratic inertia and "the way we do things around here") and think hard about where the Army is and where it needs to go. (See Figure 1.) This overarching concept, developed by the U.S. Army Training and Doctrine Command (TRADOC), will affect the way the entire Army operates, from the Soldier in the field, to the strategic planners at the Pentagon, to the acquisition workforce member working to make a program successful.

FIGURE 1

WIN IN A COMPLEX WORLD

The AOC that underpinned Army doctrine during the Cold War, AirLand Battle, assumed a known enemy and a known terrain. The new concept assumes neither. Instead of focusing on differentiation from a particular adversary, it focuses on innovation, adaptability and a more expeditionary mindset to defeat potential state and nonstate adversaries. (SOURCE: TRADOC)

The AOC attempts to sketch out what it can about the future, but also accepts unknowables as a core feature of the new landscape and thinks through how to anticipate them. How, for example, do you develop requirements for a system when you don't know when and where it will be used, and don't know what it's opposing?

You keep requirements simple and flexible, and make systems modifiable and multiuse, according to GEN David G. Perkins, commanding general of TRADOC. You focus on innovation, not differentiation—since you don't know what your enemy will be fighting with. You change the business model, so if a new technology pops up, the Army can pivot quickly to focus on it without having to let a previously authorized program of record run its course first. This requires a new approach "from Congress on down," Perkins said, from those who develop the Army's requirements to those in the acquisition community who act on them.

Perkins assumed command of TRADOC in March 2014. A 1980 graduate of the

United States Military Academy at West Point, he was awarded the Silver Star, the nation's third-highest award for valor, for his service as commander of the 2nd Brigade, 3rd Infantry Division (Mechanized) during the invasion of Iraq, commanding the unit's "Thunder Run" into Baghdad. He later served as commanding general of the 4th Infantry Division (Mechanized), facilitating the transfer of security responsibility in northern Iraq to Iraqi forces.

In addition to a B.S. from West Point, Perkins holds a master's degree in mechanical engineering from the University of Michigan and a master's in national security and strategic studies from the U.S. Naval War College.

Over the course of a long career, Perkins has held numerous strategic roles, including the Multi-National Force – Iraq's deputy chief of staff for strategic effects; deputy assistant chief of staff for operations, U.S. Army Europe; and commander of the U.S. Army Combined Arms Center at Fort Leavenworth, KS, from November 2011 to February 2014. At the Combined Arms Center, Perkins led the development and integration of the doctrine the Army uses to fight and win wars.

We spoke with Perkins Nov. 24 about the development and scope of the new AOC, the current threat climate, and where he sees the biggest future challenges. He pulled no punches, calling out a crippling lack of imagination, contemplating a new definition of success in acquisition, and planning for the unknowable.

DIFFERENTIATION VS. INNOVATION

An M1A2 main battle tank from 1st Battalion, 64th Armor Regiment scans for enemy forces in the Sangari training village at the Joint Readiness Training Center, Fort Polk, LA, Sept. 29, 2014. Given the long lead time to build a tank, to use it as an example, in an unknown world the new AOC calls on the Army to focus on the rate of innovation rather than the level of differentiation from enemy capabilities. (Photo by SGT William Gore, 40th Public Affairs Detachment)

ARMY AL&T: Tell us about the new "U.S. Army Operating Concept: Win in a Complex World." How does it address a future that is unknown and unknowable?

PERKINS: People have to understand the purpose of an operating concept. It's interesting. … Sometimes there's a misunderstanding [of what it is]. It does a couple things. It tries to describe the future—not predict the future, but describe it. A lot of people talk to me and want me to predict the future, i.e., "Hey, General, who's the next person we're going to go to war with, and where are we going to go to war with them?" That's not the role of the AOC. First of all, that's almost impossible. We never get it right, and it's actually not as useful as people think it is.

What we have to do is describe the future. Regardless of who is the enemy, what is it they are going to do to us, and how are they going to act? And so we outline a number of things about that. Examples are, they will try to avoid our strengths. Regardless of who the enemy is, we know that it is well-known that the U.S. military, the U.S. Army, once we decide to do something, we will be the best in the world at it, so going head-to-head with the U.S. Army with regard to whatever it is we decided we're going to be good at is not the best way to win. So they will try to avoid our strengths. They will try to emulate whatever capability we have. If we have UAVs [unmanned aerial vehicles], they will try to get that. The reason is, … they realize that we spend a lot of time, [the Army Acquisition, Logistics and Technology Community] in particular, trying to do research, development, trying to get warfighting concepts to figure out … what is the technology that pays off.

Basically, they mirror our thought process in research, to say, well, "If the U.S. Army thinks that unmanned aerial systems are important, then we'll get unmanned aerial systems. If they think night vision goggles are important, then we'll get night vision goggles." They're really just taking advantage of all the hard work that we've done and our thought process—actually, from a macro level, not even, "We're going to steal their plans for night vision goggles," but "We're going to get some, because the United States Army thinks that's a useful thing."

Whatever capability we have, they will try to emulate it. I don't care who the enemy is. So when you start to describe the environment you're going to operate in, it's actually much more powerful than trying to predict it. Because then you have to say, "I am going to have to fight somebody who's probably not going to take me head to head with my strengths, but, again, whatever I'm strong at, it forces them into another area." That's not to say not to be strong at something; it's just to say that if you don't want them to do something, you probably ought to be very good at it to prevent them from doing it.

The second thing is, if you describe what the future is, now you can start thinking about, well, what does the Army have to do about it? Chapter 2 of the AOC describes the future. Chapter 3 says, OK, now that you've described the future, what is it that the Army has to be good at? So we talk about how the Army has to operate, our tenets and core competencies and things like that. And then the last thing that we say is three things: Describe the future, describe what the Army has to do and then how do you get there—how do you take concepts and turn them into capabilities?

EYE ON AUTONOMY

A British Soldier holds a Prox Dynamics PD-100 Black Hornet Personal Reconnaissance System, a palm-sized miniature helicopter weighing only 16 grams. Researchers with the U.S. Army Natick Soldier Research, Development and Engineering Center are testing the Black Hornet to provide squad-sized units with organic aerial intelligence, surveillance and reconnaissance capability in challenging ground environments. The application of emerging technology creates the potential for affordable, interoperable, autonomous and semiautonomous systems that can provide force multipliers at all echelons, from the squad to the brigade combat team. (Photo courtesy of United Kingdom Ministry of Defence)

In Chapter 4, we go from concept to capabilities. So we really do three things, and Chapters 2, 3 and 4 are laid out that way.

ARMY AL&T: You have said, looking ahead to Force 2025 and Beyond, that "Everybody's got to change." What does this mean for the Army AL&T community in the near, mid- and long term? What does it mean for the TRADOC requirements community?

PERKINS: If you look at the previous concept that I grew up in the Army with, AirLand Battle, [it was a] great concept, very intellectually rigorous, and drove a lot of change. AirLand Battle was written specifically to deal with the known: the Soviet Union in the central plains of Europe with NATO. We knew the enemy. We knew the location. We knew the coalition. This AOC, "Win in a Complex World," is specifically to deal with the unknown. We don't know who the enemy is. We don't know where we will fight, and we have no idea who we'll fight with. [It is] the same intellectual process: Who is the enemy, where do we fight and what's the coalition? But a very different answer. When you look back at AirLand Battle, … it gets back to innovation. Everybody wants to innovate. Who wants to say, "Hey, I'm a legacy guy. I just wanna keep what we have. Getting new stuff is very expensive and a waste of time. In fact, I just want to go back 10 years."

Everybody wants to innovate. But there are two ways to innovate. If you're dealing with the known, like I grew up [with]

THE SOLDIER-TECHNOLOGY INTERFACE

A Ranger assigned to 3rd Battalion, 75th Ranger Regiment, scans the darkness for enemies during annual task force training at Fort Knox, KY, April 22, 2014. The Army has an advantage over enemies in the way that Soldiers can adapt and innovate using technology, depending on the conditions in which they are operating. (U.S. Army photo by SPC Philip Diab, 55th Combat Camera)

in the Cold War, then you focus on differentiation. I innovate to gain differentiation. In other words, I know that the enemy has the T-55 tank, [and] I'm going to build [an] M1 tank. I'm going to differentiate greatly, because I know Soviet five-year plans. I know how long it takes them to go from a T-55 to a T-80 or T-72 or whatever, and so I'll differentiate and get a huge delta in capability.

Usually when you focus on differentiation exclusively, what happens is it takes a lot of time—a lot of testing involved, a lot of bureaucratic processes and all that, and so it takes you 10 years to build a tank. But, since you have a known enemy and you know what you're going to use it for, even though it took you 10 years to build it, it gives you a level of differentiation for 20 or 30 years. The problem is, in an unknown world, that's not what you have to focus on because you don't know what your enemy has, you don't know what you have to fight against and you don't know what they're going to do. You have to focus on rate of innovation rather than level of differentiation. So what you do in an unknown world is you start measuring the quality of innovation by the rate of innovation, the rate of change.

The biggest challenge we have, both on my side of the equation, which is generating requirements, and your [acquisition] side, which is executing those, is that the whole system that you and I operate in was built during the Cold War, and therefore it was built to deliver a level of differentiation, not rate of innovation. That means we have to develop requirements that focus on rate of innovation, and then we have to hand those requirements off to an institution that focuses on rate of innovation, and that requires a change from Congress all the way down.

ARMY AL&T: How are the TRADOC and acquisition communities working together to fulfill this vision and ensure that desired solutions are within the

realm of the possible? For example, how are you looking at capabilities differently than before Force 2025 and Beyond?

PERKINS: We've really got to focus a lot more on what I call "first principles." That is, a lot of times we develop requirements and you build to those requirements with a focus on a level of specificity that is not useful, and, in many ways is sort of self-confining. So one of the things we should understand in the world of the future that we operate in, is that the capability of the United States Army that is most transferable is technology.

In other words, almost anything the United States Army has, our enemy can go out and buy it, if they have enough money, on the black market or the orange market or whatever. So the thing that we have to do is [look at] what is the thing that gives us the edge that is difficult to transfer. Pure technology, all you have to do is get a thumb drive in the right computer, and you can download a bunch of technology very quickly. Where we have the advantage is the way that our technology interfaces with the Soldiers, the Soldier-technology interface, the way that, again, they can innovate with that, adapt and innovate. How quickly can they adapt to the conditions that they're operating in, and how rapidly can we increase that rate of innovation?

When we take a look at a fighting vehicle, for instance, how does a Soldier interface with that? How adaptive is this vehicle to many different scenarios, many different mission sets, and have we built this thing with the understanding that whatever strength this thing has is going to be very short-lived, [and] therefore we're going to have to constantly innovate and make this bigger? The things that I think will have the shortest half-life, are they very easily innovated at a reasonable cost? There are certain things, like the rubber on the tires. The technology in tire rubber probably doesn't change as quickly as software, for instance. Or it may be even ballistic protection. So we've got to figure out, when we build something, what are the pieces of that technology that are going to quickly become outdated. Therefore, those are the things that should be most easily innovated at a reasonable cost, and it has to be something that is doable and is built into the process. I'm not sure that we generate requirements like that right now. We generally bite a whole chunk at once.

ARMY AL&T: We did an issue about a year ago on agile acquisition, but that's more on how to speed up the process of developing a product. You're actually talking about agile inserted in the product so that you can easily update it as you need. How do you keep this concept of agile from being just another spiral development or Future Combat Systems … and everyone just rolls their eyes in Congress?

PERKINS: I don't mean to be poking holes in AirLand Battle, because I think it really transformed the Army. … I constantly have to describe to folks the significant differences in this [new concept], which is unknown world versus known world, [and] rate of innovation. Another part of this is that we do gap analysis: Here's the requirement that's out there, here's the requirement I have and here's the delta gap. So we're basically trying to manage shortages: Here's the bad guy capability, here's my capability, I have a gap, which means you're basically letting the current enemy define what you focus on. The other thing we have to get better at is exploiting opportunities, whether it's from a technology point of view or not. It really is a hybrid, both concepts and technology. There's a symbiotic relationship there.

I'll use technology [as an example]; people can best relate to it: Here's something that just popped up, wherever it popped up out of. It wasn't in any requirements document. It wasn't anything we've been thinking about, but it's an opportunity we can exploit. The problem we have now—because our system is built to deliver level of differentiation, which takes a long time [and is] a very long and arduous and lockstep process—is that, when new opportunities arise, if they weren't part of the original requirements, it's very difficult to exploit that opportunity because we're so focused on another gap here.

If I exploit an opportunity over here, which wasn't apparent two years ago when we built the POM [program objective memorandum] and had a program of record, what I need to do is kill this

THE BIGGEST CONCERN I HAVE IS THAT WE WILL BE UNWILLING TO HAVE THE COURAGE INTELLECTUALLY TO CHANGE WHAT WE HAVE TO CHANGE TO PRODUCE THE PHYSICAL THAT WE NEED TO HAVE.

A QUESTION OF RISK

SGT Brandon Jackson, right, mail transport NCO, and SPC Erik Townsend, mail transport driver, both of the 10th Special Troops Battalion, secure a load of mail May 11, 2014, at Bagram Airfield, Afghanistan. Mail is one of the many commodities distributed to units in theater via ground convoy, which raises strategic risk. The AOC looks at capabilities that would allow the Army to simultaneously reduce tactical and strategic risk, such as in autonomous operations. (Photo by SGT Michael Selvage, 10th Sustainment Brigade Public Affairs)

program of record, which is focusing on filling this gap, and exploit this opportunity—because if I change my concept and do business this way, I don't have to worry about the gap.

I come from an armored cavalry background, and at one point we had a lot of blacksmiths in the cavalry back then, and you could say maybe a gap analysis then was that the horseshoes were wearing out too quickly, we need new horseshoe technology. And so we have a program of record on new horseshoes. We're working on it, we're training the blacksmiths to be better at putting nails in and shoeing the horses, but then all of a sudden there's this new technology called the internal combustion engine, and now is the opportunity to exploit [it]. But I don't have the internal combustion engine in the POM, I have this gap in horseshoes, and until I fill this gap in horseshoes I don't have money to put into internal combustion engines. Whereas, when the internal combustion engine comes on the horizon, maybe I say, "The program of record on horseshoes, I just need to kill that program and start focusing on the internal combustion engine." That is very difficult to do. We don't have an institutionalized way to look at opportunities, and we definitely don't have a way to exploit them.

ARMY AL&T: How do the capabilities of the future force translate into reforming, or better managing, the bureaucracy, so that the Army can really innovate and drive change based on the AOC?

PERKINS: The Army is a big bureaucracy. TRADOC is a big bureaucracy, the Acquisition Corps is a big bureaucracy. I tell folks if you want to change things, one of the most important things is, you have to pay attention to what metrics you use. I find metrics

not particularly useful to give you situational awareness about what's going on, because we usually measure the wrong things and we draw incorrect conclusions. I've found that the metrics we use are generally very bad at giving you a good understanding of what's going on. But they are good for one thing: Metrics drive activity. Once you start measuring something, people will start generating activity. I tell people, everybody wants their bar to be green. In other words, if you put up a PowerPoint chart and you put up a bar …, people will say, "If you're going to measure that, I want that bar to be green." Nobody wants to be amber or red, and God forbid you're ever black. So you say, "You know what? Maybe I need to start measuring things differently, measure different things."

CHALLENGING THE STATUS QUO

Perkins talks to TRADOC civilians about the new AOC, the future of the Army and what it means to be a professional, during a professional development session Nov. 4, 2014, on Fort Eustis, VA. "We design and build the Army. TRADOC changes the Army—that is what we do. Our job is not to maintain the status quo," he told the audience. (Photo by Chris Thompson)

If you want to measure rate of innovation, what is a good metric? I was talking to [an executive of] a Fortune 50 company recently … about innovation, and I said, "So, how do you all measure innovation?" He goes, "Well, one of the things that we do is that we measure the rate of failure of new startup programs, so, new ideas." This is kind of a high-tech company. He said, "Once we fall below 70 percent, we know we have a problem, if we fall below 70 percent failure." I said, "What do you mean?" He said, "If 50 percent of the ideas people come up with actually go into production and work out, then they're not pushing the envelope enough. In other words, I want people to get out there on the edge, and if they're really out on the edge thinking through stuff, a lot of this stuff, a lot of it won't pan out. … We find that if 30 percent succeeds, it really succeeds, beyond our wildest dreams.

"If we get lower than that, people are being too cautious, they're too comfortable, they're not taking enough risk." This is a company that's well-known for really pushing the envelope and coming up with game-changing stuff. What you don't know is that for every three [concepts] that went to market and now change the face of the world, seven are on the cutting-room floor. How about if, in the world that you and I live in, we went to Congress and said our goal is to make sure 70 percent of the good ideas we start fail? I'm not sure that would go over well.

But maybe one of the things to start measuring, as an Army, is not how many programs of record did we complete—I know this is almost heresy—but how many programs of record did we cancel because they were becoming obsolete, and then took that money and put it into a new startup that started as a new idea. Where we tend to focus now is on, "Is your program on time, is it within budget, is it near completion?" What we're measuring is your compliance with the status quo. That's what we measure.

What we ought to probably start measuring is innovation. … How much stuff did you stop doing because it was a good idea 10 years ago but is no longer a good idea, and we've taken those resources and put them into something nobody even thought was possible 10 years ago? Where is that graph? … You have to define success differently. You have to measure different things if you want to change. If you want to change something and you keep measuring things the same way, why do you think anything will change?

ARMY AL&T: Do you have current and emerging technologies in mind as potential opportunities?

IF YOU DON'T WANT [THE ENEMY] TO DO SOMETHING, YOU PROBABLY OUGHT TO BE VERY GOOD AT IT TO PREVENT THEM FROM DOING IT.

PERKINS: When you think of opportunities, again, what I try to do is back out and say, what are the problems that we deal with, especially on a strategic and operational level? As a military guy, what I'm always trying to do is reduce tactical risk. … At the strategic level, what our policymakers are trying to do is reduce strategic and political risk. … And sometimes those are diametrically opposed. The example I'll give you [is this]: If I'm going to go do an operation—and I'm an armor/infantry kind of guy, so I'm a maneuver guy—I'm going to go deep, so I want to make sure I have enough supply, lots of ammo, fuel and water. I want lots of supply convoys on the road, so I have more than enough bullets and more than enough fuel, because that will reduce my tactical risk. I don't want to run out of fuel, I don't want to run out of bullets.

The problem with that is, for instance, that while I'm trying to reduce my tactical risk, I am possibly raising strategic risk because now I have a lot of supply convoys on the road and I have a lot of Soldiers there. In fact, if you look at Iraq, one of the areas where we lost the most Soldiers to IEDs [improvised explosive devices] was conducting supply convoys. … We were trying to reduce tactical risk, but in some ways we were raising strategic risk because the chance of someone being taken captive or getting killed was quite high. We're always balancing one against the other.

So, for instance, taking a look at our capabilities—that's what an Army operating concept does—I want to simultaneously reduce tactical and strategic risk. One of the areas that I think does that is autonomous operations. What if you could supply tactical troops in contact without incurring additional strategic risk? … What if you could have autonomously operated vehicles, what if you could have unmanned aerial things that could deliver supplies, et cetera? … It's really a combination between technology and the concept—not just technology for technology's sake, but what can it do for me at the tactical and operational level? That's how we have to take a look at it so we're not just jumping on the latest shiny object, but we take that shiny object and we lay it on top as a way to mitigate risk from the tactical to the strategic level, not just one level. That's the problem we have when we look at technology. Sometimes technology reduces one level of risk, but it increases another echelon of risk.

ARMY AL&T: What do you see as the biggest challenges, i.e., the possible impediments, to achieving the vision for Force 2025 and Beyond?

PERKINS: Number one, I think, is sort of lack of imagination. Really, I do. Number two is a lack of willingness to take risk, to change the way we do business, everything from the way our leaders think about war to the processes, and then, therefore, a lack of risk in coming up with new and innovative concepts, and a lack of taking risk with regard to forming the process where we take a concept and form it into a capability. [The challenge] really is much more in that area than it is in actual technology itself. As GEN Sullivan [GEN Gordon R. Sullivan (USA, Ret.), 32nd chief of staff of the Army] always reminds us, the intellectual leads the physical. The biggest concern I have is that we will be unwilling to have the courage intellectually to change what we have to change to produce the physical that we need to have.

ARMY AL&T: How does the defense budget, especially the need for (and often lack of) predictability, factor into the development of this new AOC?

PERKINS: The basic answer is, it has no impact whatsoever, and I'll explain that. I brief the AOC, we'll have a PowerPoint slide and [people will say], "Oooo, that looks expensive." If you read the AOC, it's not about force structure. It doesn't talk about divisions or brigades or battalions, even though I've commanded divisions, brigades, battalions. What the AOC is, really, is a way to think about the future. (In some ways, you could say that's priceless, right?)

We hear a lot of, "It's a resource-constrained environment. Can you afford this?" We can't afford not to do it. Because in some ways, if you have tons of money, like we did until the last couple of years, … it's not as important that you have a well-defined vision and that you set priorities and that you have a way of getting there, because you have so much money that you just throw it all over the place and eventually, hopefully an answer will spring up. But if you are in a resource-constrained environment, it's even more important that you have a vision. It's even more important that you have priorities. You know, if all of a sudden you are in a household and one of the breadwinners loses a job, don't you spend even more time saying, "Gosh, what is the most important thing? What groceries are we going to buy? How much are we going

MANY CAPABILITIES, MULTIPLE OPTIONS
Support Soldiers from the 3rd Battalion, 10th Special Forces Group (Airborne), flown by the 2nd General Support Aviation Battalion, 4th Aviation Regiment and led by a special forces team, posture for a night air assault raid Sept. 21, 2014, during the culminating exercise for the Special Forces Basic Combat Course – Support in Guernsey, WY. The new AOC focuses on the Army's need to contribute to joint operations with unique capabilities and multiple options, including tailorable, scalable combinations of special operations and conventional forces, among other assets. (U.S. Army photo by SGT Duke Tran)

to put aside for the kids' college?" But if you just win the lottery, you have $100 million, you know, Ed McMahon shows up with a big check, [you think], "I don't need to make a priority list. I'm just going to buy whatever I want in the grocery store—I'll go to Best Buy, whatever I want." I get that question a lot: Can you afford to do this? My point is, you can't afford not to.

ARMY AL&T: Are there any final comments you would like to add?

PERKINS: I would say that TRADOC writes this [AOC]. The official term for this is TRADOC Pamphlet 525-3-1. … So that's the technical term. But the title is "The U.S. Army Operating Concept." It's not called the TRADOC operating concept, it's the U.S. Army's operating concept. It was written by TRADOC, but actually we were very collaborative. We talked to all the folks, really, in the whole enterprise: DA staff, folks in acquisition, division and corps commanders, so this is the Army's operating concept. When people read it, they need to say, "This is not just TRADOC's good idea, this is the way the Army is going to operate. This is how the Army thinks about the future, and so it affects everybody in the Army." And so I just encourage people, when they read it, they need to understand that when we talk about what goes on here, it should affect everyone in the Army, and if somebody thinks it does not affect them, that's where we have the problem.

So I would just encourage people, if they read through it and they say, "What does this mean to me?" just give us a call here at TRADOC. We're in the book. We'll explain it. That's one of my biggest concerns: that people think that this is some pie-in-the-sky stuff that TRADOC does in its free time. Again, the title is the Army operating concept. When we came up with AirLand Battle, which was the Army operating concept, written at TRADOC, it affected every part of the Army. This will do the same.

For more information, go to ***http://www.tradoc.army.mil/tpubs/pams/TP525-3-1.pdf****; or contact LTC Adrian Bogart at 757-501-6484 or LTC Brandon Smith at 757-501-6490.* ?

SPOTLIGHT:

MR. JEFF CHAPIN

Seeking big-picture solutions to save lives and reduce costs

MR. JEFF CHAPIN

COMMAND/ORGANIZATION:
Product Manager for MRAP Vehicle Systems, Program Executive Office for Combat Support and Combat Service Support

POSITION AND OFFICIAL TITLE:
Lead systems engineer for cross-platform solutions

YEARS OF SERVICE IN WORKFORCE: 5

EDUCATION:
MBA, Portland State University; B.S. in mechanical engineering, Purdue University

As lead systems engineer for cross-platform solutions (CPS), Jeff Chapin and his team develop, test, integrate and field add-on capabilities for Mine Resistant Ambush Protected (MRAP) vehicles. Over the past year, they've incorporated better buying power (BBP) and value engineering (VE) initiatives for MRAPs and other vehicle systems that have yielded cost savings of nearly $15 million.

Chapin came to CPS about five years ago following a career in the automotive industry, designing suspension and steering components for heavy trucks and High Mobility Multipurpose Wheeled Vehicles. Moving to a military position meant that he could use his design and program management skills while working on projects that save lives and support warfighters, he said. Originally hired to work at the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), where his brother and father have also worked, Chapin began his career working on capability insertion (CI). "Over the last five years, the name of the team has changed from CI to CPS, but the mission is the same: to provide common solutions across the MRAP variants," he said.

"When we fielded MRAP, we had to freeze the design and produce vehicles," Chapin explained. "Capability insertion is basically staying in constant communication with the warfighter so we know what new threats they are seeing in theater. This enables us to develop materiel solutions to mitigate those threats and insert them on the MRAP vehicles. Defeating our enemy would be easy if they did not adapt and find new ways to try and defeat our technology."

Costing $1,640 less than the previous solution, the retrofit yielded $5.8 million in cost savings on the M-ATV, $4.4 million on MaxxPro vehicles, and roughly $1.5 million on the RG-31 variant.

"One thing most people don't know is that while the current CPS team supports only Army vehicles, when we were first established we also supported MRAPs for the Navy, Air Force and Marines" under a joint program executive office (JPEO), Chapin explained. DOD reorganized the office in late 2012, and it is now an Army program office. Chapin is still in contact with people he worked with in the JPEO, and one of those contacts facilitated a BBP initiative last summer.

Chapin needed Gunner Accessory Package (GAP) kits for the Army's MRAP All-Terrain Vehicles (M-ATVs) and MaxxPro vehicles. "I found out that one of my contacts from the Marine Corps needed GAP kits for its MRAPs, and I knew that if we purchased an additional 500 kits, it would push us to a lower price." By combining purchases of the kits, he and his team realized a savings of $546 per vehicle,

resulting in a total savings of $2.5 million over three years.

Chapin and his team also implemented a VE program last year that saved more than $10 million and improved M-ATV safety. The vehicles had encountered problems with the turret separating from the vehicle during a rollover or an event involving an improvised explosive device, resulting in severe or fatal injuries to gunners. A new solution—a redesigned slew bearing—improved the turret retention and survivability of the Objective Gunner Protection Kit. The retrofitted turret with the redesigned slew bearing stays in place under as much as 32,000 pounds of force. Costing $1,640 less than the previous solution, the retrofit yielded $5.8 million in cost savings on the M-ATV, $4.4 million on MaxxPro vehicles, and roughly $1.5 million on the RG-31 variant.

Chapin was quick to note that "a lot of other people did the initial development and paperwork on that effort," including colleagues Jerry Haggerty, Craig Schmehl, Todd Weimer and Brian Smerdon. "They worked on the slew bearing to help develop the design, test fixtures and prototype samples. I took over engineering of the kit when it was 95 percent developed and helped get it into production and iron out any production issues."

Chapin is working with Mike Abee, logistics manager for the CPS team, to identify similar transactions. "I heard that the Marine Corps needed Neptune kits, for example, so we contacted them about sending them some of ours," he said. "They save money by getting kits that we already have, and we cut costs since we don't have to pay for storage." Chapin and Abee are also working with managers of programs including the Joint Light Tactical Vehicle and the Family of Medium Tactical Vehicles, to see if they are interested in acquiring other surplus kits. "We're looking not just across the services, but across all platforms," he said.

What do you do, and why is it important to the Army or the warfighter?

We work at developing common solutions for the different MRAPs in order to provide the warfighter with the same kit adapted to the different vehicles. The main benefit to warfighters is that they only need to learn how to use one kit, which is then applied to multiple variants. The benefit to the Army is cost savings, since we are buying a higher volume of one kit instead of small volumes of multiple kits. We've also been working with other services to combine kit orders, to get even higher volumes and drive the cost down further.

What's the biggest challenge you face in your work?

The biggest challenge for me, coming from the automotive industry, is the timeline for getting a design into production. The MRAP program moves pretty quickly, but the funding and approval process is slower than I'm used to. It can be a struggle: We have a solution that we want to get into the hands of the warfighter, but often the contracting process and the paperwork make it difficult to get it there as quickly as we'd like. We try to be creative—piggybacking on other contracts, for example, or using urgent buys or J&As [justification and approval documentation]. For me, it was also a matter of learning who to contact—in finance, contracting and procurement. In the automotive field, that was all handled by one person.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most, and why?

TACOM [the U.S. Army TACOM Life Cycle Management Command, which encompasses TARDEC] is committed to providing training to keep the workforce up to date and technically savvy. I am most impressed with TACOM's policy to help pay for master's degree classes for its employees.

What has surprised me the most was how long the development cycle is for new programs. I was used to a very streamlined development process in the automotive industry. The MRAP program has significantly improved this development cycle, but lessons learned from this program need to be incorporated for future development programs. If we can't provide what the warfighter needs, when he or she needs it, then we have failed our mission.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

I would like to see some of the lessons learned from the automotive industry sector applied to the acquisition life cycle—for example, the ability to quickly and efficiently fund development programs, the speed at which product development occurs, and an increased focus on cost-saving initiatives to help save taxpayer dollars.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

Most of the kits that I work on are safety-critical, meaning that they help improve safety or survivability for the warfighter. I am hopeful that some of the kits we have fielded on MRAP vehicles have helped protect warfighters and perhaps even saved their lives.

—MS. SUSAN L. FOLLETT

TEST DRIVE
A paratrooper assigned to the 1st Battalion, 325th Airborne Infantry Regiment (1-325 AIR), 2nd Brigade Combat Team, 82nd Airborne Division (ABN DIV) drives the new Light Tactical All Terrain Vehicle (LTATV) on Fort Bragg, NC, Oct. 29, 2014. The 1-325 AIR will be the first to exercise and assess the added capabilities of the new LTATVs by incorporating them into scheduled training events, culminating in the division's Joint Operational Access Exercise 15-01 this April. BBP 3.0 emphasizes technology insertion with faster periodic refresh cycles. (Photo by SSG Jason Hull, 82nd ABN DIV)

BBP 3.0 101

With new version, better buying power is here to stay

by Mr. Steve Stark and Ms. Susan L. Follett

Undersecretary of Defense for Acquisition, Technology and Logistics the Hon. Frank Kendall made it clear that the Better Buying Power (BBP) initiative is here to stay when he unveiled the "interim" BBP 3.0 Sept. 19 at the Center for Strategic and International Studies (CSIS) in Washington, DC. The new iteration, with a focus on using technical excellence and innovation to equip the warfighter, is a draft version; release of the final BBP 3.0 is planned for early 2015.

Kendall described the first iteration of BBP as about cost-consciousness; the second, subtitled "A Guide to Help You Think," as about professionalism; and the third, he said, could be boiled down to two "bumper stickers."

The first, "achieving dominance through technical excellence and innovation," is the crux of 3.0. "The thrust last time [in BBP 2.0] was about critical thinking and tools to help our people make better decisions as they did business deals, planned and executed programs, contracted for and acquired services, and oversaw that work. … This one [BBP 3.0] brings us back to the products, to the capabilities that we're giving to the warfighters."

The second bumper sticker, is about "strengthening our culture of cost-consciousness, professionalism and technical excellence," he said, adding, "Those three things are all about who we are and what we do, and they're central to the whole concept of Better Buying Power."

FULL STEM AHEAD
Kristine Tanabe, a postdoctoral catalyst development specialist, listens to 2LT Nicole Boda, Army Reserve officer with the 863rd Engineer Battalion, at the Argonne National Laboratory in Darien, IL, as part of a photo shoot that promotes citizen-Soldiers in the STEM industries. Kendall wants to see DOD improve its support for STEM education because it is critical for "our economic well-being, our economic competitiveness, our military competitiveness and our military superiority." (U.S. Army photo by SFC Michel Sauret)

STRIVING FOR SOLUTIONS
Quoc Truong, a physical scientist with the U.S. Army Natick Soldier Systems Center, demonstrates how "omniphobic," self-cleaning fabric repels liquids better than regular Army combat uniforms. The technology has made its way to the commercial market and has a wide variety of uses. Achieving dominance through technical excellence and innovation is at the heart of BBP 3.0. (Photo by David Kamm, U.S. Army Research, Development and Engineering Command (RDECOM))

Following is an introduction to the draft BBP 3.0, with details and Kendall's comments on each of the eight focus areas. Kendall's statements come from both his presentation at CSIS and a white paper released the same day.

AFFORDABLE PROGRAMS

BBP 2.0, Kendall said, "is not dead; 2.0 is alive and well." Although he considers some of the elements of BBP 2.0 complete, some continue with modifications to their emphasis and some simply continue. "There's an enormous amount of continuity between 2.0 and 3.0," he added.

For example, Kendall said, "should cost" continues to be one of BBP's core items. Indeed, he wrote, "This initiative requires the active management of cost, starting with the deep understanding of cost structures, followed by identifying specific goals for cost reduction (should-cost goals), and the efforts to achieve those cost reductions."

In September, he said, "It's not our duty to spend money and get it out the door; it's our duty to control our costs and save money wherever we can to get more value for the taxpayer."

DOMINANT CAPABILITIES

Another key tenet of BBP 3.0 is building better partnerships among the various communities of stakeholders—acquisition, requirements and, in the new iteration, the intelligence community. "We have to be better at responding to threats, we have to understand the threats, and we have to incorporate that knowledge into our programs and then make adjustments. That requires a stronger partnership with the intelligence community," Kendall said.

That dominant-capabilities theme, he said, includes anticipating and planning for

responsive and emerging threats. "We do have active potential adversaries out there right now who are designing things to defeat us, who are paying attention to what we are doing and thinking ahead to what they need to do to counter our emerging systems. There are also emergent threats that may not be fielded yet, but ... we have evidence that they're coming. It's a little different from a responsive threat. We have to take both of these into account as we design our programs."

Kendall didn't shy away from discussing one of the most significant threats that the United States faces. "Our technological superiority is at risk," he said. "It is eroding because we have not been making the investments we should be making. The threat of sequestration ... pose[s] problems for us in terms of maintaining technological superiority," which is central to BBP 3.0.

Kendall stated that much of the technology on which the military depends was conceived and developed in the 1970s and 1980s. It's been upgraded but isn't significantly different from what it was then. As well as it has worked, "Potential adversaries have had decades to study the American way of war and to develop and field systems and tactics designed to defeat American forces, particularly our global power projection capabilities.

"At the same time, there has been a remarkable leveling of the state of technology in the world, where commercial technologies with military applications, such as advanced computing technologies, microelectronics, sophisticated sensors and many advanced materials, are now widely available. In addition, the global information network has made protection of technical information much more difficult, a fact that potential adversaries are doing their best to exploit. Our

Better Buying Power 3.0

Achieving Dominant Capabilities Through Technical Excellence and Innovation

Draft September 2014

Achieve Affordable Programs

- Continue to set and enforce affordability caps.

Achieve Dominant Capabilities While Controlling Life-Cycle Costs

- Strengthen and expand "should-cost"-based cost management.
- Build stronger partnerships between the acquisition, requirements and intelligence communities.
- Anticipate and plan for responsive and emerging threats.
- Institutionalize stronger DOD-level long-range R&D planning.

Incentivize Productivity in Industry and Government

- Align profitability more tightly with department goals.
- Employ appropriate contract types, but increase the use of incentive-type contracts.
- Expand the Superior Supplier Incentive Program across DOD.
- Increase effective use of performance-based logistics.
- Remove barriers to commercial technology use.
- Improve the return on investment in DOD laboratories.
- Increase the productivity of IRAD and cooperative R&D.

Incentivize Innovation in Industry and Government

- Increase the use of prototyping and experimentation.
- Emphasize technology insertion and refresh in program planning.
- Use modular open systems architecture to stimulate innovation.
- Increase the return on small business innovation research.
- Provide draft technical requirements to industry early, and involve industry in funded concept definition to support requirements definition.
- Provide clear "best value" definitions so industry can propose and DOD can choose wisely.

Eliminate Unproductive Processes and Bureaucracy

- Emphasize acquisition executive, program executive officer and program manager responsibility, authority and accountability.
- Reduce cycle times while ensuring sound investments.
- Streamline documentation requirements and staff reviews.

Promote Effective Competition

- Create and maintain competitive environments.
- Improve technology search and outreach in global markets.

Improve Tradecraft in Acquisition of Services

- Increase small business participation, including more effective use of market research.
- Strengthen contract management outside the normal acquisition chain.
- Improve requirements definition.
- Improve the effectiveness and productivity of contracted engineering and technical services.

Improve the Professionalism of the Total Acquisition Workforce

- Establish higher standards for key leadership positions.
- Establish stronger professional qualification requirements for all acquisition specialties.
- Strengthen organic engineering capabilities.
- Ensure that DOD leadership for development programs is technically qualified to manage R&D activities.
- Improve our leaders' ability to understand and mitigate technical risk.
- Increase DOD support for science, technology, engineering and mathematics education.

KEEPING AN EYE ON COST

The new iteration, with a focus on using technical excellence and innovation to equip the warfighter, is a draft version; release of the final BBP 3.0 is planned for early 2015.

technological superiority is not assured, and in fact it is being challenged very effectively right now."

Kendall aims to change that with a strategic research and development (R&D) investment effort modeled on a similar 1970s effort that teamed government with industry. That effort "will be designed to set out the next few years of high-priority R&D to get us into position where we'll have technologies we can take into game-changing systems." He noted that the 1970s effort yielded many of the systems in use today: "things like smart weapons, smart-seekers, some of our networking technologies and other things that have allowed us to dominate on the battlefield for quite a long time now."

"The idea is to get to the next generation of those things," Kendall said. "If we don't do that, the concern I have about technological superiority is going to become even greater."

INCENTIVIZE PRODUCTIVITY

Another core concept of BBP 3.0, Kendall said, is aligning profitability with DOD goals. "We do a reasonably good job of aligning industry's opportunity to make a profit with the results that we expect. One thing we can do better is provide incentives to innovation" in addition to incentives for cost and schedule performance, he noted.

With respect to cost-plus or fixed-price contracts, Kendall said, "There is a stronger correlation in using the incentives in our results than there is to whether it's a cost-plus or fixed-price contract. We're going to continue to emphasize that."

His office will also emphasize the expansion of the Superior Supplier Incentive Program across DOD, Kendall said. "The idea here is to let industry know how it's doing relative to its competitors and its peers in the industrial base." This will be done at the service level, he said, not the DOD level, because many business units are aligned to particular services.

Another piece of BBP 2.0 that will carry over to 3.0 is increasing the use of performance-based logistics (PBL). "We're not improving our performance in this area as much as I'd like to see," said Kendall, although there have been improvements despite the "difficult year we had in [FY]13. Between sequestration and furloughs and everything else, the workload on our contracting people in particular was pretty excessive." PBL is "a harder way to do contracting," Kendall acknowledged, "but it gets results."

A new element in BBP 3.0 is an effort to remove barriers to using commercial technology. "This is one of the items in 3.0 where we're going to put a team together, we're going to work with industry and we're going to do specific things to implement this broad goal. Technology—of course—in a number of commercial areas moves more quickly than in military areas. We want to take advantage of that. We want to find a way to bring innovators who are in the commercial world—give them a reason to be involved with the government and do business with the government."

The government's awareness of industry's internal R&D (IRAD) has improved, Kendall said. "We want to go a step further with this and start looking at what we're actually getting out of both of these pots of money." The money for IRAD is about $4 billion to $4.5 billion a year, whereas contracted R&D is close to $10 billion a year. "That's a significant amount of money," he noted. "Our total R&D budget right now is running about $60 billion."

INCENTIVIZE INNOVATION

Increasing the use of prototyping and experimentation can help advance the state of the art, particularly when budgets are tight. Building prototypes and experimenting with them can be a more cost-effective way of developing new capabilities, Kendall said. "For a relatively small amount of money, you advance technology, you advance the state of the art in the direction you want to go by a significant amount. You reduce lead time by several years, perhaps, by having that technology in an actual product. You help your industrial base, you keep your design teams alive."

The problem, he said, "is finding the money to do it. I'm going to be proposing some of these in the budget process this fall [2014], and we'll see how it goes." Kendall added that if money does go to prototyping and experimentation, that probably will mean sacrificing "something we won't do … and that's going to be the

"IT'S NOT OUR DUTY TO SPEND MONEY AND GET IT OUT THE DOOR; IT'S OUR DUTY TO CONTROL OUR COSTS AND SAVE MONEY WHEREVER WE CAN TO GET MORE VALUE FOR THE TAXPAYER."

GLOBAL PARTNERS
U.S. Army and Singaporean scientists are advancing the future of nanomaterials through an exchange program between the countries. The two-year assignment focuses on developing cutting-edge materials with graduate students, postdoctoral fellows and professors in Singapore. Part of BBP 3.0 is improvement in finding technology in global markets to identify the best of the best in technology. (Photo courtesy of RDECOM)

difficult discussion we're going to have to have as we get into our process."

Kendall sees the emphasis on technology insertion and refresh fitting closely with the use of modular, open systems architecture; both are elements of BBP 2.0. "We have to design our acquisition plans to account for periodic technology refresh cycles on a much faster time scale," he stated.

Enabling that means that hardware and software should be developed as modular, open systems as much as possible. He conceded that it's attractive to industry to keep systems closed, "but that doesn't get us the competition we need here."

Another item new to BBP 3.0 is the effort to increase the return on Small Business Innovation Research (SBIR) Program investments. The SBIR Program has been reasonably successful in the R&D phase, Kendall said, but less so in moving SBIR-developed technologies to the point of creating actual products.

Despite the difficulties, Kendall believes it's worthwhile to find ways to work with industry to incentivize innovation. In the 1970s, he said, "we could very easily just reach out and grab smart people from industry and put them on the panel together with government people and go do a study. … The rules today don't permit that. But we can still find ways, within the rules, to have a dialogue with industry." One way, Kendall said, is to inform industry of requirements as soon as possible to get their feedback. "If they think our requirements are unreasonable for some reason, we need to know that. We need to understand it. If they think that they could be even more effective, [that] we could have more stringent requirements, or better performance requirements and they could support that, we need to know that, too."

In addition, using what he called "funded concept definition," Kendall said that DOD could essentially partner with industry in areas of risk by investing "some money … at some time early on in

THINKING SMALLER
Dr. Joseph Conroy checks the vehicle operation of the U.S. Army Research Laboratory's (ARL's) micro quadrotor, a platform for testing integrated sensing and processing on size-constrained robotic systems. New to BBP 3.0 is an effort to improve the return on investment in R&D. (Photo by Doug Lafon, ARL)

parallel with our analysis-of-alternative activities, to ask industry to do some early design trade-offs." This would allow DOD to get inputs from industry in a structured way, and in a competitive environment, he said. "All of the knowledge about the exact requirements and all technology do not reside in the government."

As part of the effort to incentivize innovation in both industry and government, Kendall wants to make sure that DOD provides clear "best value" definitions so that it "can pick and choose wisely," he said. Any purchasing decision involves a trade-off between cost and capability. DOD wants to get the best product at the lowest cost, which may lie somewhere between the objective, or optimum, and threshold, or good enough, levels. The problem is that cost tends to be everything, and as the threshold is likely to be cheaper, there has to be "some way to get credit for being above that level," he said. "Otherwise, there's no reason to offer an enhanced, objective level of capability" that might cost more but would give DOD exactly what it needs. "The idea here is that we will tell industry what it's [worth for that level of] performance: 'We'll pay another, let's just say, 10 percent if you get us to that level of performance. Or we'll pay another 30 percent if you get us a higher level of performance.' " He wants to make sure that industry can propose better-than-objective capabilities and understand that the extra cost will not automatically put them out of the running but that cost still has "to be below our overall affordability cap."

ELIMINATE BUREAUCRACY

This focus area is one that continues from BBP 2.0, and Kendall emphasized that "We want our chain of command to be empowered to do the job it's been given to do. … We want to find ways to get cycle time down ... without creating excessive risk. I've been asked by some of the people on the operational side why the acquisition system takes too long. It isn't the oversight of the acquisition systems that's slowing down our programs," he said. "What slows down our programs is not getting the work done. Not fulfilling the requirements. Not getting the design finished. Not getting the tests done. Not actually building the product on time. That's where we've got to focus if we want to reduce cycle times."

An important aspect of reducing bureaucracy is streamlining documentation. Good documentation, Kendall said, "should be the actual plan that will be implemented and used as a management document by the program office. That's the goal we're still striving for. I don't think we're there yet."

PROMOTE COMPETITION

Another core BBP 3.0 concept that continues from 2.0 is the effort to create and maintain competitive environments. "We're a low-volume, specialty-product buyer, for the most part, and we generally cannot afford competition in production. We can afford competition leading up to EMD [engineering, manufacturing and development]. Occasionally we can carry competition through EMD, and very rarely can we have competition in production." That means that DOD has to find other ways to promote competition.

Kendall also wants to see improvement in outreach to and finding technology in global markets. "We have a lot of very capable partners in the world, a lot of other countries who do good work, and we're looking for opportunities to co-develop and do sharing of the burden of developing the product, and better … economic scale of production, once we get into production."

SERVICES TRADECRAFT

"Because we spend as much money on services as we do on products," Kendall said, "this is also going to remain a core part of Better Buying Power. It's also something that we still have a lot of work to do on." For Kendall, this is an excellent opportunity for small businesses, which can provide expertise along with low overhead and a leaner company structure. Market research—"understanding what's out there, understanding what's available"—is how to get the best value, he said.

He wants to see the same kind of oversight that products receive applied to services. Whether the service is information technology, installation support, maintenance or translation, "We need to focus on best practices and improve our capabilities."

That includes defining requirements better. "One of the critical things we've found to having a successful services contract and getting good value for your money is that you write the requirements well. This enables people to bid well. This enables people to understand what you need. And this allows us to get a better business deal where the product and the performance are well-defined."

New to BBP 3.0 is an effort to improve the effectiveness and productivity of contracted engineering and technical services. "We spend a fair amount of money here, and I think we can be more productive in the return we're getting on that, as well."

WORKFORCE PROFESSIONALISM

Kendall was quick to praise the workforce for its efforts over the past year. "We have a very professional workforce, and I'm very proud of it. We have terrific people [who] went through a nightmare year in [FY]13, and they came through it with a great deal of resilience."

That aside, he said, "Every single member of that team, including myself, can improve in professionalism." That means establishing and adhering to high qualification standards for key leadership positions and strengthening requirements for specialty positions in acquisition.

Also important is ensuring that DOD leadership of development programs is technically qualified to manage R&D activities. "This is a bit of a shift. Some people have the idea that if you're a good leader and a good manager, you can lead anything. I don't believe that. … I wouldn't ask someone who's not an engineer to run a development program. I think that's a recipe for failure."

DOD also needs to improve its ability to understand and mitigate technical risk, Kendall said. While people talk about risk management, he said, "My perception is that what they're doing is they're not managing risk, they're watching it. They've identified it, they see it … Managing it is about doing things to change the nature of that risk and reduce it—carrying backups, early testing, how we structure programs." The product development cycle "is essentially a risk management process," Kendall said.

Finally, Kendall wants to see DOD improve its support for science, technology, engineering and math—or STEM—education because it is critical for "our economic well-being, our economic competitiveness, our military competitiveness and our military superiority."

JUST A DRAFT

Kendall emphasized that the version of BBP 3.0 unveiled on Sept. 19 is a draft. "We put it out, get feedback from stakeholders on the Hill, at think tanks and in industry, particularly in industry, and then we modify it and develop implementing instructions. So, in about the January time frame ... we'll put out the final version with implementing instructions." His introduction of the draft at CSIS was the start of that dialogue.

For more information, go to ***http://bbp.dau.mil/references.html****.*

MR. STEVE STARK provides contracting support to the U.S. Army Acquisition Support Center (USAASC) for SAIC. He holds an M.A. in creative writing from Hollins University and a B.A. in English from George Mason University. He has worked in a variety of positions supporting communications for the Army and Navy, and has written about defense-related topics for more than a decade. He was the founding editor of the Program Executive Office Soldier Portfolio and edited the Army's Weapon Systems handbook for six years.

MS. SUSAN L. FOLLETT provides contracting support to USAASC for SAIC. She holds a B.A. in English literature from St. Lawrence University. She has more than two decades of experience as a journalist and has written on a variety of public- and private-sector topics, including modeling and simulation, military training and technology, and federal environmental regulations.

THE LONG VIEW

LIRA decision support tool enables better long-range planning and budgeting

by MG Robert M. "Bo" Dyess Jr. and Mr. David N. Lakin

To many, lira was the Italian currency before the euro. But to those who are part of the Army's acquisition, requirements or resourcing community, the word suggests LIRA, the game-changing Long-range Investment Requirements Analysis.

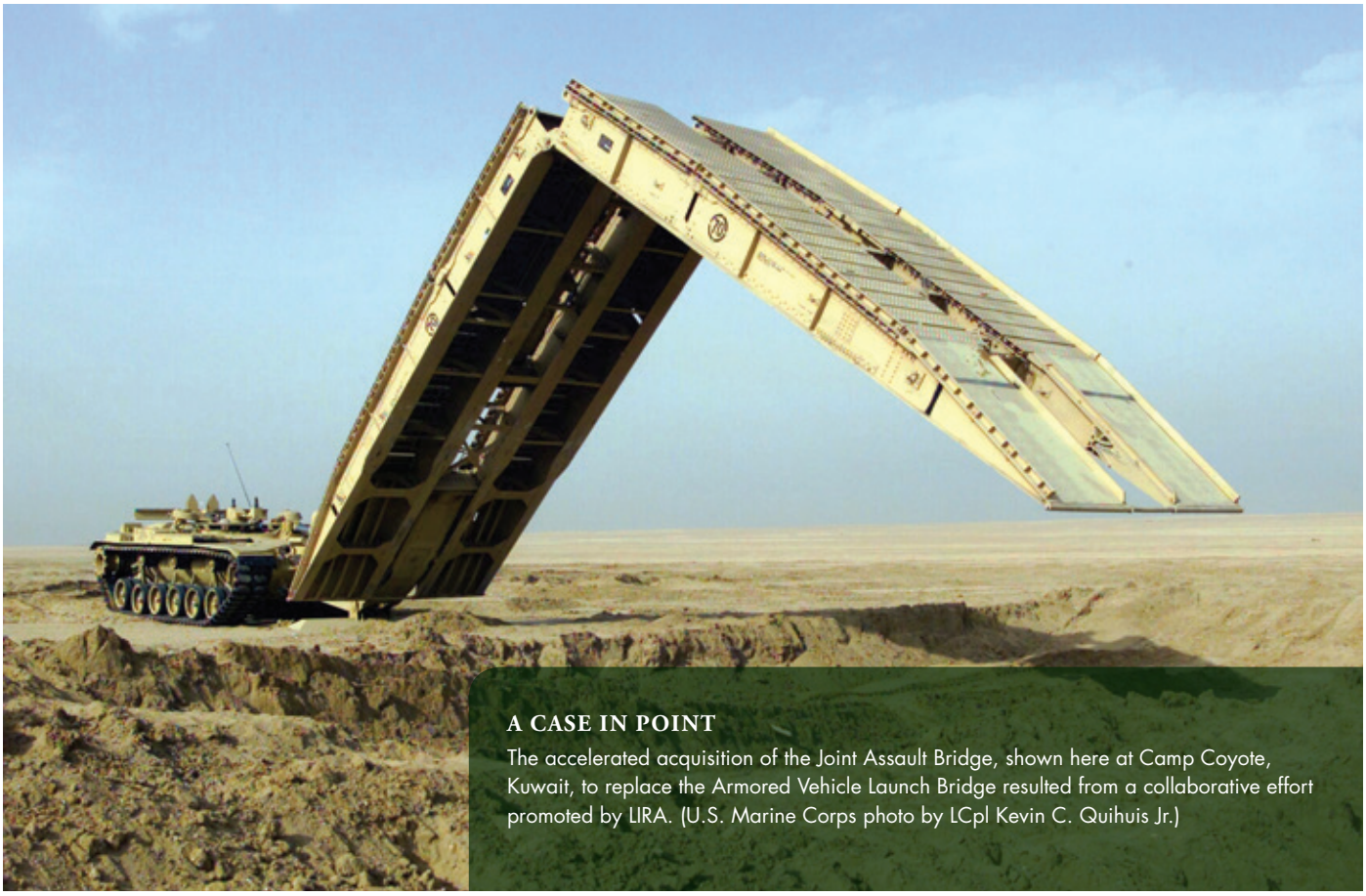
LIRA annually examines the life-cycle affordability of estimated future materiel requirements over a 30-year period against estimated total obligation authority, or legal spending limit. In other words, each year LIRA asks the question: Can the Army afford a weapon system or piece of equipment, and all the associated costs over its required useful life, with 30 years as a frame of reference?

In the past decade, DOD has taken steps to improve its acquisition strategies and better monitor its weapon acquisition programs, and continues to develop policies for estimating operating and support costs. This focus on improving acquisition processes is how LIRA began in 2012, as a structured annual review involving certain parties addressing a set of capabilities and aspects of affordability. LIRA is becoming a strategic weapon as we continue to provide for our Soldiers while facing the challenges of sequestration.

"I can't make a good decision on a program with only five years of information," said the Hon. Heidi Shyu, assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and the Army's acquisition executive, in 2012. She was expressing frustration with making major decisions on acquisition programs without being able to see how they fit in the overall Army budget over the long term, not the requisite five-year period of the program objective memorandum (POM). LIRA changed the forecasting process by providing a 30-year look, which also helps avoid any unexpected budgeting issues or "bow waves."

LONG-TERM AFFORDABILITY

While no one can accurately predict 100 percent of the Army's future fiscal resources over the long term, a credible baseline funding projection is a key element in determining the affordability of various programs. The LIRA process helps in that effort by eliminating the seam that existed previously



A CASE IN POINT
The accelerated acquisition of the Joint Assault Bridge, shown here at Camp Coyote, Kuwait, to replace the Armored Vehicle Launch Bridge resulted from a collaborative effort promoted by LIRA. (U.S. Marine Corps photo by LCpl Kevin C. Quihuis Jr.)

between the five-year POM window and what formerly was referred to as the "extended planning period."

Along with a holistic, no longer stove-piped approach to transitioning POM data into budget data, Army leaders now have more confidence in the continuity and consistency of budget, programming and long-range financial planning data. That was sorely needed because of shrinking resources, constrained budgets and other fiscal pressures facing the federal government.

In 2010, then-Undersecretary of Defense for Acquisition, Technology and Logistics Dr. Ashton B. Carter initiated the first phase of Better Buying Power (BBP), as part of then-Secretary of Defense Dr. Robert M. Gates' efficiency initiatives. Two years later, the Hon. Frank Kendall, as Carter's successor, revised and expanded BBP to include making long-term capital investment analysis covering product life cycles of 30-40 years a standard part of the acquisition process.

On Nov. 14, 2012, Kendall introduced new acquisition initiatives with BBP 2.0, to continue delivering better value to the taxpayer and the warfighter by improving the way DOD does business.

In 2012, at Shyu's request and as a result of her experience building POM15-19 (for FY15-FY19), the deputy assistant secretary of the Army for plans, programs and resources (DASA PPR) and the director of force development, Army G-8, started developing a process that became LIRA.

"LIRA provides a long-term look at affordability," said Thomas E. Mullins, DASA PPR. "Older processes did not allow for real strategic thought, since they only looked out a few years. LIRA synchronizes requirements, acquisition and resource planning over a 30-year period. It's a holistic approach that cross-walks the program executive groups [PEGs] and the capability portfolio review [CPR]."

There are six PEGs that align with the Title 10 responsibilities of the secretary of the Army, and LIRA uses four: training,

ARCHITECTS OF ANALYSIS

MG Robert M. "Bo" Dyess Jr., director of force development, HQDA G-8, and Thomas E. Mullins, DASA PPR, co-chair LIRA's equipping program evaluation group. Dyess and Mullins were early leaders in developing the LIRA process. (Photo by Marla J. Hurtado, HQDA G-8)

equipping, sustaining and installations. (The others, organizational and maintenance, fall outside the LIRA process.) The goals of the CPR are to revalidate Armywide system requirements; align resources with Soldier and warfighting priorities; and develop an acquisition process based on required capabilities that provides flexibility for the future.

LIFE-CYCLE PERSPECTIVE

The collaborative process established in LIRA allows Army stakeholders the opportunity to de-conflict long-term planning for an existing or future capability. "When the Army makes an investment, we need to take a long-term strategic look," Mullins said. "When you buy things, they don't last forever. Thirty years is the expected life cycle, and it needs to fit with the Army's requirements, resources and affordability."

LIRA has evolved since its first use in 2012. The primary stakeholder organizations in the process are the Army G-8 and ASA(ALT), with additional organizations joining each successive annual review; the four PEG co-chairs determine who should participate. In 2013, for LIRA15 (which informs POM15-19), the process included the Army G-4, the U.S. Army Training and Doctrine Command's Army Capabilities Integration Center and the U.S. Army Materiel Command.

The LIRA process brings together the various communities on the Army staff involved in resourcing, such as equipping, training, sustaining and installations, to discuss the most cost-effective and efficient ways to move forward in program acquisition. An excellent example of this combined approach is how everyone came together on the development of the Joint Assault Bridge (JAB) in the first year of LIRA.

There was no materiel solution for the Armored Vehicle Launch Bridge (AVLB). It needed to be replaced sometime in the future, but when the Army looked at it, a short-term need was clear. Training subject-matter experts said the AVLB was too expensive to maintain readiness, and sustainment personnel said there were too many moving parts, some of which were obsolete. The equipping experts successfully made the case that it was in the Army's best interest to buy the JAB sooner than originally planned, to meet the needs of the warfighter.

This coordinated decision resulted in divestiture of the AVLB and fielding of the JAB two years ahead of schedule.

SUPPORTING THE WARFIGHTER

Since LIRA provides a 30-year look at the Army's needs, resources and acquisition processes, it fits well with two new key Army documents, "Force 2025 and Beyond—Setting the Course," the July 22, 2014, guidance from Army Chief of Staff GEN Raymond T. Odierno and Secretary of the Army John McHugh; and "The U.S. Army Operating Concept: Win in a Complex World, 2020-2040," released Oct. 31, 2014, by the U.S. Army Training and Doctrine Command. The first provides the operational and organizational framework for how the Army will invest its resources to align with strategic priorities. The Army Operating Concept describes how future Army forces will prevent conflict, shape security environments and win wars.

Accordingly, LIRA allows the Army to see where the capability gaps are and what investments need to be made going

ADDING USEFUL LIFE

Soldiers from 1st Battalion, 64th Armor Regiment "Desert Rogues," 2nd Armored Brigade Combat Team (ABCT), 3rd Infantry Division maneuver their M2A3 Bradley Infantry Fighting Vehicle June 9, 2014, during a training event at Camp Shelby, MS. LIRA, by providing a long-term affordability review of the capabilities and the life cycle of a vehicle, enabled the Army to make an informed decision to upgrade and extend the life of the Bradley instead of replacing it in the short term. (Photo by SSG Richard Wrigley, 2nd ABCT)

"WE ARE TAKING HUGE BUDGET REDUCTIONS IN A VERY UNCERTAIN WORLD, SO THE QUESTION IS, IN WHICH TIME FRAME DO WE PARK THE RISK?"

forward. The G-8 Program Analysis and Evaluation (PA&E) Directorate exercises overall responsibility for developing the entire Army's investment strategy in support of the POM and the Future Years Defense Program.

BALANCING PORTFOLIOS

"LIRA, or some form of LIRA, is an enduring process that allows you to look at and balance a portfolio of portfolios, while viewing the big picture in a concise manner," said BG John G. Ferrari, PA&E director. "It's also enormously valuable as an education tool, since we have a 30-40 percent (Army) staff turnover each year."

Because LIRA participants need to make sure their data points track the intent of the Army chief of staff, "LIRA makes sure that everyone who starts the programming phase of the planning, programming, budget and execution process has done the requisite analytics. LIRA provides predictability and consistency across the portfolios, and we can see what the Army is trying to achieve over time and eliminate any unfunded requirements," Ferrari said. "While 30 years is a long period, it lets you get beyond the next five years, and you can see the best way to allocate your S&T dollars. S&T won't yield results for about 15 years, and then it takes another 10 to 15 years to get

"OLDER PROCESSES DID NOT ALLOW FOR REAL STRATEGIC THOUGHT, SINCE THEY ONLY LOOKED OUT A FEW YEARS. LIRA SYNCHRONIZES REQUIREMENTS, ACQUISITION AND RESOURCE PLANNING OVER A 30-YEAR PERIOD."

PORTFOLIO REVIEW

MG Cedric T. Wins, director of the Requirements Integration Directorate, Army Capabilities Integration Center, makes a point during the Protection Portfolio Review Oct. 22, 2014, at the Pentagon. Hershell "Hew" E. Wolfe is the deputy assistant secretary of the Army for environment, safety and occupational health. (Photo by Marla J. Hurtado, HQDA G-8)

from the lab to the field, so we need to look at a 30-year time horizon," he said.

When the Army modernizes equipment using research, development and acquisition accounts, it uses three general time periods to balance portfolios under LIRA: making incremental improvements (up to 10 years); starting new development to yield capabilities (10-20 years) and S&T investments for the future (20-30 years).

"We don't have a balanced [S&T] portfolio right now, because we can't afford it," Ferrari said. "We are taking huge budget reductions in a very uncertain world, so the question is, in which time frame do we park the risk?"

According to Ferrari, the Army took a "procurement holiday" after the Vietnam War, without a long-term balanced budget and portfolio view, as the result of an anticipated "peace dividend." The service sacrificed S&T and incremental improvements to invest in the Comanche helicopter, the Crusader Howitzer and Future Combat Systems. When the Army deployed to Afghanistan and Iraq following 9/11, there was an immediate need to provide Soldiers with upgraded equipment to meet mission requirements, Ferrari said; their equipment was 10 years old and not adequate for the new threats, terrain and climate. When LIRA was developed in 2012, current and future worldwide risks were a major factor in the budget planning process. As a result, the Army decided not to cut near-term incremental improvements or S&T funding for the future, and investments were made in a limited development of capabilities, he said.

CONCLUSION

With LIRA providing a long-term, top-down affordability review of capabilities and the life cycle of equipment, the Army was able to make decisions on some major vehicle programs. For example, in 2017, the Army will upgrade and extend the life of the Abrams tank and the Bradley Fighting Vehicle, in conjunction with a network installation, instead of replacing them in the short term. In 2019, the Army will begin production of the Armored Multi-Purpose Vehicle (AMPV) to replace the M113 Armored Personnel Carrier, which is more than 50 years old.

"LIRA allows us to ask, 'Can we afford the AMPV?' or 'When do we need a replacement for the HMMWV [High Mobility Multi-Purpose Wheeled Vehicle]?' using data and an analysis of cost, affordability and obsolescence, instead of anecdotal information," Mullins said. "We cannot afford to modernize all the Army's equipment at once, but with LIRA we can avoid budgeting bow waves by deciding when to invest our money."

TARGETED FOR REPLACEMENT

Soldiers of the 744th Engineer Company operate an M113 Armored Personnel Carrier, with a Mine Clearing Line Charge in tow, July 24, 2014, on Fort Hunter Liggett, CA. Informed by the LIRA process, in 2019 the Army will begin production of the AMPV to replace the M113, which is more than 50 years old. LIRA allows the Army to decide on acquisition priorities based on a rigorous analysis of cost, affordability and obsolescence instead of anecdotal information. (U.S. Army photo by SPC Derek Cummings, 91st Training Division (Operations))

Sequestration will place additional constraints on defense spending in FY16, and avoiding those bow waves in programming will be even more difficult, he said. "We are always fighting for cost avoidance," Mullins continued. "With sequestration heading our way, LIRA will be our best weapon."

For more information, contact Walter Nichols, acquisition program specialist in the ASA(ALT) Plans, Programs and Resources Directorate, at ***walter.g.nichols2.civ@mail.mil****.*

MG ROBERT M. "BO" DYESS JR. is the director of force development, HQDA G-8. Previously he served as director of the Requirements Integration Directorate, Army Capabilities Integration Center and as division chief, Force Integration, Combined Security Assistance Command – Afghanistan during Operation Enduring Freedom. He was commissioned as an infantry second lieutenant from the United States Military Academy at West Point in 1982, earning a B.S. He has an M.S. in systems engineering from the Virginia Polytechnic Institute and State University and an M.S. in strategic studies from The Air University.

MR. DAVID N. LAKIN is an analyst with the Plans, Strategy and Policy Division in the Force Development Directorate, HQDA G-8. He has held a wide variety of public affairs positions in the private and public sectors, including as the public affairs officer for U.S. Forces – Afghanistan from January 2011 to July 2013. He holds an M.A. in journalism from the University of Oklahoma and a B.A. in political science from Coe College.

OPENING *the* DOOR *to* 'OPEN' ARCHITECTURES

AMRDEC develops new modular approach to foster competition, innovation in guided missiles

by Mr. Chris Lofts

The Army's Modular Missile Technologies (MMT) Program is developing a new modular open systems architecture that reduces development cost and time for a wide range of guided missiles. MMT is working to change the reputation of guided missiles for being expensive and time-consuming to develop and modify. This reputation stems largely from the closed, proprietary architectures used as the basis for their design. Those closed architectures have made money for their developers, but that paradigm is no longer sustainable. And because there is no economic incentive for industry to develop modular open systems architecture for guided missiles, the Army is leading the way.

The stream of guidance from DOD and Army leadership paints a sobering picture regarding the acquisition of military systems. DOD's budget is in decline. At the same time, our adversaries are rapidly innovating. The Hon. Frank Kendall, undersecretary of defense for acquisition, technology and logistics, released Better Buying Power (BBP) 3.0 in September 2014, in an ongoing effort to improve the acquisition system. Inherent in the series of BBP initiatives is the drive to reduce acquisition timelines and life-cycle costs while "achieving dominant capabilities."

Like BBP 3.0, the new "U.S. Army Operating Concept: Win in a Complex World, 2020-2040" lays out the need for rapid innovation. It states, "Army forces will have to develop materiel solutions much faster than in the past due to the ease and speed of technology transfer and adaptation by enemies." Interpretation: We are too slow, and our potential adversaries are catching up.

THE PROBLEM WITH PROPRIETARY

Guided missile programs have a reputation for lengthy and expensive development times—the very antithesis of what DOD and the Army need at this time. The root cause for this time and expense lies in their architectures. Though physically modular, the architectures are predominantly interdependent; a change in one subsystem will reverberate in unexpected ways through the other subsystems, requiring that they be modified as well. This

MULTIPLATFORM COMPATIBILITY

MMT's "product line" approach is in part a response to the Army's need for lighter-weight and lower-cost missiles that are compatible with multiple aviation platforms, including the AH-64D/E Apache helicopter. (U.S. Army photo)

modification process is iterative and may take multiple passes to complete.

Interdependent architectures are also generally closed and proprietary, keeping costs high in two ways. The first is by presenting a barrier to competition. The second is that they are difficult and time-consuming to design and, once built, just as difficult and time-consuming to modify.

The BBP initiative has previously recommended the use of open systems architectures wherever possible to reduce costs and shorten development times. BBP 3.0 recognizes that open systems architectures "stimulate innovation" by broadening the opportunities for new competitors to "win their way onto our programs."

Open systems architectures come from the world of networked computers, where the hardware and software are in constant use. Missiles, by contrast, get used once. While open systems standards exist for the external interfaces of guided missiles, there are, regrettably, no open systems architecture options for the subsystems of guided missiles themselves. There are two primary reasons for this. The first is technical: Guided missiles are high-speed, weight-sensitive, one-shot devices with multiple time-critical functions. Because of the interrelationships of the missile's hardware, aerodynamic properties and the need for stable flight at high speed, developing them is complex. The second reason is economic: Because open systems architectures tend to reduce profit margins, the prime contractors in the missile industrial base have no incentive to develop one for guided missiles. Those outside the missile industrial base lack the system-level expertise necessary to develop guided missiles. The "economic moat" for new entrants is indeed large where guided missiles are concerned. Under these circumstances, it is understandable that no open systems architecture for guided missiles has come from the commercial sector, nor is it likely.

UNMANNED POTENTIAL

Unmanned platforms such as the MQ-1C Gray Eagle UAS are part of the vision for MMT. AMRDEC has determined that it is feasible to construct a family of munitions from a set of common subsystems that would be compatible with and effective from both manned and unmanned platforms. (U.S. Army photo)

THE MMT PROGRAM

The U.S. Army Aviation and Missile Research, Development and Engineering Center (AMRDEC), a subordinate organization of the U.S. Army Materiel Command's Research, Development and Engineering Command, has undertaken an effort to overcome the technical hurdles associated with an open systems architecture for guided missiles. Toward this end, AMRDEC established the MMT science and technology (S&T) program to develop and demonstrate modular open systems architecture for the equivalent of a guided missile product line. Additionally, MMT is striving to ensure that the lessons learned in this endeavor are applicable to guided missiles of all types and sizes.

The rationale for the "product line" approach is customer-driven. In its most recent road maps, the Army Aviation community has articulated the need for lighter-weight missiles compatible with multiple aviation platforms, including manned rotary-wing and unmanned aircraft systems (UAS). These platforms include the AH-64D/E Apache helicopter, Future Vertical Lift, and the MQ-1C Gray Eagle and MQ-7B Shadow UAS. Initial detailed mass and aerodynamic analyses showed that it is feasible to construct a family of munitions from a set of common subsystems that would be compatible with and effective from these platforms. (See Figure 1.)

The product line includes a drop-glide munition and a series of rocket-propelled variants, including an unguided variant. (See Figure 2.)

THE SOFTWARE IS THE HARD PART

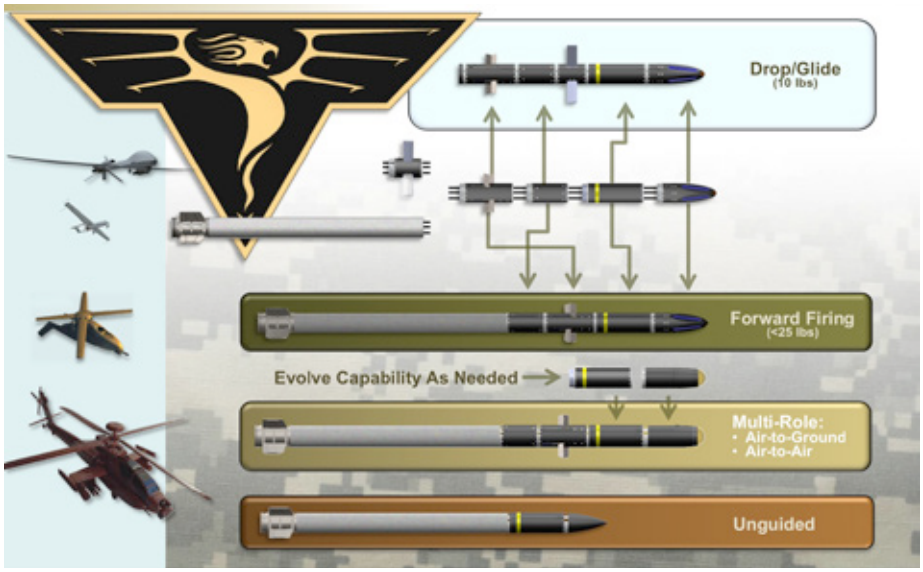
The real difficulty in procuring and managing such a guided missile product line lies not in the hardware but in the software. Traditional design practices for guided missile development would yield radically different software loads for each configuration, especially as each evolves over time. Each of these software loads, in turn, would still be sensitive to minor physical changes in the subsystems.

The root of the software problem lies in the customary, proprietary algorithms around which the guidance and control software is written. Traditional guidance and control algorithms assume that the missile will have an interdependent architecture. The MMT product line pushes the level of changes that the software must tolerate several steps further by allowing changes to occur not only in a given subsystem, but also to the order of the subsystems in the stack, the types of subsystems in the stack, the types of all-up rounds and even the launch platform types.

To achieve this level of flexibility for the software, MMT has derived a new set of guidance and control algorithms that assumes modular open systems architecture. The primary means by which MMT has achieved this result was by building each guidance and control-related software item in the form of a data-driven object. In doing so, the operational code representing the algorithms does not have to be changed when the missile configuration changes; only the data file upon which the code operates needs to be changed to reflect the new configuration.

In simulation testing, MMT software has shown its ability to withstand wide variations in subsystems, configurations of all-up rounds and launch environments. Potential applications have

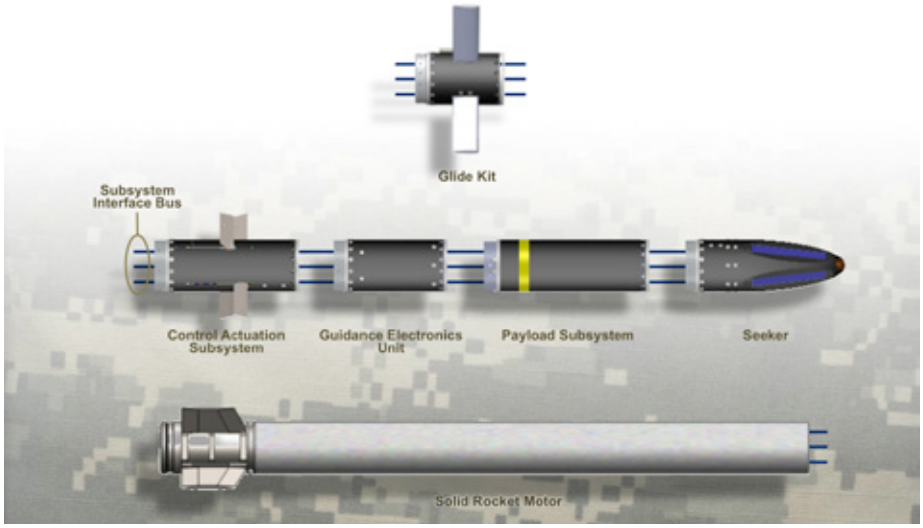
FIGURE 1



ONE PRODUCT LINE, MULTIPLE VARIANTS

Using a new "product line" approach, MMT envisions a family of munitions from a set of common subsystems that would be compatible with and effective from these platforms. The product line includes a drop-glide munition and a series of rocket-propelled variants, in line with the needs of the Army Aviation community. (SOURCE: Chris Lofts, AMRDEC)

FIGURE 2



COMMON SUBSYSTEMS

Computer-aided design models show the MMT subsystems. While open systems standards exist for the external interfaces of guided missiles, no open systems architecture options exist for the subsystems of guided missiles. MMT aims to change that by demonstrating a modular open systems architecture for guided missiles. (SOURCE: Chris Lofts, AMRDEC)

"ARMY FORCES WILL HAVE TO DEVELOP MATERIEL SOLUTIONS MUCH FASTER THAN IN THE PAST DUE TO THE EASE AND SPEED OF TECHNOLOGY TRANSFER AND ADAPTATION BY ENEMIES." INTERPRETATION: WE ARE TOO SLOW, AND OUR POTENTIAL ADVERSARIES ARE CATCHING UP.

already extended beyond the Army Aviation product line originally envisioned. MMT software has shown potential for surface-launched applications (e.g., surface-to-surface and surface-to-air). The demonstration phase of MMT includes a series of surface launches as part of the crawl-walk-run flight test plan.

FROM SIMULATION TO REALITY

The combination of MMT's open systems architecture algorithms and the simulation environment has resulted in other development time savings. MMT develops its algorithms in a six-degrees-of-freedom (6DOF) simulation that models the missile's flight trajectory.

The 6DOF simulation is coded in an object oriented programming language (C++) in a manner intended to be directly compatible with real-time processing. Thus the relevant guidance and control code from the MMT 6DOF simulation can be copied directly into the C++ compiler for the missile's real-time flight processor in one step. Normally the transition from the simulation environment to the flight hardware is a months-long, labor-intensive process with multiple steps. With its one-step process, MMT has reduced the simulation-to-real-time processor transition from months to days, saving development money as well as time.

The MMT 6DOF simulation is just as modular as the MMT hardware. The simulation has been built to permit different subsystem models to be swapped in and out at will, and to do so in a closed-loop environment, modeling the behavior of the system, that allows rapid performance evaluation of the resulting all-up round. This feature is particularly advantageous as a means to increase competition at the subsystem level.

For instance, a small business with a new seeker idea, such as a component or data-processing method, could receive a version of the MMT simulation with the MMT seeker model left blank. The small business could develop its own MMT interface-compliant model, connect it to the MMT simulation and run it to determine how the combined system would perform in a closed-loop environment representative of the new variant. This process can be replicated across multiple vendors simultaneously, enabling a very competitive prototyping acquisition strategy. This capability was successfully beta-tested in July 2014 in a collaborative effort between MMT and another AMRDEC seeker S&T program.

CONCLUSION

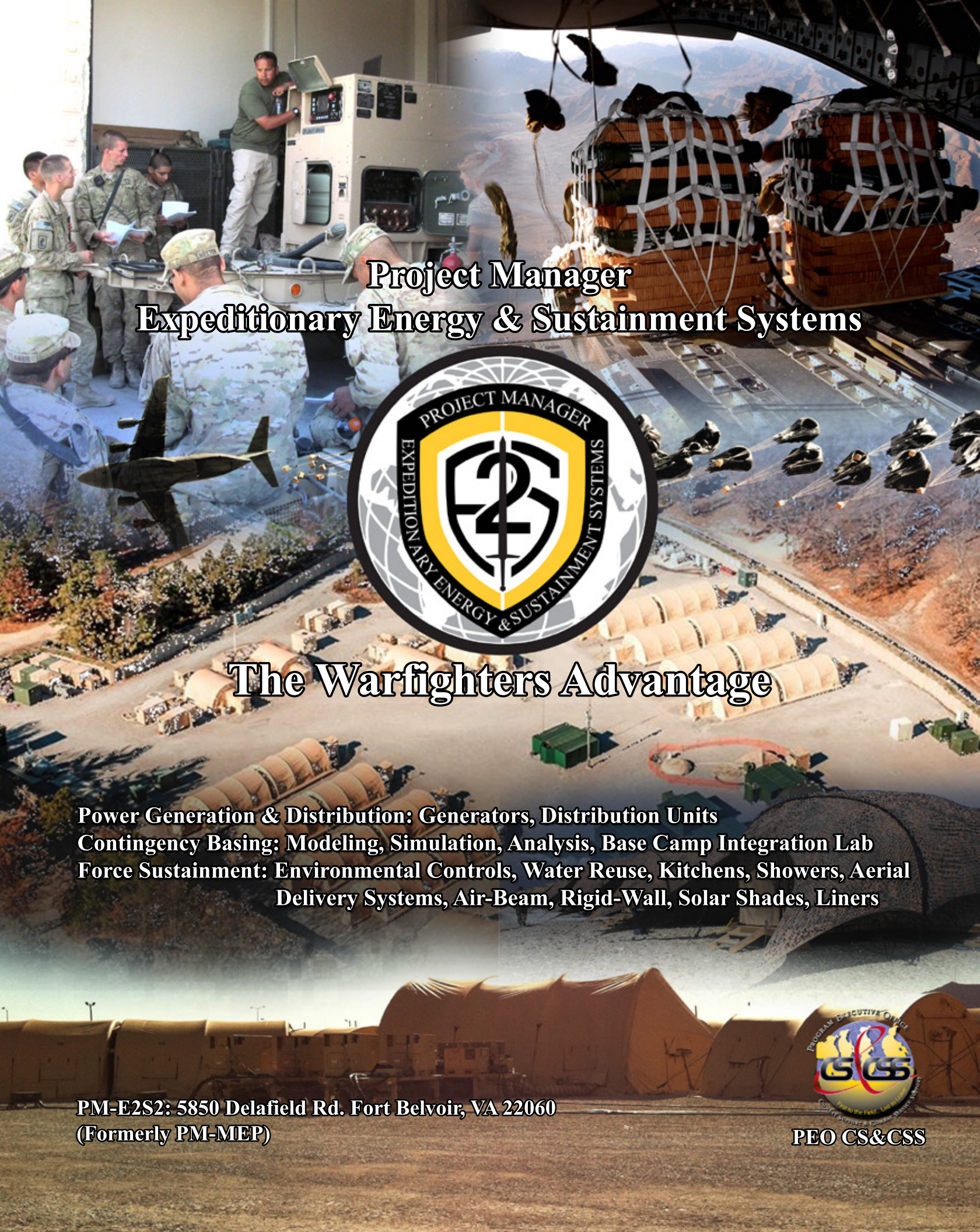
The combination of the MMT modular open systems architecture and the supporting simulation tools that have sprung from it combine into a powerful and innovative acquisition tool, permitting a project office to act as a lead systems integrator for a guided missile system.

As such, the government would be able to rapidly develop multiple prototypes before deciding on one (or more) for an initial capability. From there, the government would be able to experiment with new subsystem prototypes to reduce the cost, improve the existing capability or develop a new capability. The resulting system would be the best solution that the entire missile industrial base could produce, rather than just the best (proprietary) system that a single prime contractor team could produce.

The ability to compete individual subsystems also expands the competitive environment by creating openings for small businesses and other companies that have not traditionally participated in the development of a guided missile. MMT's modular open systems architecture provides another avenue for the Army and DOD to innovate more rapidly and at lower cost.

For more information, contact the AMRDEC aviation missiles capability area lead at ***Aviation_CAL@amrdec.army.mil****.*

MR. CHRIS LOFTS is the MMT program lead for AMRDEC, Redstone Arsenal, AL. He has an M.S.E. in aerospace engineering from the University of Alabama in Huntsville and a B.S. in electrical engineering from Christian Brothers College. With over 27 years' experience in the development of various guided missiles for the Army, he serves as its capability area lead for aviation missile S&T. He is Level III certified in systems planning, research, development and engineering.



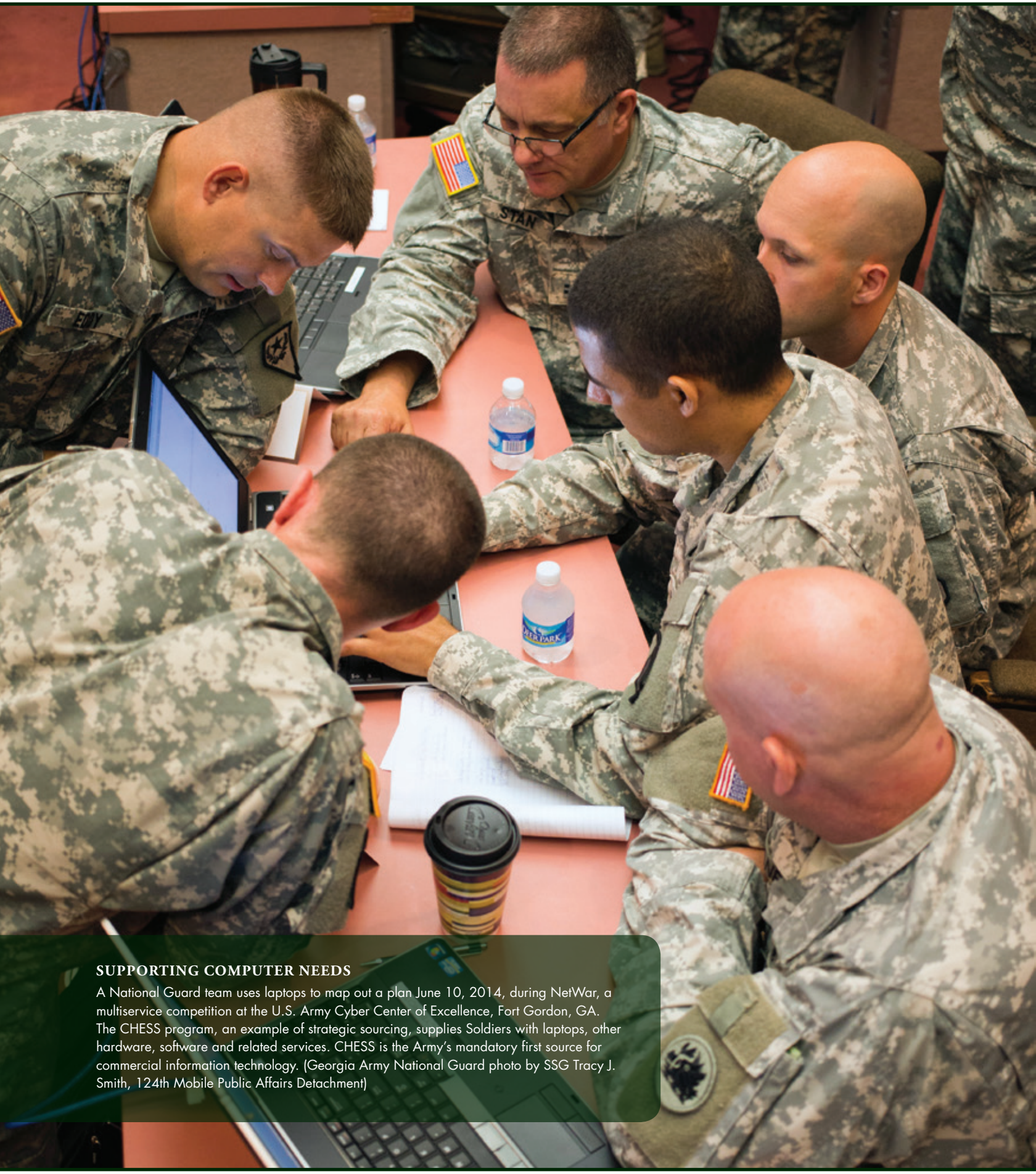
Project Manager
Expeditionary Energy & Sustainment Systems

The Warfighters Advantage

Power Generation & Distribution: Generators, Distribution Units
Contingency Basing: Modeling, Simulation, Analysis, Base Camp Integration Lab
Force Sustainment: Environmental Controls, Water Reuse, Kitchens, Showers, Aerial Delivery Systems, Air-Beam, Rigid-Wall, Solar Shades, Liners

PM-E2S2: 5850 Delafield Rd. Fort Belvoir, VA 22060
(Formerly PM-MEP)

PEO CS&CSS



SUPPORTING COMPUTER NEEDS

A National Guard team uses laptops to map out a plan June 10, 2014, during NetWar, a multiservice competition at the U.S. Army Cyber Center of Excellence, Fort Gordon, GA. The CHESS program, an example of strategic sourcing, supplies Soldiers with laptops, other hardware, software and related services. CHESS is the Army's mandatory first source for commercial information technology. (Georgia Army National Guard photo by SSG Tracy J. Smith, 124th Mobile Public Affairs Detachment)

PURCHASING POWER

Strategic sourcing identifies collaborative savings opportunities

by Ms. Caroline A. Jones

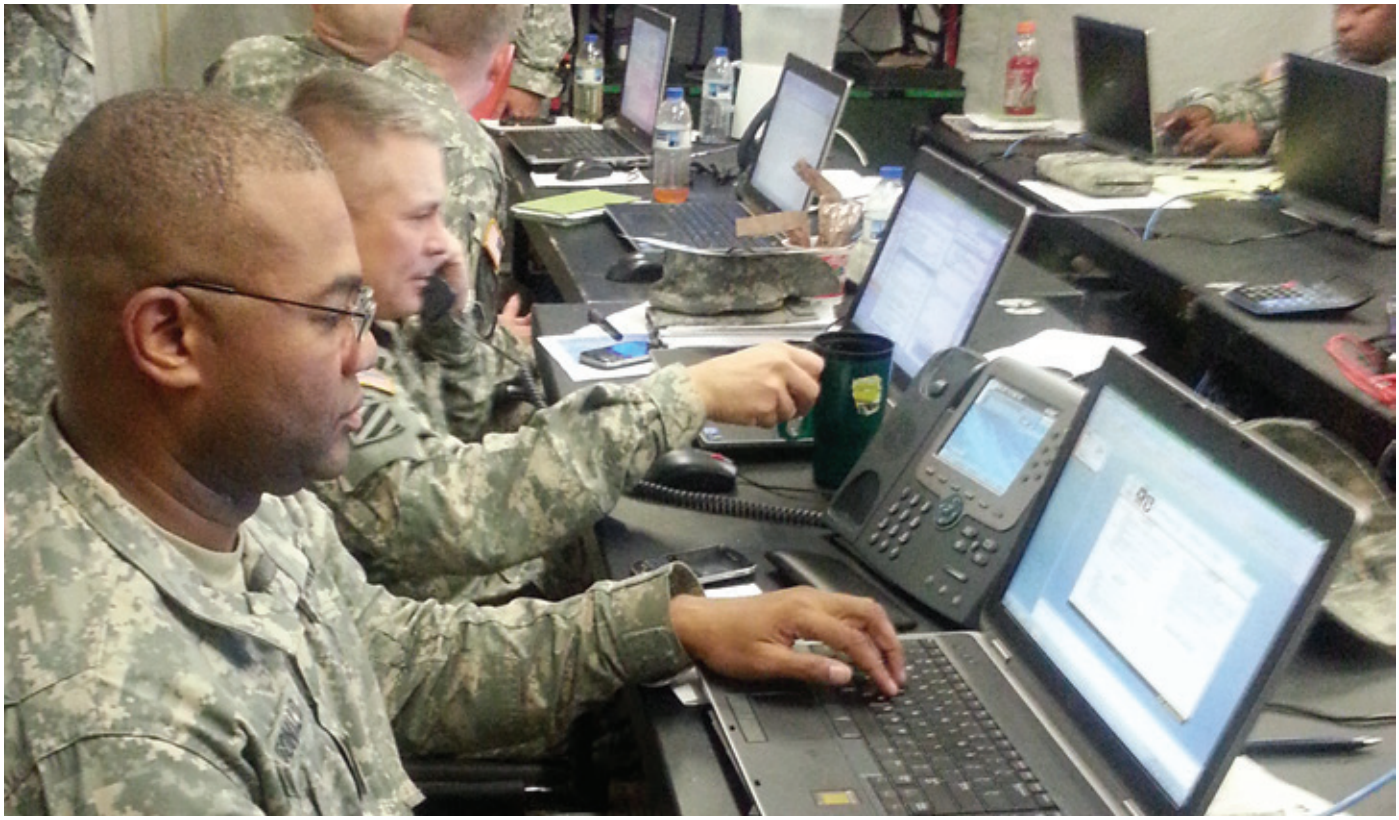
With services representing more than 50 percent of DOD's contract obligations annually, efficiency and effectiveness are key to their successful procurement. The Army Strategic Sourcing Program is a collaborative initiative to identify savings opportunities across the Army enterprise.

The Office of Management and Budget defines strategic sourcing as a "collaborative and structured process of analyzing an organization's spending and using the information to make business decisions about acquiring commodities and services more efficiently and effectively." Commands and organizations must collaboratively and critically analyze spending requirements and contracting vehicles used to acquire goods and services.

The Strategic Sourcing Executive Committee (SSEC), chaired by Deputy Assistant Secretary of the Army for Procurement (DASA(P)) Harry P. Hallock, is charged with advancing a culture of strategic decision-making in all processes that lead to the acquisition of goods and services. The SSEC's charter builds on the Better Buying Power (BBP) initiatives to support sound business practices in a fiscally constrained environment.

BETTER BUYING THROUGH COLLABORATION

In FY14, the Army spent $48.8 billion to acquire services. Of this total, services within the knowledge-based portfolio accounted for $11.9 billion. Knowledge-based services relate to tasks requiring the application of detailed processes or technical knowledge; they include program, management support, and education and training services. Facility-related services, which are associated with the design, maintenance and repair of facilities, represented total spending of $13.02 billion. Together, the two portfolios represented 51 percent of the $48.8 billion that



WHERE THE ACTION IS

LTC Robert McDonald, right, commander of the 922nd Contingency Contracting Battalion (CCB) at Fort Campbell, KY, and more than two dozen contingency contracting officers assist in fighting the spread of the Ebola virus in West Africa. In a fiscally constrained environment, commands and organizations are collaboratively and critically analyzing spending requirements and the contracting vehicles used to acquire goods and services. (Photo courtesy of 922nd CCB)

the Army obligated for services in FY14. As such, they represent the greatest, though by no means the only, opportunities to save on services acquisition through strategic sourcing.

The Army has realized significant savings by collaborating with agencies outside DOD. A prime example is the Army's far-reaching partnership with the Federal Strategic Sourcing Initiative (FSSI) of the U.S. General Services Administration (GSA), which defines FSSI as a "government-wide program that allows federal agencies to work together to develop innovative sourcing strategies for a set of commonly acquired goods and services."

Examples of these collaborations include the janitorial and sanitation supplies initiative, which comprises blanket purchase agreements (BPAs) to purchase goods in the categories of cleaning supplies, equipment and accessories. Another collaborative effort between Army and GSA has been the maintenance, repair and operations initiative, with BPAs in categories that encompass hardware, tools and tool cabinets, paints, sealants and adhesives. The Army and GSA are discussing collaboration on additional service acquisitions in the areas of building, maintenance and operations, furniture, and human resources and training.

The Army has also collaborated with the Air Force and the Defense Information Systems Agency to identify opportunities for cost savings and avoidance through the Next-Generation (NexGen) multiagency BPA. NexGen has identified and eliminated redundant wireless and handheld devices based on usage

SAVING ON SERVICES

Richard Sloop Jr., center left, site manager for a contracting company, discusses plans for an Ebola treatment center in Zorzor, Liberia, with MG Gary J. Volesky, left, commanding general of Joint Forces Command – United Assistance, and site engineer Emmanuel Tucker, center right, Nov. 18, 2014. Knowledge-based and facility-related services are fertile ground for the Army to save money through strategic sourcing. (U.S. Army photo by SFC Brien Vorhees, 55th Combat Camera)

and cost, and made available one vehicle to satisfy enterprise-wide requirements.

OPPORTUNITY ASSESSMENT

The initial step in strategic sourcing, during the early stages of acquisition planning, is to analyze spending across all services to determine the most economical way to satisfy requirements through long-term, enterprisewide investments. These assessments include thorough market research and analysis of requirements to determine the best options to pursue efficiencies and cost savings, including contract vehicles and cost-sharing arrangements.

The Strategic Sourcing Steering Group (SSSG) plays a leading role in the assessments by providing operational-level planning and guidance to commodity and service teams, commands and direct reporting units involved in strategic sourcing. In its mission to meet the goals, objectives and strategic guidance set forth by the SSEC, the SSSG collaborates with enterprisewide strategic sourcing working groups (SSWGs) to identify requirements needed to support the mission.

Aiding this collaboration is an ongoing analysis of business performance called "spend analysis." Portfolio coordinators analyze trends in spending by each portfolio group, command or organization, focusing on product service codes, which describe the products, services, and research and development that the federal government purchases; these codes are the primary means of identifying strategic sourcing opportunities. The analysis not only defines spending patterns and requirements, but also

EAGLE EYES LOGISTICS CONTRACTS

Jerry Brown, a forklift operator and warehouseman for AECOM, supports the EAGLE program contract at the Redstone Arsenal LRC. EAGLE, which provides global logistics support for the Army, other DOD services and federal agencies, is reducing the number of maintenance, supply and transportation contracts at 35 LRCs by nearly 60 percent. (Photo by MSG James Eagleman, U.S. Army Materiel Command)

determines the type of contract that is flexible and affordable.

SAVINGS INITIATIVES

Two examples of successful efforts by the SSWGs and commodity teams are the Computer Hardware, Enterprise Software and Solutions (CHESS) and Enhanced Army Global Logistics Enterprise (EAGLE) programs, both active Army initiatives.

Since April 2010, CHESS has been the mandatory first source for commercial information technology under the Program Executive Officer for Enterprise Information Systems. As of Oct. 15, 2014, the CHESS program office reported spending over $1.9 billion and saving over $297 million. "Our long-term partnerships with the Army CIO [chief information officer]/G-6 and Army Contracting Command have provided the foundation to identify opportunities to improve the procurement of commercial information technology hardware, software and services. We are continuing to collaborate with industry to ensure that the Army is able to access the right solutions at market-based prices," said Tom Neff, CHESS project director.

Enterprise Acquisition Gateway for Leading Edge Solutions (EAGLE), an Army preferred source since February 2012, is an Army contract vehicle executed by U.S. Army Contracting Command – Rock Island, IL, that provides global logistics support to meet the evolving needs of the Army, other DOD services and federal agencies. EAGLE task orders focus primarily on materiel maintenance, retail and wholesale supply, and transportation support services at the installation level.

EAGLE is reducing the number of maintenance, supply and transportation contracts at 35 of the U.S. Army Sustainment Command's U.S.-based Logistics Readiness Centers (LRCs) by nearly 60 percent. The LRCs manage installation supply, maintenance and transportation, including food service, ammunition supply, clothing, hazardous material, bulk fuel, personal property and household goods, passenger travel, nontactical vehicles, and rail and garrison equipment.

"The EAGLE contract has performed as advertised, strengthening our logistics performance work statements and allowing proper financial and operational controls to execute our support contract," said Mark W. Dille, LRC director at Redstone Arsenal, AL.

CONCLUSION

Implementing strategic sourcing at the federal level embraces the ongoing cultural shift from a command-centric focus to portfolio management and is the "buzz" within DOD.

As we continue to operate under fiscal constraints for the near future, the Army will continue to promote collaborative sourcing of goods and services within the framework of BBP, with the main goal of saving the government money.

For more information on the Army's strategic sourcing program, go to ***https://spcs3.kc.army.mil/asaalt/zp/Strategic%20Sourcing/Strategic%20Sourcing.aspx****; Common Access Card login required. Additional information on sourcing services is on the Defense Acquisition University Service Acquisition Mall website,* ***http://sam.dau.mil****.*

MS. CAROLINE A. JONES is a business management specialist in the Office of the Senior Services Manager under the Office of the DASA(P). She holds an MBA from Averett University and a B.S. in marketing from Hampton University. She is Level II certified in program management.

CONTRIBUTORS:
Mr. Harold E. Williams*, deputy director of services, and* ***Mr. James H. Lewis****, director, Portfolio Management Division, both in the Office of the Senior Services Manager.*

FROM THE PENTAGON

DASA(P) Harry P. Hallock speaks to SSEC members and guests, including Lesley Field, deputy administrator in the Office of Federal Procurement Policy, Office of Management and Budget, during the group's quarterly meeting in October 2014. The SSEC charter builds on DOD's BBP initiatives to support sound business practices in a fiscally constrained environment. (Photo by SGT Courtney Ropp, Army Multimedia and Visual Information Directorate)

SEEING THE BIG PICTURE

Hosted by DASA(P) Harry P. Hallock, right, the SSEC meets quarterly at the Pentagon. The committee is responsible for advancing a culture of strategic decision-making in all processes leading the acquisition of goods and services. (Photo by SGT Courtney Ropp, Army Multimedia and Visual Information Directorate)

FROM THE DIRECTOR,
ACQUISITION CAREER MANAGEMENT
LTG MICHAEL E. WILLIAMSON

Opportunities *to DELIVER*

Talent management strategy seeks to grow, develop future acquisition leaders

Force 2025 and Beyond is a comprehensive effort to develop concepts into capabilities that will ensure that our Army continues to deliver professionally trained and ready forces as the most decisive land power in the world. It is about people building the future Army, a complex undertaking based on lessons learned, threat assessments, promising technologies, strategic plans and other critical factors. It is about identifying the Army's best talent to seize the future.

As the director of acquisition career management (DACM), my plan for the nearly 38,000-member Army Acquisition Workforce is to have the right people in the right jobs with the right skills at the right time to deliver decisive-edge capabilities to our Soldiers at all times.

This ambitious initiative for our acquisition professionals is known as "talent management." It is an Army enterprise-level effort to identify, grow and develop our future military and civilian acquisition leaders to recognize opportunity, embrace new ideas, manage risk and realize their true potential. It is also about recruiting and retaining top-notch acquisition professionals to sustain the workforce through time.

MILITARY OPPORTUNITIES

To fully realize the maximum potential for the military members of our acquisition workforce, we continue to evaluate and refine our officer and noncommissioned officer professional development models. We do this to increase the bench of experience throughout the program management and contracting arenas while also enabling career broadening for optimal development. Our efforts include the following:

- The development and implementation of a deliberate and coordinated process to optimize leader development practices and align talent with current and future Army Acquisition Corps (AAC) requirements. The Army's military acquisition positions are now identified by categories to demonstrate career progression from functional to career-broadening opportunities to

PILOTING A NEW COURSE

LTC Reese Hauenstein, left, product manager for the CH-47F Improved Cargo Helicopter, gives a coin to a Soldier from the 603rd Aviation Support Battalion, 3rd Combat Aviation Brigade (CAB), as the unit concluded verification of the CH-47F Chinook helicopter maintenance manuals on Hunter Army Airfield, Savannah, GA, Oct. 15, 2014. The ALDC, scheduled to be piloted in late FY15, will provide centrally selected product and project managers with the capabilities required to successfully execute their acquisition leadership responsibilities. (Photo by SGT William Begley, 3rd CAB Public Affairs)

senior-level positions. This allows the Army to analyze the acquisition talent pool and identify personnel with the potential for higher-level job responsibilities, from the most junior grades all the way to senior field-grade positions.

- Progress toward future development of a system to define, capture and archive assignment metrics and data. These details will ensure that we remain on the leading edge with a talent management approach for our Functional Area 51 acquisition officers.

The publication of FY15 military acquisition assignment guidance and priorities, focused from a strategic as well as a talent management perspective, guides our Acquisition Management Branch in assigning the right personnel with the right skills to right positions at the right places. I ensured the identification of nominative positions as well as course attendance, advanced civil schooling and Training with Industry opportunities, including:

- The unique Acquisition Leader Development Course (ALDC)—Our centrally selected list (CSL) key acquisition billets (product and project manager) attend pre-command courses (PCCs) mandated by the secretary of the Army at Fort Leavenworth, KS, and a branch PCC based on their program assignment. Currently, there is not an acquisition-focused PCC opportunity.

  The ALDC is a new concept that will be piloted in the third quarter of FY15 to provide centrally selected product and project managers, contracting commanders, acquisition directors and product directors with the capabilities required to successfully execute their acquisition leadership responsibilities. The objectives of this three- to five-day course include providing acquisition senior leaders with strategic guidance; preparing those about to assume these centrally selected positions with the mindset, knowledge and skills required to effectively execute their new responsibilities; managing risk; leveraging the talents of their teams; and creating a culture of innovation. This course will also enable attendees to benefit from lessons learned by leaders at the top of the acquisition profession, and ensure a reachback capability so that participants can tap the best leaders and experts for advice when faced with difficult challenges on the job.

- Core Intermediate Level Education (ILE) for acquisition officers—The ILE venue of attendance is determined by a board that meets annually following the Army competitive category (ACC) majors promotion board. The ILE board evaluates officers selected for promotion and determines the venue in which they will attend ILE in a designated calendar year (CY). When ACC officers are board-selected to ILE for a particular venue and CY, attendance takes precedence over other assignments and developmental considerations. Core ILE serves as another talent management opportunity.

CIVILIAN OPPORTUNITIES

For the advancement of the Army's civilian acquisition professionals, we have several talent management initiatives and tools, which include the following:

- Our on-boarding activities, which energize new acquisition personnel regarding the critical importance of our mission, ensure acclimation to the acquisition team, reinforce retention

and begin, from day one, to guide, mentor and coach them on their acquisition functional responsibilities.

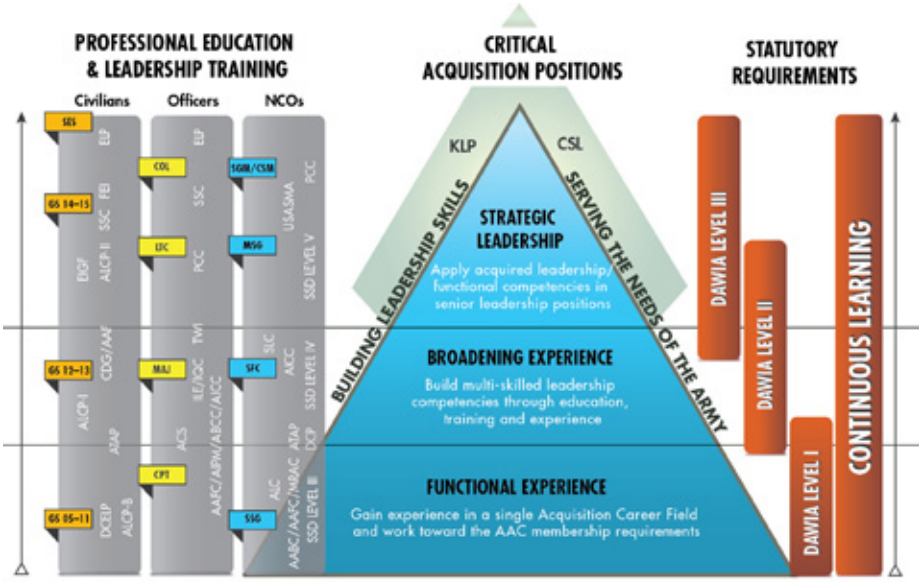
- Career development models for specific acquisition career fields (ACFs), similar to military models and available on the U.S. Army Acquisition Support Center (USAASC) Army DACM website: **http://asc.army.mil/web/career-development/civilian/career-planning-steps/**. These models are intended as notional guides for professional growth and a well-rounded ACF experience. Not every opportunity presented on the models is required or suited for everyone. Within the models, courses and programs are hyperlinks that connect to dedicated Web pages with additional information for each opportunity. Acquisition workforce civilians, along with their supervisors, should use these models as tools for developing plans to advance their acquisition careers.
- The launch in summer 2015 of "Ellie," the Army's virtual acquisition career guide, which will provide personalized acquisition career management guidance on a variety of topics including Acquisition Career Record Brief maintenance and Defense Acquisition University (DAU) training and registration.
- Development and application of an individual, overarching career concept based on mission, vision and goals, which is highly encouraged for our acquisition professionals. This career concept would include mentoring, developmental opportunities and ACF professional certifications for specific career fields as established in the Defense Acquisition Workforce Improvement Act.
- The 2014 Civilian Project/Product Manager Handbook, which provides aspiring centrally selected product manager, project manager or product

CELEBRATING PROFESSIONALISM

Williamson speaks at the celebration of the 25th anniversary of the AAC Oct. 13, 2014, during the Association of the United States Army Annual Meeting and Exposition in Washington, DC. "With more than 7,000 advanced degrees and 400 doctoral degrees, there is a true level of professionalism," he remarked. "They are analysts, engineers, contract specialists, logisticians, scientists, program managers, quality assurance inspectors and experts in several other disciplines who execute diverse responsibilities on a daily basis to meet the needs—especially the urgent needs—of our Soldiers anywhere in the world," he said. (Photo by Catherine DeRan, USAASC)

RIGHT TOOLS FOR THE JOB

These are just some of the resources that give Army acquisition professionals the tools they need to implement a career development plan that puts them on the path to success. (SOURCE: USAASC)



ARMY ACQUISITION CAREER DEVELOPMENT MODEL

MAPPING SUCCESS

The Army Acquisition Career Development Model lays out statutory certification requirements, professional education and leadership training opportunities, and the functional, broadening and strategic experiences that make for a successful acquisition career. (SOURCE: USAASC)

director applicants with a set of tools and critical information to guide them through the application and selection process. These positions are among the most challenging in the acquisition workforce. The handbook is on USAASC's Army DACM Office website: **http://asc.army.mil/web/wp-content/uploads/2014/11/2014_PM_handbookv-110414_FINAL.pdf**.

- A centrally selected product director program pilot, deployed as another opportunity for high-performing civilians with leadership potential. The FY15-16 product director centralized selection board application window was Sept. 24 to Nov. 14, 2014. The board met in December 2014, and slating will take place this winter. Implementation of this pilot program includes appropriate predevelopment and follow-on positions after successful completion of the assignment. Approximately seven to 10 re-designated CSL product or project manager billets will be identified as product director positions annually, for a steady state of approximately 21-30 professionals. More information is available at **http://asc.army.mil/web/career-development/prod-dir/**.
- Aggressive management of post-utilization assignments for key leader positions. Senior Service College graduates (including our DAU Senior Service College Fellows), and post-CSL product or project managers and product directors can expect lateral developmental and broadening experiences to enhance their skills, while allowing them to put their acquired skill sets and advanced education to good use for their benefit as well as the Army's.

ONLINE TOOLS

In addition, the following tools for both our military and civilian Army acquisition professionals are available at the USAASC Army DACM Office website:

- Civilian and military career planning steps, providing further detail on career development opportunities.
- The DACM Newsletter, published online every quarter with a focus on acquisition career development. The newsletter highlights upcoming career development opportunities and initiatives, plus news about specific ACFs.
- The monthly DACM Office column "Hot Topics," which offers a central online location for workforce members to learn about the latest centrally funded acquisition opportunities, changes to DAU courses and certification requirements, and other important information. It offers another "one-stop shop" for anything related to acquisition career management.
- USAASC's "Workforce Minutes" video series at **https://www.youtube.com/user/usaasc**, offering insights into the various opportunities available to our Army acquisition workforce. I recently recorded a message on talent management.

Using these tools and information, our Army acquisition professionals can implement strategic talent management to ensure that they are on the right path to successful careers.

CONCLUSION

The Army of the future, like the Army of today, depends on an elite cadre of acquisition professionals to develop, acquire, field and sustain the world's best equipment and services by efficiently leveraging technologies and capabilities.

To continue to achieve this mission means having the right people in the right jobs with the right skills at the right time. This is a high priority for me, and it is one I look forward to working with all members of the Army Acquisition Workforce to accomplish.

INDUSTRY INSIGHT

Looking beyond the 'bathtub' toward 2025 and beyond

by Mr. Mark Signorelli

Editor's Note: This is the first in an occasional series of viewpoints from industry on how it can work with the Army and DOD to preserve essential capabilities for the warfighter.

As the defense industry experiences the most challenging environment of the past three decades, we are forced to look to the future. We see the bottom of a sizable bathtub directly in front of us. A mere eight years ago, the defense industry was at its peak; today, our combat vehicle industrial base is at its lowest levels in our production history.

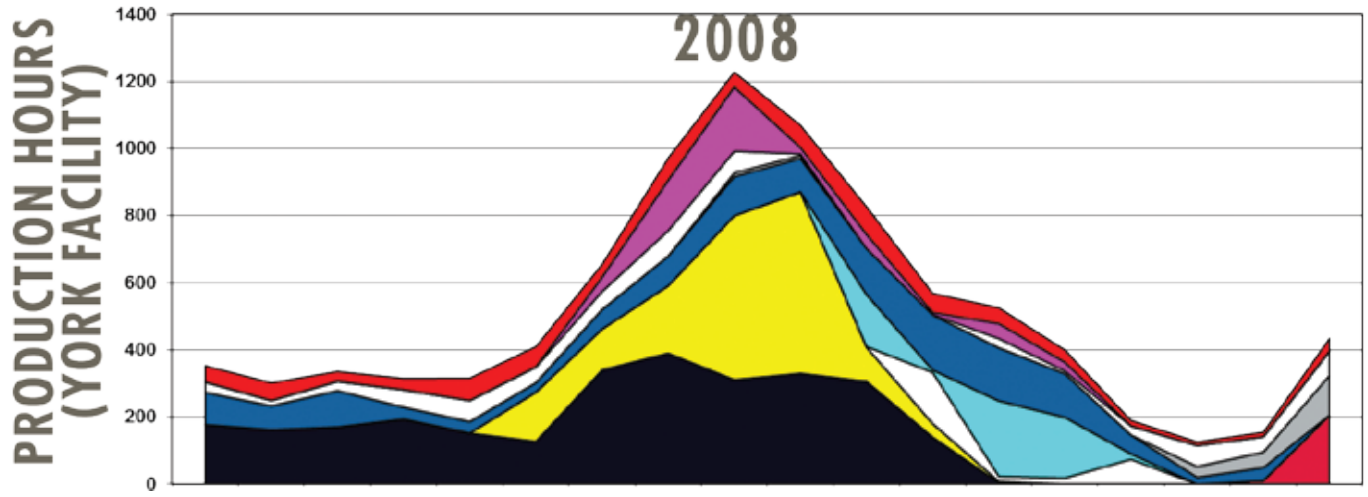
In 2008, during the war surge and at the height of Mine Resistant Ambush Protected (MRAP) vehicle production, our BAE Systems facility in York, PA, was operating at the company's highest-ever production levels. BAE Systems and the defense industry surged at short notice to meet the challenge of mass-producing MRAPs because the industrial and engineering bases were warm and operating at sustainable levels. That peak production was clearly unsustainable, however, and for the past six years, the industrial base has been in a steady decline. (See Figure 1 on Page 150.) Today, the same York facility, which produces the M109A7 and M992A3 vehicles for the Paladin Integrated Management program, as well as upgrades for the M88 fleet and the Bradley Family of Vehicles, is at one-third of the production workload that it had six years ago.

Defense companies have begun shifting their focus to preserving key skill sets for the future, i.e., "sustaining the industrial base." BAE Systems' goal, for example, is to ensure that the experts who know how to support, sustain and design combat vehicles are available when the time comes to upgrade vehicles, to integrate future technology on existing

STAYING WARM, STRATEGICALLY

BAE Systems' York, PA, facility, which produces and upgrades vehicles such as the Bradley, M88 and M109A7, is at one-third of the production workload that it had six years ago. The company is working with the Army to maintain critical skill sets during the defense spending downturn, which is resulting in a significant dip in production across the industrial base. Meanwhile, BAE Systems has consolidated the production lines in the York plant from multiple buildings into one. (Photo courtesy of BAE Systems)

FIGURE 1



LESS WORK TO DO

Production throughout the combat vehicle industrial base has dropped dramatically since the MRAP spike in 2008. This graphic, for example, represents with different colors the workload for the variety of vehicle programs at BAE Systems' York, PA, production facility. In response, BAE Systems is working to maintain the resources it will need to prepare for future work. (SOURCE: BAE Systems)

platforms or to design the vehicles of the future. The skill sets in our engineering team, our manufacturing plants and those of our suppliers are rare; it takes years to develop the expertise to sustain world leadership in combat platforms for the U.S. military. As an example, fully training and certifying an expert ballistic welder, a skill that is already becoming scarce within the industrial base, requires an investment of at least three years. How will we ensure that that skill is available and that the capability to train future generations survives?

IDENTIFYING THE CHALLENGES

As we deal with increasing pressure to right-size the business, we see very significant challenges in three areas: our production capability and capacity; our integrated engineering design, development, integration and test capabilities; and our supply base. With less work coming into the plants, we are already seeing the impact on the key skill sets and our supply base.

BAE Systems has consolidated the assembly lines in our York plant into one building, compared with multiple buildings during production peak, and shut down the Bradley turret line. Our suppliers are examining whether they can stay in business and, if so, whether it's worth the cost of doing business in the defense market, or if they should retract to their commercial business areas. Our engineering team is struggling to determine the minimum staff necessary to maintain core and critical capabilities in a market where there is little need for highly skilled and experienced systems engineering, design and integration skills. Without sufficient workload, we will lose critical skills and capabilities such as turret design, manufacturing and integration.

One critical skill set is engineering, especially systems engineers, design engineers and integration and test engineers, who are essential to the development of future vehicles. They bring a body of knowledge in unique combat vehicle design and performance that industry cannot reconstitute from the commercial engineering base.

Industry and the Army have been working closely to sustain key skills, but we

ARMOR ROLLBACK

A Soldier from the 1173rd Transportation Battalion directs an MRAP armored vehicle before it leaves the ship that delivered the MRAPs to a port in Kuwait, Nov. 25, 2014. BAE Systems and the defense industry surged at short notice to meet the challenge of mass-producing MRAPs. That was possible because the industrial and engineering bases were warm and operating at sustainable levels. For the past six years, however, the industrial base has been in a steady decline. (Photo by MSG Paul Tuttle)

are on the razor's edge; we can't relax, or we will lose the "secret sauce" that has sustained our industry and our defense. Recent remarks by the Hon. Heidi Shyu, assistant secretary of the Army for acquisition, logistics and technology, about sustaining a research and development (R&D) effort highlight the criticality of this effort not just for the Army but the defense industry that supports the Army. "I think collaboration is really essential," she said, adding, "No single person or organization possesses a monopoly on innovative ideas. It is critical for us to collaborate with industry, academia, federally funded R&D centers and other government organizations to solve difficult problems. So my vision is that we will collaborate across the board to spur innovation."

We believe that the Army and industry have to team on important R&D efforts to sustain critical engineering capabilities in both the Army R&D community and in industry. The Army's Future Fighting Vehicle program, which engages BAE Systems, General Dynamics, the U.S. Army Tank Automotive Research, Development and Engineering Center and the Program Executive Office for Ground Combat Systems, is a good example of how we can work together to support the Army's long-term needs and sustain industry's unique capabilities.

FROM NEW BUILDS TO UPGRADES

Over the past several years, as budgets have grown more constrained, we have seen an increasing shift away from new

WHEN UPGRADING IS ENOUGH

The M109A7 Self-Propelled Howitzer, a prime example of the shift in focus away from new programs to restoring and upgrading the capabilities of current systems, is in low-rate initial production at BAE Systems' York, PA, facility. The company plans to deliver the first of these vehicles to the Army this spring. (Photo courtesy of BAE Systems)

programs to restoring the capabilities of current systems and upgrading them with new and emerging technologies. A prime example of this is the M109A7 program, which marks a significant upgrade over the vehicle's predecessor, the M109A6 Paladin Self-Propelled Howitzer. The program has restored space, weight, power and cooling capacity lost from previous upgrades, while providing growth potential for emerging technologies.

The design includes components common with the Bradley, including the chassis, engine, transmission, suspension and steering system; improves survivability; and leverages technologies developed during the Non-Line-of-Sight Cannon program, such as a 600-volt onboard power system. The state-of-the-art "digital backbone" and power generation capability provide significant growth potential for future payloads as well as accommodating existing battlefield network requirements. The Army and industry accomplished all of this by leveraging existing designs and capabilities, without developing new technologies.

This shift to upgrades as we sustain our current fleet offers the chance to integrate new technologies incrementally over time rather than waiting for an all-new vehicle to integrate existing, and by then potentially outdated, capabilities. How we choose technologies, and our ability to integrate them at Technology Readiness Levels 6 and 7, may hold the key to maintaining the effectiveness of our vehicles over time rather than focusing all

efforts on new or advanced technologies and vehicles.

We are leveraging investments made across the Army and industry's broad portfolio to develop solutions that can be used to modernize existing platforms and advance new capabilities. These advances have the potential to redefine the Army's fleet of combat vehicles. Technologies such as hybrid electric drive (HED) provide electrical power to support emerging technologies such as high-energy lasers, radio frequency emitters and electromagnetic systems in ways we could never have imagined on board a combat platform. HED provides that electricity without adding an entire power system to the vehicle, saving significant space and weight while enhancing overall system performance. Incorporation of future power generation technologies is also much simpler with HED technology. Anything that generates electricity can be plugged in to power the system, such as directed-energy weapons.

SUPPORTING THE SUPPLIER BASE

Equal to the challenge of sustaining our engineering and technology capabilities is the challenge we face with our manufacturing and supplier base. At BAE Systems, we have leveraged the advances in lean and flexible manufacturing processes and practices that allowed us to surge in support of the Middle East conflicts so that we can "gracefully" manage the downturn. We have consolidated production lines and programs; we have identified critical employees with unique and core skills; we have built a manufacturing organization that benefits from a diverse throughput to sustain capability while operating at significantly lower workloads than in the past. As we look to the future, this same lean thinking will enable us to flexibly adjust our workforce and facilities in support of new requirements, although not with the same surge capacity the Army has enjoyed in the past.

Similarly, we have worked with our supplier base, largely grounded in small businesses that serve unique defense requirements. These include businesses that have unique capabilities unavailable anywhere else. We have helped them streamline their processes and production lines and identify alternate work to sustain capability; we have mentored and guided troubled businesses; and we have encouraged diversification to manage risk. Despite these efforts, we are seeing a transition of that supplier base away from the defense industry, as their order books will no longer support their core business needs. This critical but often overlooked component of the industrial base may prove to be the hardest to sustain, and in the long run may represent the greatest cost and availability to reconstitute when we once again need it.

CONCLUSION

Ultimately, we all face the same challenge. It is not an Army issue or an industry issue; it is our issue. We are inextricably linked. The question is: "How do we live to fight another day?" There are not many acquisition programs out there today, but there are exciting opportunities in technology development and integration that will provide the Army with the future capabilities to meet needs we do not understand today.

The defense industry as a whole is going to continue to experience challenges; how we collectively face them will determine our mutual success or failure. Although these challenges will not mean the end of our major factories or a catastrophic failure of our supply base, we are navigating through a growing number of significant issues more strategically than in years past in order to secure a future for new technologies and programs.

We remain optimistic. There are exciting new technologies that will enable a new generation of capabilities we could not have imagined 20 years ago; they are real, they are here and they are ready to support an Army that will protect us as we face a dangerous future. Our challenge, as well as the Army's challenge, will be maintaining our ability to seize on these exciting technologies and build new capability into the Army of the future.

Although this is a difficult period, we know that there will be a bottom and that the needs of our services will result in a rebound in the defense industry. The skills and experience that supported the country's needs in the surge are still supporting the industrial base.

MR. MARK SIGNORELLI is BAE Systems' vice president and general manager, Combat Vehicles, focused on tracked and wheeled vehicle markets serving both U.S. and international customers. He joined BAE Systems through the former United Defense in 1997 after serving 21 years as a field artillery officer in the U.S. Army, a career that culminated with an assignment as assistant deputy director for operations in the National Military Command Center. Before that, he served in a wide variety of command and staff positions in III Corps, the 1st Cavalry Division, Eighth U.S. Army, U.S. Field Artillery School and 72nd Field Artillery Brigade. During Operations Desert Shield and Desert Storm, Signorelli served as the 1st Cavalry Division artillery operations officer in Saudi Arabia, Kuwait and Iraq. He holds a B.S. in zoology from the University of Florida.

OLD DOG, NEW NOSE

Existing chemical detector turns out to be just the solution for defeating explosives

by Mr. Steve Stark

The work that scientists at the U.S. Army Edgewood Chemical Biological Center (ECBC) in Edgewood, MD, are doing to improve the venerable Joint Chemical Agent Detector (JCAD) isn't so much a case of teaching an old dog new tricks as it is discovering that the old dog can sniff out vastly more than you ever thought it could. JCAD, a lightweight, portable, automatic chemical warfare agent (CWA) detector, has been around for almost 25 years, and nearly 60,000 of them have been fielded.

"The JCAD is already fielded and in the hands of our warfighters, so that made it a good candidate to start with" when the Army was looking for new ways to detect explosives and so defeat improvised explosive devices (IEDs), said Gretchen Blethen of ECBC's Point Detection Branch, which is within the Chemical-Biological Detection Division in the Research and Technology Directorate of ECBC. Dr. Augustus W. Fountain III, who has a Ph.D. in chemistry, is the acting director.

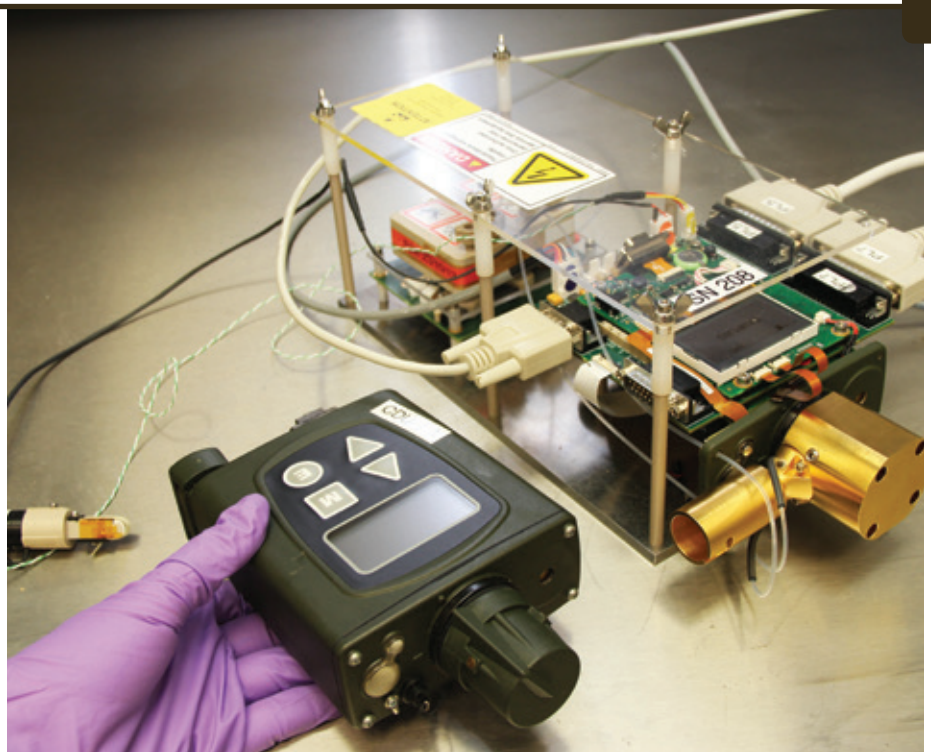
The JCAD Explosives Detection Program came about when Fountain was in Iraq in 2010 as the chief scientist for the counter-explosives exploitation cell. He noticed, he said, that "the Army was spending an awful lot of money fielding handheld ion-mobility spectrometers that were just for explosives and were very similar to devices that were used at airports." Those were in addition to JCAD, which meant that Soldiers had to carry more than one device.

Fountain's issue with those other devices was at least twofold. First, no one was using them "because they didn't have the proper logistical support, [and] Soldiers weren't properly trained on them." In addition, the Transportation Security Administration (TSA)-type devices were extremely power-hungry. Second, "ion-mobility spectrometry has been used by the Army for chemical detection for upward of 20 years, and that capability was already fielded" in a different device. Even though the science was used

primarily for CWA detection, Fountain said, it was perfectly suited for explosives. "If you understand the principles behind how that system operates, it's no different than the ones that are in airports or the ones that they were fielding for explosives," Fountain said. And it's no different from what JCAD is capable of.

When he returned from Iraq, Fountain started an Army technology objective (ATO) program to see if ECBC could upgrade JCAD to detect explosives. The widespread misapprehension within DOD that the chemical threat and the explosive threat were separate domains, requiring separate detectors, arose largely from concepts of operation that were written according to individual threats, ignoring others.

As Fountain sees it, CWAs and explosives are both chemicals, so one device should be able to detect both. The premise is simple: It's a better idea to give Soldiers a single piece of equipment that can do several different things well rather than several pieces of equipment, each of which can do only one thing.



FIRST OF A KIND

JCAD has been modified from its original design, right, for detecting chemical warfare agents into a dual-use item that can also detect explosives, making it the Army's first portable, near-real-time explosives detector. (Photo courtesy of U.S. Army ECBC Public Affairs)

ION-MOBILITY SPECTROMETRY 101

To understand how the JCAD works and why it's useful in detecting chemical agents and explosives, it helps to understand what ion-mobility spectrometry is and does. Ions are either positively or negatively charged atoms or molecules. A neutral particle (neither positively nor negatively charged) can be ionized by exposing it to an electrical field.

That's what JCAD does. It has a pump, Fountain said, that draws in ambient air. The air passes over an element that gives the molecules in the air a charge, ionizing them. Molecules of different chemicals each have a different shape, weight and mass, and those unique properties make it possible to determine what kinds of chemicals may be present in an air sample.

On the opposite end of the JCAD chamber from the intake is a detector, an electrical grid that attracts the particles. The particles travel at a rate of speed proportionate to their shape and size (hence ion mobility). Generally, Fountain said, smaller molecules arrive quickly while larger molecules travel more slowly. Ion-mobility spectrometry tells you the mass of a molecule by measuring its size and weight, then combining that with its speed through the chamber toward the detector. "It's a simple but elegant way of measuring the mass of an ion," Fountain said. When you know the mass of the ion, and you know its charge—which JCAD does because it charged the molecule—then you can calculate the ratio of mass to charge.

That calculation tells you what kind of chemical the molecule is—and whether it's a hazard. "You're really just imparting a charge, attracting it to a pole," Fountain said, "and then counting how long it takes to get there—it's generally microseconds." The software in the JCAD does all of these calculations very rapidly.

ONLY ONE SYSTEM NEEDED

Given that there were already tens of thousands of JCADs fielded, the next logical step for Fountain was to have the JCAD work to its full potential. "In my mind, it made a lot more sense just to have one system that was already fielded that we had the logistics to support [and] we had the training programs already in place to train Soldiers in how to use it," he said. "It didn't make sense that we would buy commercial off-the-shelf that was really designed for airport screening and put it in a military environment and not have it perform as well."

PROTOTYPE FIELDED SOON

A member of the Utah National Guard's 85th Weapons of Mass Destruction Civil Support Team uses a JCAD to check for chemical agent leaks during Vigilant Guard, a regional earthquake response exercise held Nov. 4, 2014, at U.S. Army Dugway Proving Ground, UT. The ATO program for JCAD CED is in the applied-prototype design phase, with plans to have a working prototype in early 2015. (Photo courtesy of Utah National Guard Public Affairs)

The ATO ran from 2010 to 2012. "We are continuing to work and expand technologies that were developed as part of that effort," Fountain said. "We were given funding by the Army to look for novel ways to detect homemade explosives and [military-grade] explosives as part of the counter-IED fight. And so this is one of the efforts that we started to just see if we could take an existing chemical warfare agent detector, JCAD, and, without any modifications to the hardware, see whether we could actually detect any explosives with it."

VAPOR PRESSURE

For the most part, CWAs have a high vapor pressure. Most explosives, on the other hand, are solid and have a low vapor pressure. It takes a lot of energy "for a molecule [with a low vapor pressure] to go from the condensed phase, whether it be a solid or liquid, into the vapor phase," Fountain said. At ambient temperature, solids have very low vapor pressure and must be heated to get a sample of vapor. "It's not that there is no vapor present," Fountain continued. "It's just that it's in such low quantities that it's very challenging to detect above the background."

"Vapor pressure is basically how much gas you could get off a solid or a liquid at a particular temperature," said Dr. Charles S. "Steve" Harden, who provides contract support to ECBC's Point Detection Branch for Leidos, and whose doctorate is in chemical physics. "Take the example of water. Water has a vapor pressure of one atmosphere at 212 degrees Fahrenheit. That's where it boils. That's [a vapor pressure of] 14.7 pounds per square inch at sea level. At room temperature," he continued, "it's got about a tenth of that." Harden said that an explosive like ammonium nitrate "has essentially no vapor pressure at ambient temperature. We have to collect a sample on a swab, then we have to heat it up and drive it into the JCAD."

That's why in the second, current, phase of the JCAD Chemical Explosive Detector (JCAD CED), "we've been working with Smiths Detection to add a heated swab so that you could pick up material off a surface, or swab a suspected device, and then place that swab, like a small Q-tip, toward the inlet of the detector and then very rapidly heat it up so we generate enough vapor for it to be presented for the detector," Fountain said.

SHARPENING RESULTS

To help the JCAD CED detect explosives more readily and more accurately, the team is also adding two on-demand vapors, a dopant and a calibrant, which are two ways of refining results. It's "been known for a long time," Fountain said, that having a chloride ion present "just makes the explosive a little bit easier to detect. One of the things that we've been working with is adding this dopant [the chloride ion] to assist the formation of ions and make them more reproducible so it can be easier to detect [the explosive] with the system."

The calibrant, Fountain said, makes detection more reliable. "When you're just looking for two or three chemical warfare agents, you don't have to be as precise on your detection windows. So if an ion arrives at a certain time, plus or minus, within a given percent, you can

call it a detection. As you add the number of molecules that you want to detect, you have to narrow those detection windows to prevent them from overlapping, which reduces the number of false positives. Having a calibrant, which we know has a very precise time of arrival at the detector, allows us to adjust for systematic error in the detector." In effect, it's like zeroing a scale or synchronizing watches. Knowing "T-zero," or the exact time that the ion begins its race to the detector, makes the measurements much more precise.

NEXT STEPS

Part of the mission of this ATO was to use the JCAD hardware as is, without modifying it, Harden said. But that didn't prevent the team from modifying the software. It is working with Smiths Detection, the manufacturer of the hardware and developer of the software, to do just that. The JCAD CED version will have a cradle that will enable the explosives detection portion of the device. The team also modified the device's rain cap to accommodate the swab. When the JCAD is plugged into the cradle, the software will recognize that it is in explosive detection mode, and when it comes out of the cradle, it will just be a JCAD.

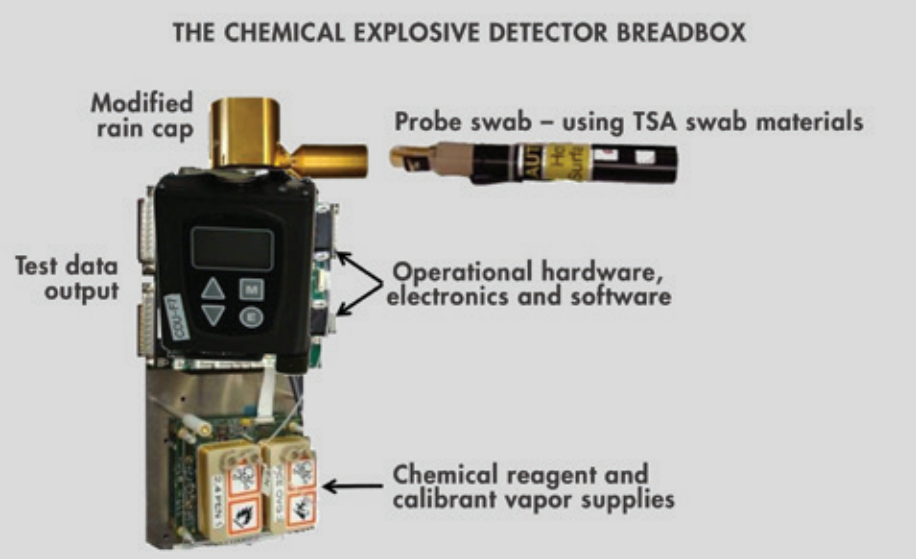
The research has also had other rewards. "Many of the emerging chemical threats and explosives share the challenge of presenting little to no detectable vapor for sampling," Fountain said. "By conducting research into the detection of solid explosive residues, we have learned valuable lessons that are equally important for detecting nonvolatile solid and liquid chemical agent residues as well."

For now, the ATO is in the applied-prototype design phase in partnership with Smiths Detection, Fountain said. JCAD CED is currently built on what is known as a "breadbox"—that is, a relatively simple form that enables experimentation with the circuitry. (See Figure 1.) "What we're hoping to do is have a working prototype, probably in early calendar 2015, and take it through system-level testing. Then the intent would be to do an engineering change proposal to the existing JCAD or perhaps do a spiral upgrade to the system, so that we could add explosive detection capability to all of the existing JCADs."

There is still science to be done, Harden said. But the result will be worth it, not only in terms of increasing the capacity and reducing the number of tools warfighters must carry, but also in cutting the cost to the taxpayer. "The upgrade is cost-effective and reduces the need for yearly maintenance," Blethen noted.

For Fountain, the idea of exploring the possible capabilities of a system and working across domains to add capabilities to systems, as his team has done with JCAD, is possible across acquisition. JCAD, or the replacement to it, should be engineered with the idea of upgrading it in mind. That, he said, will help DOD adapt to whatever threat emerges and adjust to it proactively.

FIGURE 1



THE BREADBOX

Modifying the JCAD breadbox was the brainchild of ECBC's Dr. Augustus W. Fountain III, who created an ATO program following a deployment to Iraq, where he was the chief scientist for the counter-explosives exploitation cell. (SOURCE: ECBC Chemical-Biological Detection Division)

MR. STEVE STARK provides contract support to USAASC for SAIC. He holds an M.A. in creative writing from Hollins University and a B.A. in English from George Mason University. He has worked in a variety of positions supporting communications for the Army and Navy, and has written about defense-related topics for more than a decade. He was the founding editor of the Program Executive Office Soldier Portfolio and edited the U.S. Army's Weapon Systems Handbook for six years.

SPOTLIGHT:

Ms. Debi Dawson

No looking back—Army all the way

MS. DEBI DAWSON

COMMAND/ORGANIZATION:
Program Executive Office for Soldier

TITLE:
Director, strategic communications

YEARS OF SERVICE IN WORKFORCE: 16

YEARS OF MILITARY SERVICE: 16

AWARDS:
PEO Soldier's public communications team contributed to earning several prestigious awards in the military public affairs community, including the following:

Keith L. Ware Public Affairs Award, Direct Reporting Unit-level Competition; Keith L. Ware Award, Outstanding Initiatives in New Media; Communicator Award of Excellence in Publications and Video News Release; Communicator Award of Merit, Brochures; Association of Marketing and Communication Professionals Platinum Hermes Creative Award; Public Relations Society of America (PRSA) Commonwealth Award of Excellence; PRSA Commonwealth Award of Merit; MarCom Creative Award

EDUCATION:
B.S. in communications, associate degree in general studies, University of Maryland, Overseas Division

The Program Executive Office (PEO) for Soldier has had exactly one public affairs officer since its inception in 2002, and that would be Debi Dawson. That said, it wasn't a slam dunk that she would get the job, she said. Some wanted to see an officer in the post. But thanks to the first of what she said have been many great leaders in the PEO—in this case, then-COL(P) James R. Moran—she got her shot.

Dawson joined the Army at 19. "I was in the delayed entry program in high school, and then went to basic training at Fort Jackson, SC, and then my first duty assignment was in Germany." As a "people person" with a hunger for travel and a desire for new experiences, the Army was exactly what Dawson wanted. She joined, she said, "and I never looked back." Those were the good old days, Dawson said, long before the euro, when a German Mark was worth about a quarter. As she tells it, the exchange rate was so favorable that privates could buy BMWs. She also deployed to Korea. Her final military assignment was in the office of then-Deputy Secretary of Defense Dr. John J. Hamre. That is where she got her start in public affairs.

As PEO Soldier's public affairs officer (PAO), it is Dawson's job to tell the PEO's story, one of providing Soldiers "with capabilities to ensure they remain decisive and dominant throughout the full spectrum of military operations." For her, that story has a vastly diverse audience, all of whose members are important, including members of Congress, allies and partner nations, taxpayers, Soldiers' families, military retirees and, of course, Soldiers themselves. Communicating with all of them about more than 450 products and programs as different as socks, sensors and Squad Automatic Weapons is no easy feat, and Dawson takes that responsibility very seriously. "The Soldier, as we know, is the centerpiece, … and we want to make sure that he or she's got the equipment to do the job and come back alive."

Recently, Dawson said, PEO Soldier has been doing "PPE returns." Personal protective equipment, such as helmets and body armor, has significantly increased the chances of survival for Soldiers wounded—or almost wounded—on the battlefield. "The PPE returns highlight those Soldiers and the piece of kit that saved their lives," she said. For Dawson, this is the most rewarding part of her job. "We conduct forensic evaluations of these pieces of equipment to understand why they worked so well and investigate how we can make them better. Watching these PPE returns is impressive.

"If a Soldier has been wounded and a piece of his kit has saved his life … if he's taken an AK-47 [round] from 1,000 meters away and his Advanced Combat Helmet saved his life," that's a story worth telling and celebrating, she said. "Same thing for [armor] plates" and their round- and shrapnel-stopping ability. The PEO holds these events most often at the units so the Soldiers can be with their comrades to celebrate. But not long ago, Dawson said, "We did an event here at the PEO Soldier headquarters [at Fort Belvoir, VA] with a Soldier, SGT Joseph Morrissey, who took a round to the chest and survived it thanks to his Interceptor Body Armor. Knowing that that piece of equipment saved Morrissey's life and then, on top of that, he was able to have a little baby girl, it's just phenomenal. That's just so rewarding. It really and truly is." Telling these stories is what Dawson does best. To her, it is simply mission-critical to help people understand the value and importance of the equipment that the PEO supplies to Soldiers. "It's important that leadership sees what kit is out there for the Soldiers on the battlefield."

MISSION-CRITICAL

SGT Joseph Morrissey, with his wife, Nikki, receives the Enhanced Small Arms Protective Insert plate that saved his life, at a Sept. 18, 2013, ceremony at Fort Belvoir, VA. Dawson finds ceremonies like these, which demonstrate the importance of the equipment that PEO Soldier supplies to warfighters, one of the most rewarding aspects of her work. (Photo courtesy of PEO Soldier)

What do you do, and why is it important to the Army or the warfighter?

> ***"THE SOLDIER, AS WE KNOW, IS THE CENTERPIECE, … AND WE WANT TO MAKE SURE THAT HE OR SHE'S GOT THE EQUIPMENT TO DO THE JOB AND COME BACK ALIVE."***

Since 2002, I have had the pleasure of working as the public affairs officer for PEO Soldier, serving as the director for strategic communications and public affairs officer for this $1.2 billion Army acquisition organization. The primary responsibilities include managing and overseeing public and command information, online Web and social media presence, and media and community relations. I also serve as the public affairs adviser to the PEO Soldier headquarters and all subordinate program management organizations' staffs to ensure awareness of all PA policies and procedures. As a trained operational security reviewer, I ensure that appropriate reviews are conducted to protect sensitive information from release.

How did you become part of the AL&T Workforce?

I had been supporting Product Manager Soldier Systems for about three years when the Army restructured and created program executive offices. BG Moran said, "Hey, Debi, I'd love for you to come up and do public affairs for me." I had to apply for the position, and here I am.

During your career with the Army AL&T Workforce, what changes have you noticed—in processes, training, equipment, etc.—that have impressed you the most? What change has surprised you the most, and why?

The ease and speed at which we can get information directly to our target audiences. It wasn't too long ago where we sent out press releases and contacted reporters about covering our story. There was a limited pool of publications and many people striving to tell their story. Now with the Internet, blogs and social media, there are myriad venues we can use to tell the PEO Soldier story. Additionally, having blogs and our Facebook and Twitter social media presences means we can directly tell our story to the public without a filter.

We want to hear from the Soldier without a filter, too. Their feedback is very important—to the product managers, so we can make improvements to that piece of kit. Of course, we want to make it easy for that Soldier to have access, so we have lots of social media tools here, and I'm very proud of our team's ability to get that message out.

Family members are also an important part of the audience for the PEO Soldier story. That family member wants to know that his son or daughter has the best equipment out there—or his or her mom or dad, husband, wife.

Nowadays, we also have to look at the return on investment in the communications we do, because, of course, budgets are shrinking. We don't have the budget that we used to have.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

The Army has always cared for the Soldier and worked to give them the best equipment possible. Through the years, Army acquisition has become even wiser in procuring equipment for Soldiers. It leverages industry, academia and defense scientists to perfect standard equipment—such as the Advanced Combat Helmet, which has saved many Soldiers' lives from gunshots—and cutting-edge technological advances, such as Nett Warrior, an integrated dismounted-leader situational-awareness system for use during combat operations.

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

Most people don't know how much planning, organization and protocol go into this job. There are many types of communication vehicles, and they all have to be planned, organized and staffed. The variety of people my job requires me to interact with—Soldiers and the general public, members of Congress, entertainment industry, traditional media, and the always-evolving world of blogs and social media—there's never a dull moment.

—MR. STEVE STARK

SPOTLIGHT:

MR. STEPHEN D. AUSTIN

COMMAND/ORGANIZATION:
U.S. Army Reserve, Office of the Chief, Army Reserve

TITLE:
Chief financial officer and director, resource management and materiel

YEARS OF SERVICE IN WORKFORCE: 7

YEARS OF MILITARY SERVICE: 27

AWARDS:
Defense Superior Service Medal, Legion of Merit, German Bronze Cross of Honor and other awards and decorations, Engineer Regiment Bronze de Fleury Medal, U.S. Department of Commerce Certificate of Appreciation

EDUCATION:
M.S. in national resource policy from National Defense University; M.A. in national security policy and strategic studies from the U.S. Naval War College; M.S. in civil engineering from the University of Illinois, Champaign-Urbana; B.S. in engineering from the United States Military Academy at West Point

Mr. Stephen D. Austin

A heavy lifter in the Army Reserve arena

Steve Austin isn't *that* Steve Austin, the $6 million eponym of the old TV show, nor is he Stephen F. Austin, the man called "the father of Texas," but he just might be related. Still, that doesn't mean that Austin, a member of the Senior Executive Service, lacks serious accomplishments. An engineer by training, his real specialty these days is leadership and management. That may sound abstract, but in his current role as the chief financial officer and director of resource management and materiel for the Office of the Chief, Army Reserve (OCAR), he is part of an organization that is perhaps the only one in DOD to combine comptroller, budgeting, financial management, procuring, equipping and programming under one hat—Austin's.

That means he has a role in every aspect of acquisition for OCAR, which, as Austin tells it, has no walls between development, finance, planning, equipping and so forth. For Austin, that allows for a higher order of coordination between the functions. And that calls for management and leadership.

BUILDING CONSENSUS

Austin, center right, talks with, from left, DRS Technologies' Brian Byrd, former DRS Technologies employee Ron Johnson and LTG Jeffrey W. Talley, CAR and commanding general U.S. Army Reserve Command, at the annual meeting of the Association of the United States Army, October 2014 in Washington, DC. (Photo by LTC Laurel Devine, OCAR Public Affairs).

Austin calls what he does "programming," which is not computer programming but rather the analysis, development and defense "of the five-year budget commonly called the FYDP (Future Years Defense Program) before it is transferred to the financial community to finalize a one-year budget that's sent to Congress."

It's not all that different from the work he was doing as then-COL Austin in the Office of the Secretary of Defense, Office of Program Analysis and Evaluation (OSD PA&E), now OSD's Office of Cost Assessment and Program Evaluation, or CAPE. After he retired from the Army, he spent a year as a contractor with SAIC, then took a job with the National Oceanic and Atmospheric Administration (NOAA) doing programming as the director of PA&E, responsible for putting together a five-year Future Years Program that was transferred to the NOAA chief financial officer (CFO) annually to finalize the organization's annual budget.

Then he moved up to the U.S. Department of Commerce as the director of program analysis and risk management, a natural progression given that NOAA is part of Commerce. Then it was back to the Army. "[LTG] Jack Stultz, the former CAR, was looking for a new CFO [and] director of resource management and materiel, and I applied for the job." Stultz retired in 2012, and was succeeded by current CAR LTG Jeffrey W. Talley.

Austin said Stultz told him that at that level, the most important thing he could do was provide management and leadership, and Austin found that Stultz was right—that's the biggest part of the job. To provide that leadership and management, Austin added, you don't necessarily

have to be a subject-matter expert. What you have to be is "comfortable with numbers and, as an engineer, I am. I've been doing programming for a long time, so here I am."

What do you do, and why is it important to the Army or the warfighter?

I am responsible for all fiduciary matters, including comptroller, budgeting, financial management and programming, for the Army Reserve. I am also responsible for all materiel readiness in the Army Reserve, including equipping, supply, property accountability and logistics support affecting 205,000 Soldiers in 1,500 units at more than 1,000 facilities around the world. This includes overseeing the planning and execution of all National Guard and Reserve equipment appropriation funding for the Army Reserve.

How did you become part of the AL&T Workforce?

When I became the director of materiel for the Army Reserve four years ago, I was tasked with representing the Army Reserve in all Army acquisition and logistics discussions, decisions and analysis. As such, I had to become familiar with all programs that provide equipment to the Army Reserve. Given my history, mainly with the Army but also including programming ships, aircraft and satellites as the director of PA&E for NOAA, I am also able to provide broad, thoughtful comments, questions and insights in senior Army acquisition discussions.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most, and why?

I have noticed that the testing process has become more sophisticated, while still remaining true to providing Soldiers the best equipment possible as efficiently as possible. I was very impressed by the JLTV [Joint Light Tactical Vehicle] limited user testing [LUT] that I observed in October at Fort Stewart [GA]. Of note, a weapons platoon from the 100th Battalion, 442nd Brigade of the Army Reserve participated in the JLTV LUT, the first time an Army Reserve unit has participated in testing in at least 10 years.

Further, the AL&T Workforce continues to get more professional. I am impressed by the responsiveness of the Army PEO [program executive office] and PM [program manager] workforce to the Army Reserve in terms of new equipment training, delivery schedules and locations, and reacting to unit needs. In the last few years with the focus on the Total Army and an operational Reserve, the Army Reserve was the first unit equipped for two pieces of equipment, the Palletized Load System II and the Medium Flail [M1271 Medium Flail Mine Clearing Vehicle]. This was unheard of before.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

Getting needed equipment, services and resources into the hands of Army and Army Reserve Soldiers in a timely manner. Further, seeing them successfully execute all their missions with the equipment we have provided to them.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

I anticipate that acquisition processes will become more streamlined, while still keeping Soldier requirements and decision-makers in the loop. I expect that more testing requirements will be satisfied with very advanced modeling, which will likely require government verification of the modeling, but I believe user training will always be required. Nobody can test how a Soldier will use a piece of equipment better than a Soldier.

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

I combine the Army Reserve G-4, G-8, comptroller and PA&E all under my leadership. As such, I focus on equipment and resource programming, budgeting, execution and sustainment. I do not think you will find this combination together under a single leader anywhere else in the Army—or DOD, for that matter. Given this portfolio, there is nothing that I am not interested or involved in to some degree.

—MR. STEVE STARK

"I AM IMPRESSED BY THE RESPONSIVENESS OF THE ARMY PEO AND PM WORKFORCE TO THE ARMY RESERVE IN TERMS OF NEW EQUIPMENT TRAINING, DELIVERY SCHEDULES AND LOCATIONS, AND REACTING TO UNIT NEEDS."

SPOTLIGHT:

MS. DAWN L. ROSARIUS

COMMAND/ORGANIZATION:
U.S. Army Medical Research and Materiel Command

TITLE:
Civilian deputy, principal assistant for acquisition and U.S. Army Medical Command acquisition career management advocate

YEARS OF SERVICE IN WORKFORCE:
16, following 5 as a contractor

AWARDS:
Silver Award, Excellence in Federal Service; Superior Civilian Service Award; Order of Military Medical Merit; the National Defense University President's Strategic Vision Award for a paper, "Avoiding Misdiagnosis by Integrating Logistics Early into the Source Selection Process for Army Medical Equipment"; Army Surgeon General's Excalibur Award as part of the Technology Assessment and Requirements Analysis team; Sherikon President's Award

EDUCATION:
M.S. in national resource management, Industrial College of the Armed Forces, National Defense University; M.S. in technology management (with a concentration in biotechnology), University of Maryland; B.S. in electrical engineering with a minor in mathematics, Loyola College

Ms. Dawn L. Rosarius

Dual roles yield twice the rewards

Dawn Rosarius wears two hats, and they're both pretty big: In addition to serving as the civilian deputy and principal assistant for acquisition for the U.S. Army Medical Research and Materiel Command (USAMRMC), she's the acquisition career management advocate (ACMA) for the U.S. Army Medical Command (MEDCOM), a role she assumed two years ago.

As ACMA, she's responsible for ensuring that MEDCOM personnel receive their certification within the two-year period, and then sustain that certification with continuous learning points.

"We have a small team supporting the ACMA effort," said Rosarius. That includes Ash Ficklin, who serves as the MEDCOM organizational acquisition point of contact, and Eva Rosvold, an ACMA analyst.

"The biggest challenge I face [as the ACMA] is education. We have spent a great deal of time on what it means to be part of the acquisition workforce, and what the opportunities and the benefits are. There wasn't a lot of that in the past."

Rosarius joined the USAMRMC in 1993 as a contractor in a support role and became a civilian staff member five years later when she began work for the U.S. Army Medical

WORKFORCE ADVOCATE

As the ACMA for MEDCOM, Rosarius is responsible for ramping up efforts to raise awareness of what it means to be part of the acquisition workforce, including the opportunities and benefits. "The biggest challenge I face is education," she said. (Photo by Heather McDowell Duong, USAMRMC Public Affairs).

Materiel Agency. "When I first started, I didn't think I'd still be here 20 years later," she said, "but it's such meaningful work that I can't imagine doing anything else."

What do you do, and why is it important to the Army or the warfighter?

As the civilian deputy to the principal assistant for acquisition, I support our program managers in developing, selecting and fielding medical and health solutions that help in saving lives and preventing illness and death for our warfighters.

As the MEDCOM ACMA, we support more than 850 acquisition workforce professionals across Army medicine. It is critical that we educate, grow and influence our acquisition workforce so we have the best research, development, contracting, test and sustainment teams available to meet the needs and requirements of our warfighters and clinicians.

How did you become part of the AL&T Workforce?

I first became part of the AL&T workforce in 1998, when I worked as a supervisory biomedical engineer and chief of the Technology Support Division at the Army Medical Materiel Agency.

During your career with the Army AL&T Workforce, what changes have you noticed that have impressed you the most? What change has surprised you the most, and why?

Tons! For one, we used to have to submit large paper packages to the Army Acquisition Support Center for certification, and it took weeks or months to find out if you obtained certification. Now, it's all electronic via CAPPMIS [the Career Acquisition Personnel and Position Management Information System], and it takes less than 48 hours. CAPPMIS is a fantastic tool.

I'm frequently surprised by the misunderstanding by military and civilians of the word "acquisition." Most believe it just means procurement or contracting, when it really supports the entire life cycle, from the early science to program management to sustainment and disposal. It is a mission for me to educate as many people in Army medicine as possible as to what acquisition really means.

What's the greatest satisfaction you have in being a part of the AL&T Workforce?

The knowledge of the acquisition process and the ability to help us save lives through our product development and fielding, and the ability to mentor and support our AL&T Workforce.

Acquisition has changed profoundly in many ways in the past 25 years. How do you see it changing in the future, or how would you like to see it change?

I believe that [Undersecretary of Defense for Acquisition, Technology and Logistics Frank] Kendall is trying to streamline efforts. I would like to see less contracting requirements and more acquisition leeway to determine and select the best solutions for our clinicians and warfighters. There are so many requirements and layers of requirements that burden the system and senior leaders. There's just not enough staff to support the added bureaucracy, when solutions can be delivered successfully without such bureaucracy.

What's something that most people don't know about your job? What surprises outsiders most when you tell them about your job?

We support more than 850 acquisition workforce members across the world, in Korea, Hawaii, Germany and across the continental United States. Our acquisition professionals assist in saving lives.

—MS. SUSAN L. FOLLETT

SMALL BUSINESS IN THE BIG PICTURE

Kendall announces creation of new acquisition career field

by Ms. Susan L. Follett

(SOURCE: USAASC/victoryv/Sungil_Kim/iStock/Thinkstock)

OPENING DOORS TO SMALL BUSINESS

Larry Lane, deputy director of the Fort Sill, OK, Logistics Readiness Center, speaks about the contracts his organization uses during an open house hosted by the Mission and Installation Contracting Command – Fort Sill on June 25, 2014. About 80 small business owners attended to learn about contracting opportunities and how to apply. (Photo by Jeff Crawley, Fort Sill Cannoneer)

Small business specialists in the acquisition workforce now have a long-term career trajectory with the creation of the small business career field (SBCF), announced in September 2014 by Undersecretary of Defense for Acquisition, Technology and Logistics Frank Kendall. Creating the SBCF expands training and other career development resources available to the workforce and provides them with the tools to maximize opportunities for small businesses.

DOD guidance on the new career field indicates that small business professionals influence more than 20 percent of DOD discretionary spending, but until now small business has not been a separate functional area for the acquisition workforce. Those working with small businesses perform a wide variety of tasks, including subcontract oversight, developing small business utilization strategies, Small Business Innovation Research and Small Business Technology Transfer program management, and advocacy and outreach to promote competition through the use of small businesses.

DOD's Office of Small Business Programs, the functional leader for the SBCF, developed the cross-functional career field as the best way to build core expertise in small business while also providing the chance to obtain experience in other fields.

"The goal is to incorporate small business concepts into all of the acquisition career fields, not just contracting but also logistics and engineering, for example," said Cory Foster, contracting and life-cycle logistics proponency officer for the U.S. Army Acquisition Support Center (USAASC) Director of Acquisition Career Management Office.

"IT'S BEEN A CHALLENGE TO FIGURE OUT JUST HOW MANY PEOPLE WE HAVE WORKING IN THE SMALL BUSINESS FIELD, MOSTLY BECAUSE PEOPLE DON'T ALWAYS REPORT THEMSELVES WORKING IN SMALL BUSINESS."

CAREER FRAMEWORK

The SBCF qualification framework, which mirrors the Army's acquisition workforce development framework and the Air Force's Program Management Leadership Development model, outlines a clear track of career advancement for small business professionals, from point of entry through executive leadership positions. Certification in the SBCF will require a bachelor's degree, as well as credits related to business and science, technology, engineering and mathematics as employees move through the career.

Key to developing the new acquisition career field was first to understand the composition and expertise of the existing workforce. But just how many small business professionals there are is difficult to quantify. DOD estimates a total of 686, roughly 200 of them in Army acquisition. "It's been a challenge to figure out just how many people we have working in the small business field," said Foster, "mostly because people don't always report themselves working in small business. We conducted a self-identifying data call in May 2013 and arrived at a figure of nearly 300, but a second self-identifying data call in June 2014 put that figure closer to 200."

COURSE DEVELOPMENT

Work on developing the new career field began in 2012, when the DOD Office of Small Business Programs created a functional integrated product team (FIPT). In 2013, the FIPT completed a competency validation effort using a competency assessment by the Office of Personnel Management. The resulting small business competency set, which includes 38 technical and 13 professional competencies in categories such as small business utilization, contracting, science and technology, and entrepreneurship, provides the basis to determine the learning objectives for the small business certification curriculum.

The FIPT is now working with Defense Acquisition University (DAU) to incorporate the competencies into the topics and learning objectives that underpin course development. DAU, with input from the FIPT, completed an initial analysis to determine which of its existing courses may offer content for the small business curriculum, to minimize cost and redundancies.

"The SBCF is heavily contracting-centered," said Foster, "and there are a lot of courses in our contracting curriculum that would be applicable for the SBCF."

Development of all the SBCF courses is expected to be complete by the end of FY16. Within 24 months thereafter, small business acquisition professionals will be required to achieve compliance with the training requirements. Likewise, all new entrants to the small business workforce will have 24 months to complete the training required for the position. Professionals entering the SBCF from other acquisition career fields may already have completed some of the courses in the curriculum. In such cases, those courses will count toward completion of small business certification requirements.

Career development programs will include a Small Business Exchange Program (SBEP). The SBEP will primarily follow the model of the Defense Procurement and Acquisition Policy Acquisition Exchange Program while incorporating aspects of other successful programs, including the U.S. Army Corps of Engineers' small business rotation and the Air Force's PALACE Acquire program. The goal of the SBEP is to give small business acquisition professionals the opportunity to see how industry and other small business program offices operate, to broaden their skill sets and to use those lessons learned in their offices.

Additionally, DOD's Office of Small Business Programs will pilot a small business executive fellowship (SBEF) that will allow participants to work in an Office of the Secretary of Defense program and take part in the interaction among industry, Congress, the services, the White House and other stakeholders.

Pilots for SBEP and SPEF are tentatively planned for the second quarter of FY15. DOD is developing its implementation plan for the SBCF and is working with each of the services to develop service-specific implementation strategies, Foster said.

MS. SUSAN L. FOLLETT provides contracting support to USAASC for SAIC. She holds a B.A. in English literature from St. Lawrence University. She has more than two decades of experience as a journalist and has written on a variety of public and private-sector topics, including modeling and simulation, military training and technology, and federal environmental regulations.

CIVILIAN
Career Planning Steps >

Career models for individual career fields are available now.

- Business – Cost Estimating
- Business – Financial Management
- Contracting
- Engineering
- Facilities Engineering
- Industrial/Contract Property Management
- Information Technology
- Life-Cycle Logistics
- Production, Quality and Manufacturing
- Program Management
- Purchasing
- Science and Technology Manager
- Test and Evaluation

http://asc.army.mil/web/career-development/civilian/career-planning-steps/

UNITED STATES ARMY

DACM

DIRECTOR, ACQUISITION CAREER MANAGEMENT OFFICE

asc.army.mil

For anything acquisition career-related.

CAMP

DESIGN ▪ DEVELOP ▪ DELIVER ▪ DOMINATE

ARMY AL&T

2014 Readership Survey Results

MOST-READ CURRENT TOPICS
Highest number of responses about which subjects are interesting and useful:

Acquisition - 211

Science and Technology - 209

We asked, you answered. And what we found in our 2014 Readership Survey is that Army AL&T is doing an admirable job of meeting its goals. Maybe those results aren't so surprising, considering that a great deal of our content comes from our readers—experts in the issues shaping defense acquisition today and the challenges it will face in the future.

As the graphics on these pages indicate, the magazine earned high marks for its work to inform and connect the Army acquisition community through success stories, lessons learned and innovative approaches to warfighter challenges. Over the past few years, we've increased our focus on improving the magazine's design and accessibility, and that work is also paying off: Marks for writing, photo and art quality held steady or increased from the 2012 survey.

In the current climate of long task lists, short days and tight deadlines, we appreciate the time you took to respond to our survey. Your responses inform the topics we cover and highlight the changes we need to make. Please remember that although we conduct a formal survey every two years, we're always interested in hearing from our readers. So if you have an idea for a story, want to suggest a new feature or would just like to talk about something you've read, please don't hesitate to contact us at **armyalt@gmail.com**. After all, it's *your* magazine.

GOAL 01

Meet the magazine's stated mission, which includes:

- Instructing members of the Army Acquisition, Logistics & Technology (AL&T) community about AL&T processes, procedures, techniques and management philosophy.
- Disseminating information pertinent to the professional development of workforce members and others engaged in AL&T activities.

78%
AGREE that the magazine provides instruction about AL&T processes, procedures, techniques and management philosophy.

19%
Have read a particular article that laid out a challenge and solution that was applicable to their work.

71%
View the magazine as HIGHLY CREDIBLE.

67%
AGREE that the magazine presents information on topics and subjects that are relevant to their profession.

GOAL 02

Give proper recognition to the Army Acquisition Workforce community by highlighting successful programs, people, lessons learned and the authors of particularly good articles.

74%
Are aware that the magazine is written almost entirely by members of the Army Acquisition Workforce.

80%
AGREE that the magazine gives proper recognition to the acquisition community by highlighting successful programs, people, lessons learned and the authors of particularly good articles.

GOAL 03

Present content in the most user-friendly, easy-to-read and easily accessible format possible.

74%
AGREE that the overall quality of the online magazine is oustanding or good.

74%
AGREE that the overall quality of the magazine's mobile app is outstanding or good.

GOAL 04

Identify areas of the magazine that could be improved to increase and better serve readership.

96%
Said the magazine improved or maintained the quality of design.

91%
Said the magazine improved or maintained the quality of articles.

GOAL 05

Compare results from the 2012 survey to measure improvement or slippage and gauge effectiveness.

Greatest improvement:
Strengthens the connection to the Acquisition Workforce by "serving as a source of continuing education."

2012 - 9%
2014 - 45%

Most declined:
"Highly credible" rating.

2012 - 80%
2014 - 71%

Contracting - 175 | Logistics - 169 | "Critical Thinking" - 169 | Career Information - 161

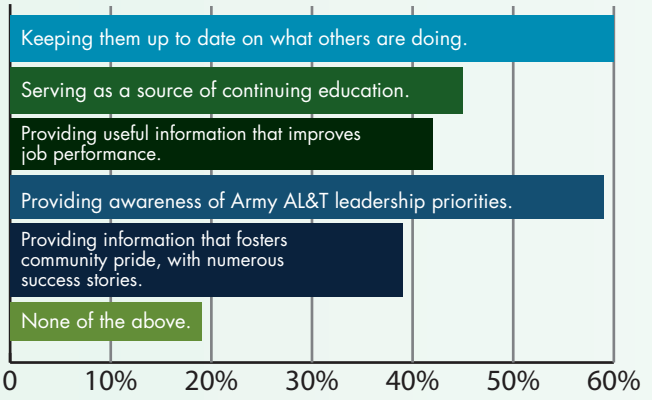
BBP - 155 | Human Interest (Workforce Spotlights) - 143 | "Then and Now" - 138

"From the AAE" - 132 | Commentaries - 131 | "From the DACM" - 113

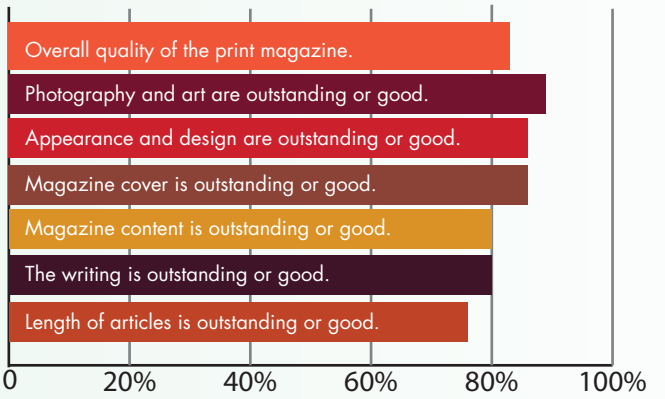
MOST-REQUESTED FUTURE TOPICS

Lessons learned • Requirements management • Technology challenges • Staying current with industry developments • Contracting • Budget challenges • Policy updates • Cybersecurity • Research and development • Engineering • Examples of "how to do more with less" • Career development • Medical

Army AL&T magazine strengthens readers' connection to the Acquisition Workforce by:



Evaluation of magazine quality in the following areas:



47%

Prefer the print version of the magazine.

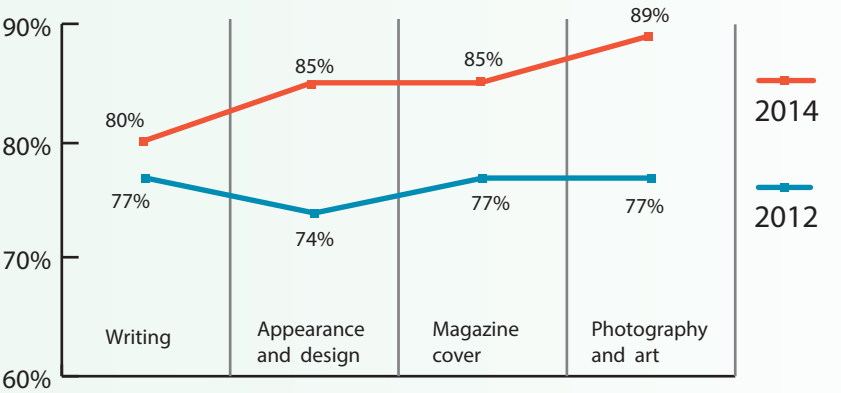
50%

Prefer the online version of the magazine.

3%

Prefer the mobile app version of the magazine.

How readers rated magazine quality in 2012 and 2014:



(SOURCE: U.S. Army Acquisition Support Center)

USAASC PERSPECTIVE

FROM THE DIRECTOR,
U.S. ARMY ACQUISITION SUPPORT CENTER

CRITICAL CONNECTIONS *to Acquisition Career Success*

For the U.S. Army Acquisition Support Center (USAASC) Army Director of Acquisition Career Management (DACM) Office, efficiently and effectively managing career development for the nearly 38,000-strong Army Acquisition Workforce requires a network of committed, caring individuals working toward the same goal: to provide the best career guidance for workforce members to achieve successful and rewarding acquisition careers.

Acquisition career managers (ACMs), responsible for assisting the acquisition workforce with their career management, in turn are assisted by the more than 400 organizational acquisition points of contact (OAPs) at acquisition organizations worldwide, who provide day-to-day, face-to-face career management support. (See Figure 1.) Appointed by their respective organizations to help the workforce with general acquisition questions and concerns, OAPs also work to provide their senior leaders with data on the progress of the workforce in meeting acquisition training requirements. OAPs are a vital link to the ACMs at the USAASC Army DACM Office.

Craig A. Spisak
Director, U.S. Army Acquisition Support Center

The acquisition community also has nearly 50 acquisition career management advocates (ACMAs) at the GS-15 or Senior Executive Service level throughout the Army. These advocates are nominated by their organization's leadership to represent their acquisition community. They receive an appointment charter signed by the DACM, which charges them to serve as principal adviser to the DACM and their senior leadership on "the execution of acquisition career development, policy, procedures and programs." Like ACMs and OAPs, ACMAs also listen to the concerns of the local acquisition workforce and offer advice on managing careers and achieving career goals.

OAPS PLAY CRITICAL ROLE

OAPs target acquisition workforce management information to the most appropriate groups or populations within their organizations, disseminating it with a precise focus. OAPs are trusted super users within the acquisition community, with greater access to the Career Acquisition Personnel and Position Management Information System (CAPPMIS)/Career Acquisition Management Portal, the central repository for all Army Acquisition Workforce data. They can analyze the data for their organizations to identify potential challenges within their respective acquisition workforce and provide status reports to ACMAs on the career development of their acquisition community.

The OAPs' link to USAASC makes them a valuable day-to-day resource. If you have career management questions or concerns that you are unable to resolve through the USAASC Army DACM Office website or automated support system, contact your local OAP. They can assist with basic acquisition inquiries, and have

relationships with ACMs that they can leverage to get precise answers to more complex inquiries.

ACMAs—ombudsmanlike individuals who are in a unit's chain of command—provide a similar service, but at a higher level. These senior-level representatives take a more strategic look across their communities and provide feedback to USAASC, as well as offering advice and counsel to the Army acquisition senior leadership in their organizations. In turn, USAASC keeps ACMAs informed with quarterly engagements on the latest acquisition workforce policies, procedures, new career development opportunities and initiatives from the undersecretary of defense for acquisition, technology and logistics.

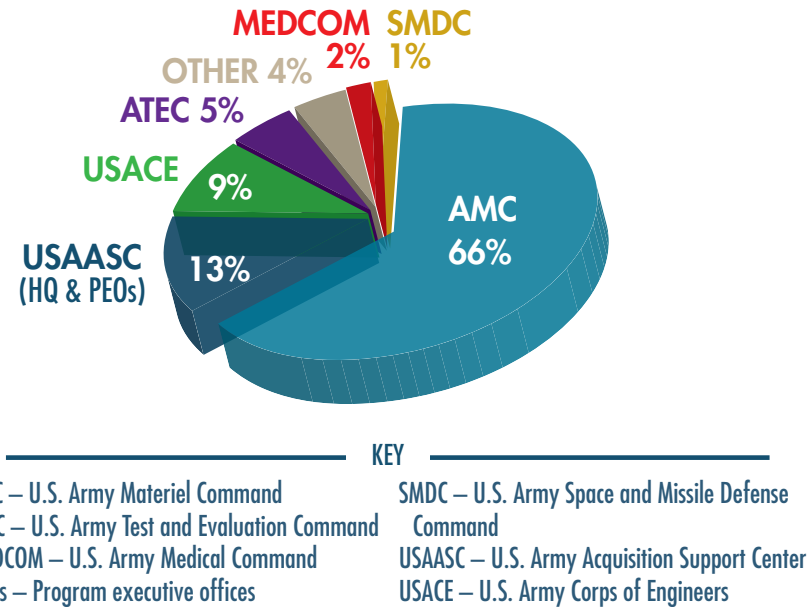
This regular, coordinated interaction between the USAASC Army DACM Office and the ACMAs allows the latter to target their efforts to the senior leaders within their organizations as well as to encourage their acquisition professionals to take advantage of acquisition career-related information and opportunities. ACMAs comprise a network of senior acquisition professionals who care about the professional health of the Army acquisition community and volunteer their time and talents to strengthen it. OAPs and ACMAs are essential to the many organizations that have acquisition professionals in their workforce. They both help the USAASC Army DACM Office attend to Army Acquisition Workforce matters, and contribute to the greater Defense Acquisition Workforce.

KEEPING IN TOUCH

There is no such thing as overcommunicating. USAASC keeps in touch with the acquisition workforce through many channels—email blasts, Army AL&T magazine, Access AL&T and the DACM Newsletter are just a few. Additionally, the robust Army DACM office website is our repository for everything acquisition career-related, featuring career development opportunities, career models for specific civilian acquisition fields, frequently asked questions on acquisition workforce policy and information on Defense Acquisition University classes and continuous learning. These multiple means of communication, along with OAPs and ACMAs, support the goal of professional growth in the workforce, attacking it from multiple angles.

There is no doubt that OAPs and ACMAs provide a great service to the acquisition workforce on career management—but you are your own best career manager. No one knows your goals and objectives better than you do. Though there are people who can give you advice and counsel about experiences, certification or education that can help you do your job better, at the end of the day, those who are most self-aware and understand the goals they want to achieve in an acquisition career are going to be the best and brightest in their profession. Nourish a desire for ongoing challenges and continuous learning. It is the mark of a true professional who realizes that there's something to be learned every day.

FIGURE 1



FAR-REACHING WORKFORCE

The widely dispersed nature of the Army Acquisition Workforce requires a supporting structure of acquisition career specialists, including OAPs and ACMAs. According to CAPPMIS data as of Oct. 31, 2014, two-thirds of the Army Acquisition Workforce is at the U.S. Army Materiel Command, with USAASC and the U.S. Army Corps of Engineers accounting for an additional 22 percent. (SOURCE: USAASC)

ON THE MOVE

DOD HONORS CHEMICAL WEAPONS TEAM

DOD leadership recognized 45 DA civilian employees who voluntarily deployed at sea to destroy Syrian chemical warfare materiel, during a ceremony Oct. 8, 2014, at the Edgewood Area of Aberdeen Proving Ground (APG) in Edgewood, MD. The award recipients are members of the Joint Program Executive Office for Chemical and Biological Defense (JPEO CBD), U.S. Army Edgewood Chemical Biological Center (ECBC) and U.S. Army Chemical Materials Activity. The honorees received 12 Meritorious Civilian Service Awards and 33 Superior Civilian Service Awards. Pictured with the award recipients are, from center front to right, **Rep. Charles A. "Dutch" Ruppersberger**, D-MD; the **Hon. Alan F. Estevez**, principal deputy undersecretary of defense for acquisition, technology and logistics; **Rebecca K.C. Hersman**, deputy assistant secretary of defense for countering weapons of mass destruction for the Office of the Under Secretary of Defense; and **MG John F. Wharton**, commanding general, U.S. Army Research, Development and Engineering Command. Other dignitaries at the event included **Carmen Spencer**, JPEO for Chemical and Biological Defense, front row, far right; and **Joseph Wienand**, former ECBC director, front row, sixth from left. (Photo by Steve Lusher, JPEO CBD)

PYBUS RETIRES AFTER 22 YEARS

Wimpy D. Pybus retired in December 2014 from federal service, most recently as the deputy assistant secretary of the Army for acquisition policy and logistics in the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology at the Pentagon. In that position, which he had held since 2003, he had leadership and policy responsibility for Army acquisition and industrial base policy; life-cycle logistics; and integrated logistics support planning and execution for Army weapon system development, production and fielding.

Pybus, who was selected to the Senior Executive Service in December 1995, is a retired Army colonel who began his military career in 1958 as a private and served almost 34 years in uniform. In the course of his civilian career, which Pybus began in 1992 as deputy director for maintenance policy and resources in the Office of the Secretary of Defense, he also served as director for aviation, munitions and war reserves, and as deputy director for supply and maintenance and chief of the Aviation Logistics Office in the Office of the Deputy Chief of Staff for Logistics, G-4, HQDA. He is the recipient of the Presidential Rank Award – Meritorious Executive (twice), the Defense Exceptional Civilian Service Award and the Legion of Merit, in addition to numerous military honors, and is a member of the Army Acquisition Corps.

CERDEC DIRECTOR JILL SMITH RETIRES

Jill H. Smith bade farewell to the Army and 38 years of service, which culminated in her assignment as director of the U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC), at an informal retirement reception Oct. 3, 2014, at APG. Smith was selected for the Senior Executive Service in May 2001 as director of the U.S. Army Research Laboratory's Weapons and Materials Research Directorate, where she led basic and applied research in the areas of weapons lethality and protection, as well as the laboratory's basic and applied materials research. She joined CERDEC as director in October 2010.

Henry Muller was appointed as the acting director of CERDEC Oct. 6, 2014. With responsibility for more than 2,200 employees, he will manage, plan and execute technical research in the area of command, control, communications, computers, intelligence, surveillance and reconnaissance, which includes night vision and reconnaissance sensors, combat identification, cyberspace operations, systems and readiness engineering, test and evaluation, acquisition and standardization efforts. Before this assignment, Muller was director of CERDEC's Intelligence and Information Warfare Directorate. He entered the Senior Executive Service in November 2008.

ISRAEL RETIRES FROM USAASC

Larry R. Israel, chief of the Human Resource Management Division of the U.S. Army Acquisition Support Center (USAASC), retired in December 2014 after 42 years as an Army civilian. Israel began federal service as a college student working for the U.S. Postal Service. During his career, he worked as a security assistant, a physical security specialist and a personnel management specialist, serving a variety of organizations including White Sands Missile Range, NM, and the U.S. Army Materiel Development and Readiness Command, before coming to the U.S. Army Acquisition Executive Support Agency, the precursor to USAASC, in 1991 as a supervisory management analyst. He was assigned to the position of division chief in 1994.

CHANGE OF COMMAND AT USAMRMC

The U.S. Army Medical Research and Materiel Command (USAMRMC) hosted a change of command ceremony Sept. 16, 2014, at Fort Detrick, MD, during which **MG Joseph Caravalho Jr**. relinquished command of the USAMRMC and Fort Detrick to **MG Brian C. Lein**. **LTG Patricia D. Horoho**, the Surgeon General of the U.S. Army and commanding general of the U.S. Army Medical Command, presided. Lein, a general surgeon by training who received his commission in 1988, came to USAMRMC from the Office of the Surgeon General, where he served as deputy CG for operations. His previous assignments include tours as surgeon general, U.S. Forces – Afghanistan, and medical adviser, International Security Assistance Force Joint Command in Operation Enduring Freedom, and as commander, Landstuhl Regional Medical Center, U.S. Army Europe and Seventh Army, Germany. A graduate of the United States Military Academy at West Point, Lein received his M.D. from Temple University and holds a Master of Strategic Studies degree from the U.S. Army War College. (Photo by Lisa Morris, USAMRMC Public Affairs)

MG Brian C. Lein accepts the flag of USAMRMC from Surgeon General of the U.S. Army **LTG Patricia D. Horoho** during the change of command ceremony Sept. 16, 2014, at Fort Detrick, MD, in which **MG Joseph Caravalho Jr.**, right, relinquished command of the USAMRMC and Fort Detrick. In her remarks, Horoho thanked Caravalho for brilliant leadership through trying times; his tireless efforts to reinvigorate and maintain partnerships throughout the services and among local, state and congressional leaders; and for using his experience and expertise to enhance the future of Army medicine. Horoho cited Lein's charismatic leadership and management skills in affirming her confidence that the USAMRMC is in excellent hands. Caravalho, whose new assignment is as deputy CG for support in the Office of the Surgeon General, thanked the command and its leadership for their unwavering dedication and continued commitment to Army medicine. "From brain health to arm transplantations to freeze-dried plasma, the researchers of the USAMRMC have left no stone unturned and have put this command one step away from global health," he said. (Photo by Shannon Bishop, U.S. Army Garrison Fort Detrick Public Affairs)

PD LIS ASSUMPTION OF CHARTER

Ricky Daniels assumed the duties of product director for logistics information systems (LIS) during an event Oct. 9, 2014, hosted by **COL Harry Culclasure**, project manager for the Army Enterprise Systems Integration Program, at Fort Lee, NJ. LIS, a program of the PEO for Enterprise Information Systems (EIS), provides life-cycle management of all functional and technical aspects of such systems for the Army.

CHANGE OF CHARTER AT JLENS

Susan D. Campbell accepted leadership of the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) Product Office from **Gary Hallinan** during an Oct. 17, 2014, change of charter ceremony at Redstone Arsenal, AL. **COL Terrence L. Howard**, project manager for cruise missile defense systems (PM CMDS), officiated at the ceremony. The PM CMDS, which has responsibility for JLENS, is assigned to the Program Executive Office for Missiles and Space (PEO MS). Before her current position, Campbell directed space initiatives at PEO MS. Hallinan, who had served as the JLENS product manager starting in August 2013, is now the business manager for PEO MS' Missile Defense and Space Systems Project Office. (Photo by Laura Brezinski)

STEM DAY

Douglas K. Wiltsie, the PEO for Enterprise Information Systems (EIS), spoke at the AFCEA Belvoir Science, Technology, Engineering and Math (STEM) Symposium on Nov. 13, 2014, at the Fort Belvoir, VA, Officers' Club. This inaugural STEM Day event included demonstrations from local high school students as well as a panel discussion of chief technology officers with representatives from PEO EIS, U.S. Army Cyber Command and the Defense Logistics Agency.

ENTERPRISE COMPUTING CHANGE OF CHARTER

Archie Mackie formally assumed the charter of product director (PD) for enterprise computing on Oct. 28, 2014, at Fort Belvoir. He reports to the project director for enterprise services under PEO EIS. In this role, Mackie oversees a portfolio of initiatives that develop, deliver and sustain enterprise information technology services in support of the Army's overall network modernization effort. Mackie has been serving as the PD since June 11, 2014.

GENERAL OFFICER ANNOUNCEMENTS

The U.S. Senate confirmed the following Army general officer nominations on Dec. 11, 2014:

MG Anthony R. Ierardi, for appointment to the rank of lieutenant general and assignment as deputy chief of staff, G-8, U.S. Army, Washington, DC. Ierardi, who served previously as special assistant to the director of the Army Staff, Washington, DC, received his third star on Dec. 12.

MG Larry D. Wyche, for appointment to the rank of lieutenant general and assignment as deputy commanding general and chief of staff, U.S. Army Materiel Command, Redstone Arsenal, AL. He is currently serving as special assistant to the commanding general, U.S. Army Training and Doctrine Command (TRADOC), Fort Lee, VA.

The Office of the Chief of Staff, Army announced the following officer assignments:

MG Robert M. Dyess Jr., director, force development, Office of the Deputy Chief of Staff, G-8, U.S. Army, Washington, DC, to deputy director and chief of staff, Army Capabilities Integration Center (ARCIC), TRADOC, Joint Base Langley-Eustis, VA, succeeding **MG William C. Hix**, who has been assigned as director, strategy, plans and policy, Office of the Deputy Chief of Staff, G-3/5/7, U.S. Army, Washington, DC. Succeeding Dyess will be **MG Cedric T. Wins**, director of ARCIC's Requirements Integration Directorate at TRADOC.

PROMOTIONS

The following general officer was promoted to the rank indicated:

MG Bruce T. Crawford, currently serving as commanding general, U.S. Army Communications-Electronics Command and Aberdeen Proving Ground, MD.

RETIREMENTS

BG Stephen B. Leisenring in November 2014 culminated more than 32 years of service, most recently as deputy chief of contracting management, U.S. Army Corps of Engineers, Washington, DC.

BG John J. McGuiness in October 2014 culminated more than 31 years of service, most recently as PEO for Ammunition and commanding general, Picatinny Arsenal, NJ.

THEN & NOW

1993 / 2001 / *2033*

INTERNATIONAL CYBERWAR *2033*

by Mr. Lloyd N. "Neale" Cosby

As a general rule, Army AL&T magazine does not publish fiction, but, as the saying goes, science fiction today can be science fact tomorrow. In its May-June 1993 edition, Army AL&T's predecessor publication, RD&A Bulletin, ran a fictional imagining of what virtual ("synthetic," in those days) training and warfare would look like in 2001. When we came across that story, it struck us as prescient. It turned out that the author, Neale Cosby, was still in the area, and we asked him to take another look at the story, 21 years after writing it. He agreed with us that he got pretty much everything right in terms of the technology. So, instead of our usual Then & Now fare, we asked him to work with us to imagine another several years into the future. Here is that future:

The first time President-elect Madeleine Smith saw the wrist-worn device that she'd be wearing nonstop for the next four years—hopefully eight—she wondered why, even now, in 2033, the military couldn't make a device that was at least vaguely fashionable. Yet she'd found, during her first days in office, that the utility of the device outweighed its appearance. Now, on Feb. 3, 2033, sitting in the presidential box at Ford's Theatre, watching an updated version of "Macbeth," she felt the distinctive three taps on her wrist indicating an emergent national security crisis. She gave the device a tap to activate the audio without lighting up the flexible screen. Immediately, the voice of Secretary of Defense Mot Campbell was in her ear, as if they were standing in the room together.

"Madam President, sorry to bother you at the theater, but we have a situation," the secretary said as the president stepped away from her seat to activate the conformal display without bothering other theatergoers.

"Okay, Mot. I'm in." Arrayed across the screen on her wrist now was her entire national security team. "Good evening, everyone."

"Please tap the world map and we'll walk you through where we are," said the secretary. The president did so, and the map filled her screen. "We have a situation that is almost identical to the one we rehearsed after your inaugural last month," Campbell said, his voice calm and confident. "Thanks to the leadership of the director of national intelligence, we're ahead of the enemy."

The DNI, Jill Scott, said, "Madam President, we've been training, tracking, updating, retraining and rehearsing the enemy cyberthreat for the past two years. Now, unfortunately, our predictions have come true. Thanks to the big data analytical tools developed by DARPA, we know with certainty what the enemy is planning, where they're conducting their attacks, and we've developed three options for you to consider for countering the threat. If you tap the red button in the upper left-hand corner, I can show you the action."

On the president's wrist screen map, an overlay of enemy action had appeared in red.

"If you'll slide the time bar on the bottom backward—to the left—you'll see the buildup over the last few months," said the secretary of defense. Even though she was accustomed to whiz-bang technology, President Smith was still impressed with the way she could simply rewind time by sliding her finger over the display. "The red enemy actions will increase as you move forward to today. If you slide the time bar to the right, you'll see the option your national security team recommends."

Not only did the president see the past and the present, she could see the future her team had projected with option Alpha. While she knew it was the result of sophisticated software and hardware, it seemed so natural.

"We're being attacked on at least 11 small war fronts," said Scott. "The attacks range from low-key cyberprobes to the physical takeover of three of our allies. Let's look stateside first. I'm zooming into Texas for you. Please touch Dallas. The city is without electricity. Now, I'm flying into the cloud farms outside of Las Vegas. They are aflame. Go to the FAA site in West Virginia. That site is burning, and thus all flights across the nation have lost contact with air traffic control." The president slid from place to place on the screen, and automatically the display updated. Because of the training that she and her team had undergone, she was calm, ready.

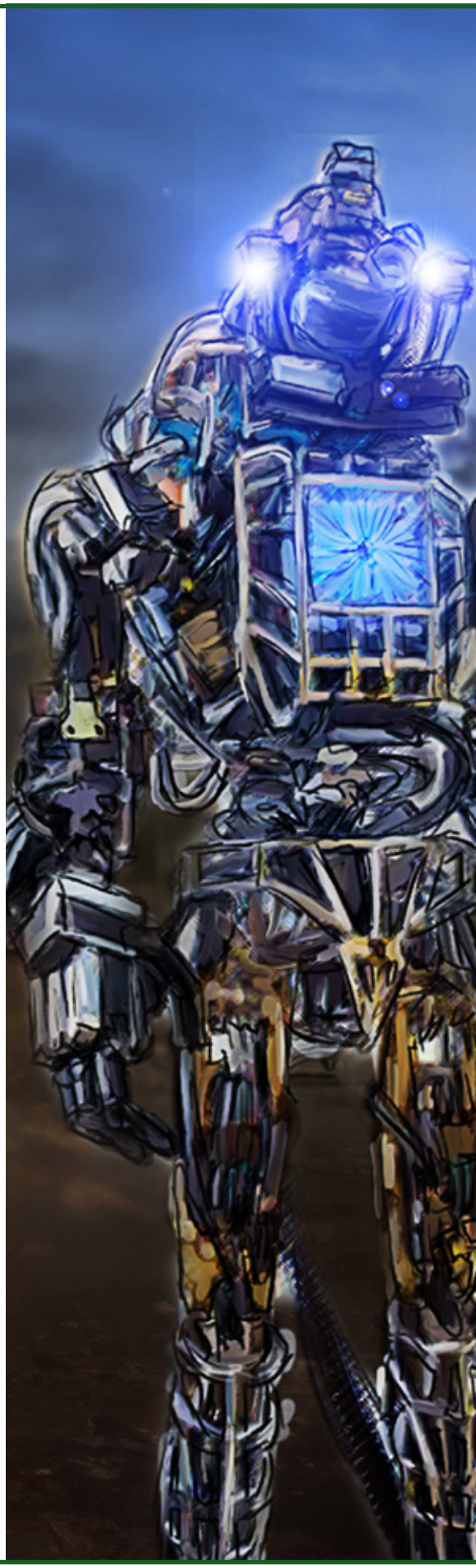
"Overseas, now. Armed warriors are attacking the palace in Indonesia." Each time the DNI named a new place, the display automatically flew there. "Go to Toronto. The reservoir north of the city has been contaminated with a chemical agent that makes the water unusable. Go to France. Areas within Paris are unable to use any payment system."

Parisians not being able to shop was the least of their concerns at the moment, thought the president.

"At 1739 hours today," said Scott, "terrorists launched a small-yield nuclear missile into space. The electromagnetic pulse from its detonation disrupted GPS coverage from three satellites. The loss of these satellites has impacted international banking, vehicle traffic, cellphone traffic and more."

"Yet our network survives," the president said.

"Correct," said Peter Wilson, commander of U. S. Cyber Command. "The network



FUTURE FORCE

Cosby's vision of 2025 includes robotic ground forces that are commanded digitally at stateside posts and an integrated approach to global security monitoring and threat assessment. (Illustration by Kirk Nelson, U.S. Army Acquisition Support Center)

defense that we established in 2015 has hardened our net and provided more than adequate workarounds to keep us online during this attack. I'm confident that we're safe at this time."

The president thought of her two predecessors and the cyber disaster of 2017, a disaster that had changed a recalcitrant Congress into a more sensible body. Still, it had taken almost five years to elect people to Congress with the courage to fund this vital system and the robotic forces that would replace boots on the ground. Indeed, it had been Congress that had pushed the Army to accelerate the development of robotic forces.

Secretary of Defense Campbell spoke now. "We recommend that you execute option Alpha. As we speak, we have nine C-17 aircraft orbiting Eastern Europe. Each is loaded with a company, or three platoons, of robotic ground forces. On your command, they will air-drop for action planned for each site. As you're aware, we command these robotic forces digitally from stateside military posts. Their language translation capability was recently upgraded.

NOT ONLY DID THE PRESIDENT SEE THE PAST AND THE PRESENT, SHE COULD SEE THE FUTURE HER TEAM HAD PROJECTED WITH OPTION ALPHA.

"Each of these robotic units," the secretary continued, "is composed of both lethal and nonlethal robotic soldiers, based on their specific mission. Also, we have 13-person special operations forces teams to keep eyes and ears on enemy actions over each of the sites. Each of the SOF teams is networked with stateside controllers as well as air and ground fire units."

The president smiled. "So, we have a very small footprint of boots on the ground."

Campbell knew the president's sense of humor well. "Precisely. SOF only. More treads on the ground than boots. Meanwhile, all of these sites are covered with unmanned aerial vehicles, also controlled stateside and networked into the network intelligence coordinating centers. They're helping paint the picture on your conformal display at this moment, as well as the displays of the rest of the team."

"Oh," said the DNI. "I almost forgot. Note the rapidly changing sets of dials in the lower right-hand corner of your display. That's a consolidation of all social media networks around the world, including Russia, China, Europe, the Middle East and Asia. These sites lit up instantaneously shortly after 1939 hours tonight. Most importantly," the DNI continued, "the stateside social media displays give you a running picture of the mood of our citizens. The people are speaking."

"With your approval, ma'am, we are ready to execute option Alpha," said Campbell.

"You have my approval," the president said. Then, "By the way, Mot, I want to congratulate you for having had the foresight to put this in place. The American people owe you a debt of gratitude." The secretary of defense had trained at Harvard, served one term in the House of Representatives and one term in the Senate, and was selected by the president from the opposing party. President Smith admired him greatly.

"Thank you, ma'am, but this was not my idea. This idea and the entire strategic concept came from a social network created around 2015 to leverage the vast knowledge base of the retired military community. A small investment has paid off enormously."

The president knew this vital asset well. "Remind me who's responsible?"

"GEN Namrog," the secretary of defense said. "He had the vision and tenacity to keep pushing this for the last 50 years." The president could hear the admiration in her friend's voice.

"Ah, yes. Is he still around?"

"Yes, as a matter fact is. He will be 99 on Aug. 25."

"I'd like to thank him personally," the president said. "Please arrange for me to visit him."

MR. LLOYD N. "NEALE" COSBY is an independent consultant to defense agencies. He holds an M.S. in international affairs from George Washington University and a B.S. in agriculture economics from the University of Kentucky. He has worked on a number of Defense Advanced Research Projects Agency projects, namely SIMNET, the first networked, virtual training system, and Command Post of the Future, which became an Army program of record in 2006. He is currently working on big data projects. He is an advocate for the Army to provide standoff distance for ground forces.

Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology)

As of 12/15/14

Hon. Heidi Shyu

ASA(ALT)
AAE & SPE
SAAL-ZA

Ms. Diana Banks

Special Assistant to AAE
SAAL-ZA

LTG Gustave Perna

Deputy Chief of Staff
G-4 Logistics

LTG Robert Ferrell

Chief Information Officer
G-6

LTG Michael Williamson

Principal Military Deputy DACM
CIO
SAAL-ZB

Mr. Gabriel Camarillo

Principal Deputy
SAAL-ZX

SGM Rory Malloy

Sergeant Major
SAAL-ZB

Mr. Wimpy Pybus

DASA Acquisition Policy & Logistics
SAAL-ZL

Ms. Ann Cataldo

DASA Defense Exports & Cooperation
SAAL-ZN

Mr. Tom Mullins

DASA Plans, Programs & Resources
SAAL-ZR

Mr. James Shields

PEO Ammunition (Acting)

BG Bob Marion

PEO Aviation

MG Daniel Hughes

PEO C3T

Mr. Scott Davis

PEO CS & CSS

Ms. Mary Miller

DASA Research & Technology
SAAL-ZT

Mr. Harry Hallock

DASA Procurement
SAAL-ZP

MG Paul Ostrowski

Deputy for Acquisition & Systems Management
SAAL-ZS

Mr. Doug Wiltsie

PEO EIS

BG David Bassett

PEO GCS

Mr. Stephen Kreider

PEO IEW&S

BG L. Neil Thurgood

PEO Missiles & Space

Mr. Kevin Fahey

Executive Director SoSE&I
SAAL-SSI

BG Brian Cummings

PEO Soldier

MG Jon Maddux

PEO STRI

Mr. Carmen Spencer

JPEO CBD

Mr. Conrad Whyne

PEO ACWA

Mr. Craig Spisak

Director USAASC

MG Brian Lein

Commander MRMC*

* 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
FT BELVOIR, VA 22060-5567

ASC.ARMY.MIL

HEADQUARTERS DEPARTMENT OF THE ARMY | PB 70-15-01 | APPROVED FOR PUBLIC RELEASE: DISTRIBUTION IS UNLIMITED

"Our Army will continue to deliver professionally trained and ready forces as the most decisive landpower in the world to the Joint Force. Force 2025 and Beyond is the right strategy to do so."

Raymond T. Odiemo
General, United States Army
Chief of Staff

John M. McHugh
Secretary of the Army

PUBLISHED BY

U.S.ARMY

UNITED STATES ARMY
USAASC
ACQUISITION SUPPORT CENTER