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OCTOBER–DECEMBER 2015

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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

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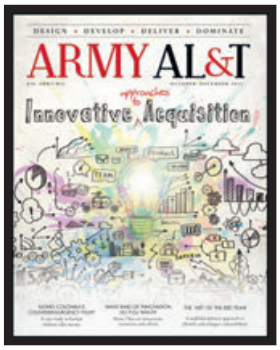
ARMY AL&T

OCTOBER–DECEMBER 2015

FEATURES



ON THE COVER
Most people think of innovation as The Big Idea, but more often than not, innovation—in products, processes or otherwise—is likely to be lots of little ideas.

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ARMY AL&T

OCTOBER–DECEMBER 2015

FEATURES

SCIENCE & TECHNOLOGY

CONTRACTING

TRIBUTE TO THE HON. CLAUDE M. BOLTON JR.

? CRITICAL THINKING

$ BBP 3.0

FOREIGN MILITARY SALES

COMMENTARY

OUTSIDE THE BOX

WORKFORCE

DEPARTMENTS

ELECTRONIC EXTRAS

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From the Editor-in-Chief

The very word "innovation" makes most people think of world-altering inventions or concepts such as the wheel, Newton's law of gravity, flying machines and the Internet with all it offers. Take today's ubiquitous cellphone, for instance. Making a cellphone from scratch would be overwhelming for anyone, and, at the very least, daunting for any company. Inventing the microprocessor, LED display and antenna for the cellphone is hard enough, but you also have to invent the cell tower, the switching system, speakers, keypad and on and on to make it work!

Indeed, no one person or company produced today's cellphone. The multitude of ideas that were heaped, one upon another upon another, over time to create the final products we use today are lost on most people. In reality, while some innovations may spring into being in an instant or by accident (fire comes to mind), most represent an iterative process with one idea spawning another, and another, and so on. According to the August issue of Scientific American, the single reason humans came to dominate the planet is our ability to cooperate. By cooperating and exchanging ideas, we are able to innovate and create almost anything we have been able to imagine.

So, who are the innovators? Quite literally, everyone in the Army Acquisition Workforce and those in support can lay claim to that distinction. Anyone who tries to make something new, better or faster qualifies as an innovator.

This issue focuses on the people in the acquisition community who have used their knowledge, experience and creativity to make processes, products or people more effective. For example, the software engineers at the Program Executive Office for Missiles and Space who are applying the Agile software development framework to the acquisition of software. Or the smart people at the U.S. Army Engineer Research and Development Center in Vicksburg, MS, who have adapted a red-teaming initiative to incorporate Soldier feedback and troubleshooting into every step of the development process. And, in Critical Thinking, we have an in-depth, down-to-earth interview on the nature of innovation with Pierre Chao of Renaissance Strategic Advisors and the Center for Strategic and International Studies.

Innovation is a continuous phenomenon, of course. In a future issue of Army AL&T, you undoubtedly will read about how scientists at the U.S. Army Research Laboratory are working with graphene (just one atom thick), and its unique strength, flexibility and electrical conductivity properties to make everything from flexible displays to lasers—all of which can lead to other product improvements. Again, WHAM! You have innovation on top of innovation.

Not every innovation has to be a product. This issue features a special section on the innovative ways in which the United States helps other countries fill security gaps through the foreign military sales (FMS) program, which in turn helps exercise and preserve U.S. industrial capabilities. The lead story in that section shows how one FMS case helped the Colombian government vastly improve security for that nation and its people.

Finally, sad news but an opportunity to celebrate a remarkable life: The Hon. Claude M. Bolton Jr., the assistant secretary of the Army for acquisition, logistics and technology from January 2002 to January 2008, passed away suddenly on July 28. The Army and Air Force communities, as well as Defense Acquisition University, lost a valued leader, innovator and mentor whose innumerable contributions helped shape today's superior acquisition workforce. See our tribute to him on Page 102.

As a reminder, the news and information don't start or stop with the printing of this magazine. Please visit our online Army AL&T magazine at **http://usaasc.armyalt.com** and see online extras that we just couldn't fit in the print version. As always, if you have questions, comments or a great idea for a future article or issue, write me at **ArmyALT@gmail.com**. I look forward to hearing from you!

Nelson McCouch III
Editor-in-Chief

EQUIPPED FOR DOMINANCE
As night begins to fall on the desert, PFC Daniel Porter, an all-source analyst for the 2nd Armored Brigade Combat Team (ABCT), 1st Cavalry Division, secures his night vision optics to his Advanced Combat Helmet during a rotation at the National Training Center, Fort Irwin, CA, in February. Both the optics and the helmet are products of extensive research in Army labs. (U.S. Army photo by SSG John Healy, 2nd ABCT Public Affairs)

FROM THE ARMY
ACQUISITION EXECUTIVE
THE HONORABLE HEIDI SHYU

Innovation *to Win in a* Complex World

Investing in S&T to confront the future threat

In October 2014, U.S. Army Training and Doctrine Command rolled out the latest Army Operating Concept (AOC), titled "Win in a Complex World." This AOC details how the Army of the future will strengthen capabilities across multiple domains as part of a joint partnership to ensure dominance against "determined, elusive, and increasingly capable enemies."

Simultaneously, it challenges our forces to "conduct expeditionary maneuver through rapid deployment and transition to operations." The increasing proliferation of technologies to diverse and capable enemies means the Army must be prepared for a wider and more varied threat picture than ever before. This issue of Army AL&T explores ways the Army employs innovative solutions to ensure our continued dominance, including science and technology (S&T) investments valued at approximately $2.5 billion per year. This includes research performed in Army laboratories, individual research projects at universities, the work of university-affiliated research centers and innovations from small and large companies.

The Army funds critical S&T investments not available in commercial products to enable us to develop breakthrough products that will shape the Army of the future.

HOLLYWOOD-STYLE REALISM
Clinton Fischer, an engineer at the COL John M. McHugh Armaments Integration Facility, demonstrates a test at the facility's Simulated Weapon Environment Testbed during a media day at Picatinny Arsenal, NJ, May 4. The Army is using a Vicon-infrared, marker-tracking system—the same technique that Hollywood uses to capture live video and turn that into animation—to capture performance data of Soldiers using experimental weapons or equipment and thus ensure their dominance on the battlefield. (Photo by David Vergun, Defense Media Activity)

FROM THE LAB, FOR THE SOLDIER
The Concept for Advanced Military Explosion-Mitigating Land Demonstrator (CAMEL) was on display at the Pentagon during DOD Lab Day May 14. CAMEL shows how research by the U.S. Army Research, Development and Engineering Command (RDECOM) on improving blast protection in vehicle platforms considers the occupant first and offers lessons learned for the development of future military vehicle platforms. CAMEL is also but one example of how Army laboratories are investing in innovative technologies, and how Army scientific and engineering efforts enable Soldiers on the battlefield to have technological overmatch. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

I will highlight two examples in Army aviation: the Improved Turbine Engine Program (ITEP) and the Degraded Visual Environment Mitigation (DVE-M).

STRONGER ENGINE, SAFER FLIGHT

ITEP, featured in the October – December 2012 issue of Army AL&T, will produce a new class of turboshaft engine that will replace the current T700 class engine for the UH-60 Black Hawk and AH-64E Apache, which together make up 70 percent of the total Army helicopter fleet. The current T700 engine originated in the 1970s and no longer retains significant potential for power growth to meet new requirements and increased aircraft weight. The Improved Turbine Engine will fit within the current engine nacelle of the UH-60 and AH-64 at similar weight, offering a 50 percent improvement in shaft horsepower and functionality in high-temperature environments around the globe.

Degraded visual environments are responsible for a large majority of Army aviation accidents over the past 10 years. Operating in DVEs was described in an article in the July – September 2012 issue of Army AL&T as a top priority in S&T. The inability to operate safely in DVEs has had a significant impact on tactics, techniques and procedures employed to support the ground force. The Army's DVE-M program addresses the loss of vertical lift aircraft and the occupant injuries resulting from a lack of situational awareness under various DVEs. Achieving the capability to conduct missions in such conditions will grant a significant tactical advantage by enhancing the safety and effectiveness of Army operations. Just as breakthroughs in infrared technologies allowed the U.S. military to "own the night," DVE-M will enable us to "own the weather."

WEATHER OR NOT
New York Army National Guard LTC Kevin Ferreira, operations officer for the 42nd Combat Aviation Brigade, conducts a simulated flight during training in June at Fort Drum, NY. The goal of Army S&T research into DVE-M is to provide Army aviation the capability to conduct operations 24/7, 365 days a year regardless of weather and environmental conditions. (U.S. Army National Guard photo by SGT J.P. Lawrence)

BEYOND OWNING THE NIGHT
The Army is preparing to introduce the Enhanced Night Vision Goggle III (ENVG III), with fielding to begin in 2017. Worn on a helmet like earlier models, the ENVG III can be wirelessly linked to the Family of Weapon Sights Individual, which is mounted on small-arms weapons. The ENVG III is the latest technological breakthrough enhancing the U.S. military's established ability to own the night. (Image courtesy of Program Executive Office for Soldier)

The multidisciplinary DVE-M S&T research explores the trade space between flight controls, sensors and cueing, and will enable Army aviators to safely fly in white-out, brown-out, rain, fog, clouds, smog or darkness. The long-term goal is to provide Army aviation the ability to conduct operations 24/7, 365 days a year regardless of weather and environmental conditions.

RESEARCH LEADS INNOVATION

Another example of the Army's commitment to investing in innovative technologies is our laboratories. In 16 Army laboratories across the country, nearly 12,000 scientists and engineers perform research that is vital to our Soldiers. In our labs, these scientists and engineers work on projects covering a wide variety of technological innovations that address the challenges facing the Army around the world.

These projects range from basic research in materials to applied research focused on solving specific military problems to advanced technology development demonstrating technical feasibility at the system or subsystem level. Examples of these technology projects include advancements in lighter and stronger armor, next-generation night vision goggles, directed-energy weapons, nontraditional ground-vehicle survivability demonstrators optimized for occupant-centric protection, reducing operational energy consumption and Soldier load, optimizing training with live-virtual-constructive simulation, and medical research in support of care for traumatic brain injuries and rehabilitation for wounded warriors.

CONCLUSION

In order to win in an increasingly complex and uncertain world, we must have the capabilities to address the full spectrum of potential threats, from countering terrorism to helping partner nations counter nation-state threats. This entails rapidly developing and fielding a broad portfolio of capabilities that will enhance our mobility, survivability, situational awareness and lethality in different environments.

Winning in an uncertain world is no small task. However, the Army has repeatedly risen to great challenges in its 240 years. With our focus on nurturing innovative S&T to enable the next generation of dominant capabilities and our strong partnerships with the commercial and defense industrial base, the Army is prepared to rise to tough challenges. Armed with this commitment to innovation and partnership, we will keep our forces Army Strong.

SPOTLIGHT:

MR. TAG CHOATE

Speaking two languages

MR. TAG CHOATE

COMMAND/ORGANIZATION:
U.S. Army Contracting Command – Redstone Arsenal, AL

TITLE:
Supervisory procurement analyst

DAWIA CERTIFICATIONS:
Level III in contracting; Level I in program management

YEARS OF SERVICE IN WORKFORCE: 14

EDUCATION:
MBA in information technology and e-commerce, National American University; B.S. in business administration, logistics and operations management, Weber State University

AWARDS:
Air Force Civilian Achievement Medal; Army Superior Civilian Service Award

Tag Choate and his team think of themselves as bilingual. They oversee the operation and integration of procurement information systems by the U.S. Army Contracting Command – Redstone Arsenal (ACC-RSA) Contracting Center, AL. "Our job is to be intermediaries between the people who use the systems and the people who develop them," he explained. "Often, the system users don't understand software or coding issues and the software developers aren't familiar with contracting or acquisition. So we have to speak both 'languages' and work to develop good relationships with both groups to make sure everything goes smoothly."

Before joining the Army Acquisition Workforce, Choate got his start working in Air Force acquisition. He has noticed a couple of differences in the way that each branch approaches the process. The Air Force has a program executive office that exclusively handles service contracts, he noted, something the Army has only recently started to consider. He also noted that airmen enter the acquisition field earlier in their careers, often as second lieutenants or as enlisted personnel. In the Army, he said, it's more common to transition to acquisition at the rank of major or lieutenant colonel. That has its advantages and disadvantages. "Acquisition is a very technical field, and it can be challenging for someone to make that transition. But those Soldiers often have more operational experience and a better understanding of how the equipment is used in the field."

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

I am responsible for the management, oversight and integration of various procurement information systems and operational support programs used by the ACC-RSA Contracting Center. My team provides technical assistance to contracting officers and specialists and functional insights to developers in various program offices. This support ensures the timely and efficient procurement of goods and services to support warfighters who rely on the Army Aviation and Missile Life Cycle

I have found that the most influential people in my career were less concerned with titles like director, leader or mentor and were more concerned with living the Air Force and Army core values.

Management Command to execute their mission.

How did you become part of the Army Acquisition Workforce, and why?

I joined the AL&T Workforce as a Student Career Experience Program intern with the Air Force. I found that contracting—specifically the information systems used to execute the contracting mission—was an excellent fit with my interests in supply chain management and technology. I have remained in the AL&T Workforce because I am proud to work for an organization whose strategic interests and moral character reach beyond generating wealth for shareholders.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

I spent about three years developing the functional requirements for the Army's future contract writing and management system [the Army Contract Writing System]. This project gave me the opportunity to interact with contracting, finance, logistics and program management professionals across the Army. Additionally, since similar systems have had a 20-year-plus life cycle, it provided me the once-in-a-lifetime chance to engage in strategic planning for a system that will affect the Army contracting enterprise for an entire generation. I am also very grateful for the opportunity I had to participate in the DOD Executive Leadership Development Program in 2008-09. The lessons this program provided in strategic thinking, communications, teamwork and knowledge of the DOD mission have been instrumental in my career progression.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I have found that the most influential people in my career were less concerned with titles like director, leader or mentor and were more concerned with living the Air Force and Army core values. My first contracting officer took the time to teach me the ropes, although it took time away from doing the other things he was responsible for, and taught me the concept of selfless service. I learned integrity from one of my directors, who refused to back down from her responsibilities even under extreme pressure to compromise process for the sake of expediency. The co-worker who performed the same job for 15 years while bringing the same level of intensity to each project she was involved in taught me duty.

I feel extremely privileged to have worked with so many people who live each day according to these principles and do so without the expectation that it be done because they are required to do so as a mentor. Similarly, although I've never sought after or worn the title of mentor, I try to incorporate their example into my core values. In doing so, I hope that I will pass along their influence to others regardless of rank or title.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

Although I get great enjoyment working with business systems, managing people and projects and improving business processes, the greatest satisfaction I have in being part of the AL&T Workforce is knowing that in my own little way, I am contributing to the mission of the greatest military power this world has ever known, and that this power is being used for the proliferation of freedom across the globe.

What advice would you give to someone who wants to get where you are today?

There is no magic recipe for being promoted, getting accepted into programs or working on interesting projects. The most any of us can do is prepare ourselves to take advantage of opportunities when they present themselves. Most of the opportunities for advancement and development I have been extended were predicated upon whether I had successfully completed the duties and responsibilities of my current and previous assignments. Because I had my responsibilities well taken care of, I was available to take on new responsibilities that were both fun and challenging. I'm in a rewarding position, and my advice to anyone who wants to get there, too, is to do your best to fulfill the duties you have, whatever they may be; then, be patient and vigilant in seeking out new opportunities.

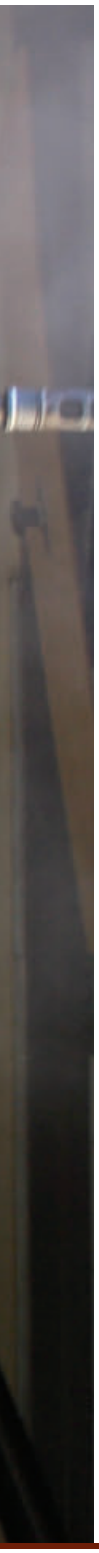
—MS. SUSAN L. FOLLETT

THE TRUE MEASURE OF SUCCESS
A Soldier from the 3rd Infantry Division, fitted with biomechanical sensors, fires a test weapon in August at Fort Benning, GA, to evaluate the impact of different calibers on felt-recoil and marksmanship. Because a weapon system is only as good as a Soldier's ability to use it effectively, HSI focuses on developing a system that augments Soldier capabilities and mitigates performance limitations. (U.S. Army photo by Sam Ortega, ARL)

Keeping Design *on TARGET*

PM Soldier Weapons teams with ARL's Human Research and Engineering Directorate and the Maneuver CoE to incorporate human systems integration early in weapon system development, to ensure that weapons are designed to work in harmony with other systems and equipment.

by Dr. Gabriella Brick Larkin, Mr. Joshua Charm, MAJ Aron Hauquitz and MAJ Adam Patten



Technology may advance in leaps and bounds, but the physical and cognitive abilities of people who use technology stay much the same. History tells us the performance of new products is better when human performance is among the factors considered during the design and development process.

What does this mean to the military materiel developer? Military products, including weapon systems, perform better when we consider and accommodate a Soldier's physical and cognitive skills during design and development. We do this within an engineering process called human systems integration (HSI).

Product capabilities do not exist in isolation. They interact with and affect—while being affected by—the user as well as other products. HSI is the concept of ensuring that system designs are an extension of the user rather than an addition. When the user, the Soldier, is the dynamic center of a system of systems in military materiel development, HSI ensures that system designs continuously account for and involve the Soldier-user. These considerations include the Soldier's inherent capabilities and limitations, the environment, other equipment and systems, squad members and the mission. Optimizing any given materiel solution depends on the extent to which its design optimizes the functions of the overarching system of systems.

THE SOLDIER IS CENTRAL
A Soldier from 2nd Battalion, 11th Infantry Regiment traverses the Army's Load Effects Assessment Program obstacle course in December 2014 at Fort Benning, GA, during a usability evaluation of weapon slings. In military materiel development, the Soldier must be the dynamic center of a system of systems; product capabilities do not exist in isolation. (U.S. Army photo by Sam Napier, ARL)

At Project Manager Soldier Weapons (PM SW), assigned to Program Executive Office (PEO) Soldier, one aim of weapon development programs is to produce and field adaptive and agile technology advances to the asymmetric battlefield. PM SW approaches all acquisition programs with this in mind. The organization strives to reduce acquisition time and improve product effectiveness by introducing Soldier performance into the equation early in the overall process.

Focusing on lightening the Soldier's load and other strategies for optimization aren't new per se. The Army HSI Program, formerly called MANPRINT, has existed since the 1950s. However, specifically integrating HSI into system requirements and source selection is a relatively new approach for project management offices. PM SW takes a particularly progressive approach to using dedicated, integrated HSI support.

IT STARTS WITH THE SOLDIER

Battlefield overmatch, the condition in which one side's capabilities and resources far outweigh the adversary's, is not simply an outcome of superior firepower. Overmatch derives from the superiority and dominance of the stronger force's warfighters in conjunction with the advanced weapon systems they use.

Thus, HSI factors pertaining to usability, situational awareness and maneuverability are driving forces in achieving overmatch. A weapon system is only as good as a Soldier's ability to use it effectively. HSI enables the Army to develop a system that augments Soldier capabilities and mitigates performance limitations.

PM SW routinely uses a Soldier-system strategy and not just a systems-strategy approach. This kind of strategy helps define parameters needed to support the operational capability of any materiel solution. For example, a rifle's operational capability is based on its accuracy, ballistic effect, reliability and rate of fire. Traditionally, the definition of accuracy has been in terms of target effects (e.g., a weapon in a stand must meet a 5-inch mean radius impact at 300 meters). While this kind of measurement is necessary, it fails to consider HSI.

ARL-HRED will use Soldier acceptance events as criteria for down-selecting in source selection competitions. This ensures that the final product not only meets all product specifications but also truly reflects what the Soldier wants and needs in the field.

A Soldier-system-centric approach also defines accuracy as the extent to which rifle designs facilitate aim stabilization and mitigate the effect of recoil for follow-on shots. Thus, accuracy includes:

- The degree to which a weapon's fire selector is easily accessible to right- and left-handed Soldiers with hand sizes ranging from the 5th to 95th percentile.
- The extent to which the size, shape, weight and center of gravity of the rifle's design facilitate mobility and manipulation when transitioning between targets or maneuvering through small areas.
- The ease of maintenance requirements and malfunction procedures.
- The round capacity, trajectory of the ammunition used and the ease of changing the magazine.
- The compatibility with enabling systems and the operational capability of the enabler itself.

This definition, combined with the specifications for target effects, is a Soldier-system-centric way of determining accuracy.

A COLLECTIVE EFFORT

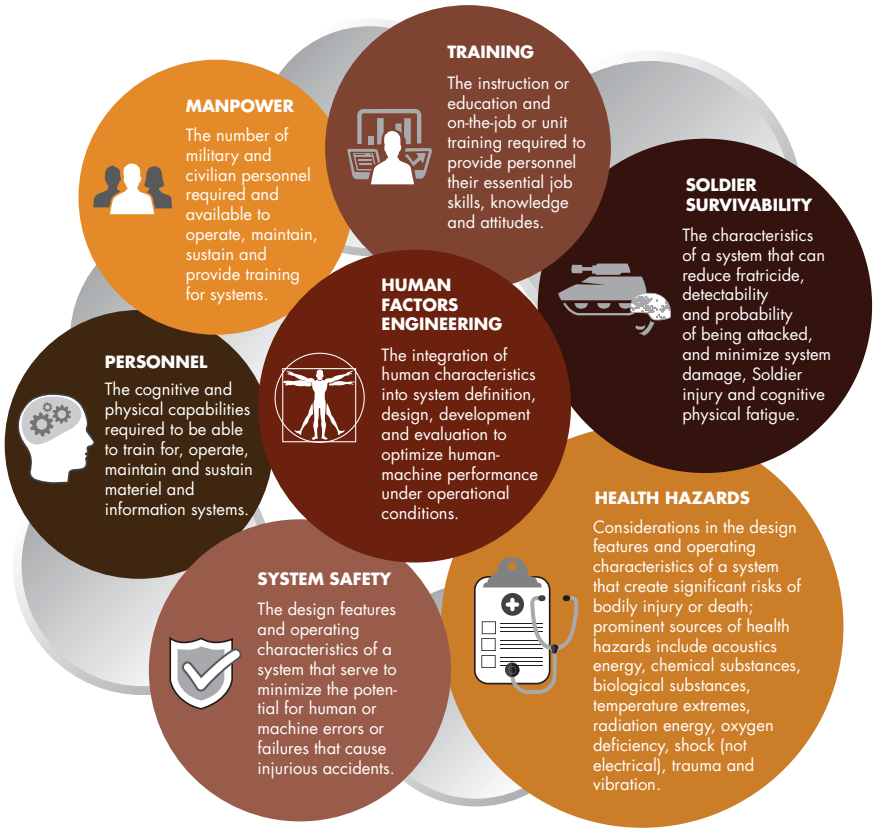
Current policy requires an Army HSI assessment for each acquisition milestone, beginning at Milestone B. However, PM SW recognizes the importance of establishing underlying design parameters for systems that bridge the operational—not simply the technical—capability gaps.

This calls for maintaining productive partnerships with other organizations involved in the process. For PM SW, they include most notably the Lethality Branch, Soldier Division, of the U.S. Army Maneuver Center of Excellence (MCoE) at U.S. Army Training and Doctrine Command (TRADOC), and the U.S. Army Research Laboratory Human Research and Engineering Directorate (ARL-HRED) of the U.S. Army Research, Development and Engineering Command (RDECOM).

PM SW works closely with ARL-HRED and MCoE to support upfront assessment and experimentation that are geared toward defining these parameters, integrating HSI earlier in the PM's acquisition efforts and providing HSI support to the requirements process. Thus the focus of acquisition efforts broadens from system-centric to Soldier-system-centric.

ARL-HRED is the lead for the Army HSI Program (AR 602-2, "Human Systems Integration in the System Acquisition Process"). For maximum effectiveness, we must consider HSI far earlier than when an HSI assessment is required. Being able to identify and investigate HSI considerations in concept development, thereby influencing requirements generation and science and technology (S&T)

ARMY HUMAN-SYSTEMS INTEGRATION DOMAINS:



THE MANY ASPECTS OF HSI
The Army's HSI program considers optimization in multiple domains that affect total system performance. Each domain constitutes a piece of the larger HSI picture. (SOURCE: Human Systems Integration office, HQDA G-1)

GATHERING PERFORMANCE DATA
An 82nd Airborne Division Soldier fires at close-range targets on ARL-HRED's M-Range at Aberdeen Proving Ground, MD, in March as part of a study to inform requirements for a Squad Designated Marksman Rifle. M-Range targets provide automated data on engagement time and quality of hit to allow a meaningful analysis of the impact of different materiel solutions on Soldier-system performance. (U.S. Army photo by Ron Carty, ARL)

processes, should result in the transition to a program of record that addresses underlying capability gaps in the manner needed. HQDA G-1 termed the idea of performing HSI work earlier than required "moving human systems integration to the left." TRADOC, the Decker-Wagner Army Acquisition Review and Army Acquisition Policy endorse this practice, recognizing that early, integrated HSI can provide return on investment across a product's entire life cycle.

PM SW has worked with ARL-HRED and MCoE to develop a progressive strategy incorporating HSI in other nontraditional ways as well. Whereas ARL-HRED provides expertise in HSI and the behavioral sciences, MCoE ensures that this expertise is applied in an operationally relevant context. PM SW uses the results of this collaboration in several ways, such as influencing source selection of new products.

The partnership among PM SW, MCoE and ARL-HRED is critical to this process. Open and continuous discussion and collaboration to define scenarios and Soldier-system performance metrics ensure that evaluation of HSI is experimentally reliable and operationally valid. This application drives results for PM SW's acquisition efforts, which optimizes Soldier-system performance and maximizes Soldier acceptance of fielded systems. PM SW considers the needs of each particular program and effort when tailoring an HSI program to the item.

The following examples illustrate how the three organizations have used HSI effectively:

- Research: PM SW funds HSI studies, designed and conducted by ARL-HRED in collaboration with MCoE, to evaluate the impact of different materiel solutions on Soldier-system performance. PM SW uses the results to inform requirements or engineering change proposals. In one such study, results indicated that currently available solutions that can technically meet the requirement may fail to support functional needs. As a result, PM SW incorporated modifications to the requirement language. ARL-HRED is now pursuing a collaborative research and development agreement with industry partners to further this initiative.

- Soldier acceptance: PM SW funded ARL-HRED support to MCoE to identify critical functional needs that underlie Soldier acceptance and general usability of an end product. ARL-HRED, PM SW and members of the Picatinny Arsenal legal and procurement communities developed a qualitative research design (QRD). With the QRD, ARL-HRED will use Soldier acceptance events as criteria for down-selecting in source selection competitions. This ensures that the final product not only meets all product specifications but also truly reflects what the Soldier wants and needs in the field.

- Review of lessons learned: PM SW and MCoE use this exercise to support requirements generation. Just as new technology incorporates what already exists, it must also draw upon lessons learned from previous development and acquisition efforts. These lessons come from rigorous reviews of operational testing, post-combat survey data, HSI assessments and other Soldier feedback and Soldier-system performance sources. MCoE incorporates these lessons in new and sometimes existing requirement documents (e.g., through memos of clarification), and uses them to inform test and evaluation strategy in order to ensure assessment of the system's functional performance.

CONCLUSION

Industry has successfully applied HSI early in product development for quite some time, but PM SW is the only project management office currently using it as a regular part of source selection and other nontraditional applications within the Army.

It has introduced HSI to several programs currently in the early stages of acquisition—including the Grenadier Sighting System, Compact Semi-Automatic Sniper System, XM-17 Modular Handgun System and Small Arms Fire Control—and to the Improved Weapons Cleaning Kit, which has been fielded. Analysis and documentation of the return on investment will follow product fielding.

An integrated HSI program supports requirements development, testing and procurement processes. HSI helps create an acquisition program that bridges the gaps between operational needs, requirements, S&T and products. PM SW is broadening the focus to Soldier-system performance and system-of-systems considerations. It is leveraging information from the field and capitalizing on ongoing S&T investments and research efforts by the government, industry and academia.

Making transformational advances in small arms requires learning from and leveraging past and current Army investments. Program managers must reach across organizational lines to best develop and procure materiel solutions that operationally support an underlying capability gap. Widening the focus of priorities from system performance to Soldier-system performance facilitates an adaptive and agile operational capability and yields a better return on acquisition investment. Incorporating HSI within the PM SW portfolio is critical for future investments in Army systems that will augment Soldier capabilities and mitigate Soldier limitations to achieve battlefield overmatch.

For more information, contact Dr. Gabriella Brick Larkin at ***gabriella.b.larkin.civ@mail.mil****.*

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FEEDBACK FORUM
A Soldier with 1st Battalion, 23rd Infantry Regiment, 3rd Striker Brigade Combat Team, 2nd Infantry Division looks through a FGM-148 Javelin scope during Decisive Action Rotation 15-08.5 at the National Training Center (NTC) in July. By identifying units, from platoon through battalion level, that are preparing for a CTC rotation, ATEC can integrate system evaluations with scheduled maneuver home station training exercises and thus gain opportunities to solicit Soldier feedback. (U.S. Army photo by PVT Lisa Orender, NTC Operations Group)

Tested by AUSTERITY

Forced by budget constraints to reduce costs, ATEC is applying a comprehensive strategy across developmental and operational testing, incorporating Soldier participation and feedback early in the process for better data.

by COL Stephen Lutsky, Ms. Alicia Thomas and Mr. Michael Dillen

Just as the equipment of yesterday will not meet the needs of tomorrow, nor will the traditional way of conducting the test and evaluation (T&E) mission. As the Army continues to focus on modernization and postures to meet the needs of Force 2025, the U.S. Army Test and Evaluation Command (ATEC), the Army's independent T&E component, must be ready to test and evaluate the systems that will provide America's Soldiers with the tactical edge they need to prevent, shape and win conflicts in the complex world in which we operate.

To remain effective in an era of budgetary austerity, the T&E community must explore better ways to test, collect meaningful data and evaluate systems with less money and fewer personnel. To overcome this austere reality, ATEC has been looking proactively at its processes and practices to find innovative ways to improve T&E and reduce costs. The command's current efforts include encouraging customers to consider testing earlier in the acquisition process, fully leveraging historical test data for analysis and reducing costs by integrating developmental testing (DT) and operational testing (OT). For example, the long-standing practice of conducting sequential DT and OT events costs more than the Army can afford. ATEC has developed a new methodology known as the Comprehensive Test Strategy (CTS) that, if implemented in FY18, would enable ATEC to test more effectively, collect meaningful data and evaluate systems while saving time and money. CTS looks across all the developmental phases of the acquisition cycle for ways to use T&E resources—time, money and people—more efficiently while supporting all major milestones and fielding decisions to improve warfighting technologies.

This continuous improvement of T&E processes and attention to a system's entire acquisition life cycle, from technology development through sustainment, is increasingly essential. In this way, ATEC can identify efficiencies, achieve test-cost savings, enhance data products and reduce

T&E timelines to support fact-based decision-making. The ultimate goal is to ensure that Soldiers' equipment is effective and suitable and will survive in even the toughest operational environments to which Soldiers deploy.

STRATEGIC PRINCIPLES

In compliance with current acquisition and T&E policy, CTS examines all aspects of the developmental phases of the acquisition life cycle in search of T&E efficiencies while supporting all major milestones and fielding decisions.

The CTS rests on four key tenets:

- Actively using Soldiers in DT.
- Leveraging DT data to support OT evaluations.
- Using maneuver force home station training for data collection.
- Using combat training center (CTC) rotations to evaluate operational impacts.

Although the individual tenets are not new, combining them into one strategy with greater emphasis on the use of alternate OT methods has not yet been fully explored.

USING SOLDIERS IN DT

Leveraging Soldier-user assessments during DT helps uncover early system design or functional issues. Program managers can leverage data from those early assessments to make decisions on system technology development in advance of production and fielding. Leveraging the data early mitigates the impact of system design changes on a program's cost and schedule. To ensure Soldier availability and competence in testing, ATEC has re-energized its training mission so that Soldiers may perform multiple roles in the field: Soldier, operator, maintainer, tester and evaluator (SOMTE). However, as the Army continues to reduce its force structure, the availability of SOMTEs for participation in testing is uncertain.

TEST STRATEGY IN ACTION
Soldiers attach hydraulic hoses in preparation for a bridge retrieval during preproduction qualification testing of the Joint Assault Bridge at APG in 2014. In an example of leveraging DT to support the OT evaluation, ATEC's T&E master plan for the bridge includes creating an operationally realistic environment during the production-qualification test by adding Soldiers in realistic scenarios to certain phases. (U.S. Army photo)

Soldier feedback is invaluable and influences the program manager's decision-making during early phases of acquisition and T&E. For example, in May 2013 during an ATEC test on a grenade ammunition pouch in partnership with the Rapid Equipping Force, Soldiers navigated an obstacle course during which grenades fell out of their ammunition pouches. ATEC provided data from the user assessment to the program manager, which resulted in the redesign of the pouch. Early Soldier involvement and data collection allowed for system improvements without which Soldier safety or readiness might have suffered.

The benefits of using Soldiers in DT extend beyond reducing T&E costs, though. Perhaps equally notable is gaining Soldiers' understanding of the environment in which they will be using a system and how other Soldiers will interact with it. Capturing Soldier feedback is critical to the Army's efficient development of effective, suitable and survivable systems.

LEVERAGING DT DATA

Soldier participation in operationally realistic scenarios throughout the DT environment has yet to be practiced, but it clearly can reduce the time and cost of OT later in the acquisition cycle by enabling discovery of potential opportunities for system improvement while the system is in development.

One key to the success of this approach is limiting the test scope to only what is necessary to accomplish the evaluation. This means removing all test facets of the OT that have no impact on the specific operational area of focus and accepting that this focus on operational realism will not negate test results. Operational data obtained during this process can be used to make improvements early in the program's life cycle. Using Soldiers in an

REALISM RULES
The integrity of a tent could be a matter of life or death for Soldiers operating in areas contaminated by biological or chemical weapons. The Joint Expeditionary Collective Protection tent was put to rigorous testing this spring at the Yuma (AZ) Test Center and Tropic Regions Test Center, elements of ATEC. To adapt to numerous fiscal constraints, the T&E community is exploring more effective ways to test, collect meaningful data and evaluate systems with less money and fewer personnel. (U.S. Army photo by Carlos Mora, U.S. Army Tropic Regions Test Center)

operationally realistic DT environment can also reduce the scope of a subsequent OT event because there is no need to gather specific operational data again.

One example of leveraging DT to support the OT evaluation is in the Joint Assault Bridge T&E master plan. ATEC will be able to create an operationally realistic environment during the production-qualification test by adding Soldiers and realistic scenarios to the last portions of the launch-and-retrieve cycles and the reliability, availability and maintainability (RAM) miles of the operational-mode summary and mission profile testing.

In the past, civilians would conduct the total RAM event without adding Soldiers and realistic scenarios to the event. Thus the event was missing Soldier-conducted RAM mileage, and RAM miles could not be reduced in the actual OT event, which ultimately meant higher cost. The environment will be further improved by having the Soldiers perform their duties as vehicle crew members and execute their primary mission using the Joint Assault Bridge. Avoiding the use of an opposing force saves valuable resources without affecting the reliability assessment. We expect that this combined DT-OT strategy will reduce the duration of the initial OT, from six to five weeks.

HOME STATION TRAINING

With fewer deployments, priority for use of installation training areas is going to mission-essential task list (METL) validation and preparation for capstone events at CTCs, which are expecting organizational units to arrive prepared to execute their METL without requiring training. By identifying platoon- through battalion-level units that are preparing, ATEC can integrate system evaluations with scheduled maneuver home station training exercises to capitalize on opportunities for Soldier feedback.

Historically, an OT is a stand-alone event, forcing the program manager to provide funding for test assets, blue force, opposing force, support and sustainment costs. Using home station training for data collection benefits the program manager by reducing resource requirements to only the test assets, with the organization's maneuver funds supporting personnel and equipment not provided by the program manager.

An additional benefit of using home station training for data collection is the increased opportunity for Soldiers to become familiar with the test asset.

CTC ROTATIONS AND OPERATIONAL IMPACT

Like NTC rotations at Fort Irwin, CA, Army CTCs are DA-resourced, large-scale, realistic operational events that offer a rich environment for conducting program T&E. CTC formations are normally at the battalion or brigade level, which provide a better sample size for evaluation without additional cost to the program manager. School-trained and -certified observer controllers are present to provide feedback on mission success and data collection, reducing the customary number of data collectors.

By using the unit that participated in the home station training exercise, ATEC can eliminate the need to repeat new equipment training. In addition, the unit transports test assets to a CTC with its organic equipment, providing critical transportability data that can be used to support the system evaluation.

Evaluating operational effectiveness and mission performance is the primary objective during a CTC event. ATEC uses the data collected to complement data from the DT and the home station events, resulting in a comprehensive evaluation report to inform Army decision-makers.

Successful T&E requires senior leader buy-in and early cross-organizational planning. ATEC prepares a memorandum

GETTING SOLDIERS INVOLVED EARLY
Soldiers guide a Joint Assault Bridge during an emplacement event. In a manner similar to ATEC's T&E plan for the bridge, test experts will collect and integrate the T&E data required for Abrams and Bradley fighting vehicles into a home station (phase I) event and a CTC (phase II) event based on the need for a large force-on-force environment or complex scenarios. (U.S. Army photo)

of agreement up to two years in advance, updating it periodically to reflect any changes in personnel or requirements intended to reduce risk. The objective is to structure the CTC rotation in such a way as to satisfy both the training objectives of the unit commander and the evaluation data needs of ATEC.

CONCLUSION

ATEC plans to implement the CTS at the start of FY18. Depending upon the selected unit, however, cost savings for the 2018 Stryker Engineering Change Proposal (ECP), using the provided rough-order-of-magnitude (ROM) cost estimate, are projected to possibly exceed $3.4 million, for a 37 percent cost reduction. Cost avoidance for the 2020 Abrams and Bradley ECP is projected from the provided ROM cost estimate to be more than $4.03 million, for a 22 percent cost reduction.

The CTS is only one example of how the T&E community is rapidly adjusting, adapting and responding to a constrained environment while remaining compliant with acquisition and T&E policies. The CTS is a solid plan for capitalizing on early Soldier interaction and feedback in data collection and the consolidation of T&E requirements within an existing training framework.

The benefits of CTS to the Army will include eliminating duplicative testing, optimizing the use of dwindling resources available to the test community, reducing T&E time and costs, earlier fielding of equipment with a reduced burden on training resources and the ability to provide better-evaluated equipment to the maneuver force through early identification of operational problems.

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MRAP ROAD MAP

During the last decade of conflict, MRAPs rolled out of forward operating bases in Diyala and Ghazni and patrolled the streets of Kabul and Baghdad. MRAPs saved lives, protecting coalition troops from IEDs and rocket fire. DOD spent billions on them. Now, the MRAP fleet represents a valuable investment the acquisition community must maintain for the next contingency. To modernize MRAPs in today's fiscally constrained environment will require innovation. Here, TRADOC's Maneuver Center of Excellence proposes a strategy.

by Mr. Robert "Bob" Thomas, Mr. Thomas Stafford and Mr. Harry Jackson

The Mine-Resistant, Ambush-Protected (MRAP) capability is not an anomaly limited to the past decade of unconventional war, but probably will be needed anytime our Army is called upon around the globe. The Army's enduring MRAP fleet consists of 8,585 vehicles in three variants: the MaxxPro Dash, MaxxPro Ambulance and MRAP All-Terrain Vehicle (M-ATV). These are the newest and most capable vehicles in the inventory, with the oldest produced no more than four years ago.

The Army is placing the majority of retained MRAPs in mission-dependent augmentation sets for use in future contingencies. Other retained MRAPs will be distributed across the force to facilitate unit training and extend the tactical network down to company level within division headquarters and the infantry and Stryker brigade combat teams (BCTs), through the addition of the networked capability set and key leader vehicle upgrades.

Given that the Army is likely to retain this capability into the mid- to late-2020s, how should the Army ensure that it stays ahead of anticipated threats? The U.S. Army Training and Doctrine Command (TRADOC) Maneuver Center of Excellence (MCoE) has proposed an MRAP modernization strategy that provides a template for planning, considering proven technologies to ensure that retained MRAPs evolve with the threat and operational environment. The strategy advocates incremental and affordable investments in capability so MRAPs can support unified land operations today and operate as needed around the

globe well into the next decade. Although not yet formally approved or resourced by DA Headquarters, the strategy provides a starting point for discussing how to ensure that the enduring MRAP fleet remains highly capable in the future.

INNOVATION STRATEGY

The enduring MRAP fleet represents a significant investment of U.S. taxpayer dollars. For the acquisition professional, modernizing the fleet is a unique opportunity to provide careful stewardship of the MRAPs that have saved U.S. and coalition partners' lives over eight years of combat in Iraq and Afghanistan. Innovation is key to implementing the modernization strategy in a resource-constrained environment.

Innovative capability enhancements will improve MRAPs along several lines of effort. The strategy also supports Army modernization objectives, generally adhering to the technology first principles from TRADOC Pamphlet (PAM) 525-3-1, "The Army Operating Concept [AOC]: Win in a Complex World," published in October 2014. The "firsts" are shown in Figure 1.

The MRAP innovations are the result of lessons learned and Soldier feedback gained over more than eight years of MRAP use in combat. This can serve as a model for modernizing vehicles in the future.

LINES OF EFFORT

The proposed strategy focuses on the modernization of current or integration of new components, weapon systems and subsystems, using proven technologies to increase capability, reduce operating costs and provide longevity and durability. This strategy leverages nondevelopmental improvements and will use new-start developments as a last resort to add a critical warfighting capability or mitigate a critical system capability gap. In concert with vehicle modernization, the expanded efforts in training and doctrine are necessary to enable maneuver elements within the BCT and other brigades to employ the MRAP with emphasis on the Soldier and the squad, which are the foundation of the Army.

Training aids, devices, simulators and simulations will require improvements of similar fidelity to ensure training is relevant. Full use of the MRAP home station training fleet to support driver, crew and collective training will provide a seamless transition into the brigade operational project sets in the Army's prepositioned stocks.

The MRAP modernization will focus on protection and survivability, operational suitability and effectiveness, lethality and sustainability. (See Figure 2 on Page 26.)

PROTECTION AND SURVIVABILITY

- **Force Protection (AOC tech first principle 8 – anticipate enemy countermeasures).** Properly secure combat equipment and supplies and integrate vehicle components to prevent them from becoming secondary injury mechanisms upon impact from hostile fire, explosive blast or vehicle incident. Provide rapid vehicle egress to facilitate crew emergency evacuation caused by fire or other immediate hazard inside the vehicle. Upgrade

FIGURE 1

TECHNOLOGY FIRST PRINCIPLES

(TRADOC PAM 525-3-1, "The U.S. Army Operating Concept: Win in a Complex World")

1. Emphasize integration of technology with Soldiers and teams.
2. Simplify systems and integrate Soldier training into design.
3. Maximize reliability and reduce life cycle costs.
4. Design redundant systems that improve effectiveness under conditions of uncertainty.
5. Develop systems that degrade gracefully (no linkage to MRAP).
6. Maintain foundational knowledge to reduce the opportunity for surprise (no linkage to MRAP).
7. Reduce logistical demands.
8. Anticipate enemy countermeasures.
9. Ensure interoperability.
10. Consider scale and organizational implications.

MAPPING MODERNIZATION

The elements of MCoE's modernization strategy for the MRAP are mapped to the first principles for technology outlined in TRADOC's AOC. (SOURCE: Harry Jackson, MCoE)

KEY CAPABILITY

Soldiers from 1st Battalion, 2nd Infantry Brigade, Task Force Blackhawk use an M-ATV to cordon off the town square of a small Afghan village near Combat Outpost Yosef Khel in March 2012. Soldiers have relied on MRAPs for the last eight years of combat operations. Now updates are planned to make MRAPs more lethal, more sustainable, safer for their crews and better able to withstand damage and attack. (U.S. Army photo by SGT Ken Scar, 7th Mobile Public Affairs Detachment)

the Objective Gunner Protection Kit (OGPK) to the initiatives pioneered by the U.S. Army Armament Research, Development, and Engineering Center in the OGPK 2.0 configuration to mitigate turret separation during attack or accident, and explore means to protect the gunner from blast. Replace the current Gunner Restraint System (GRS) with the next-generation GRS as legacy systems wear out.

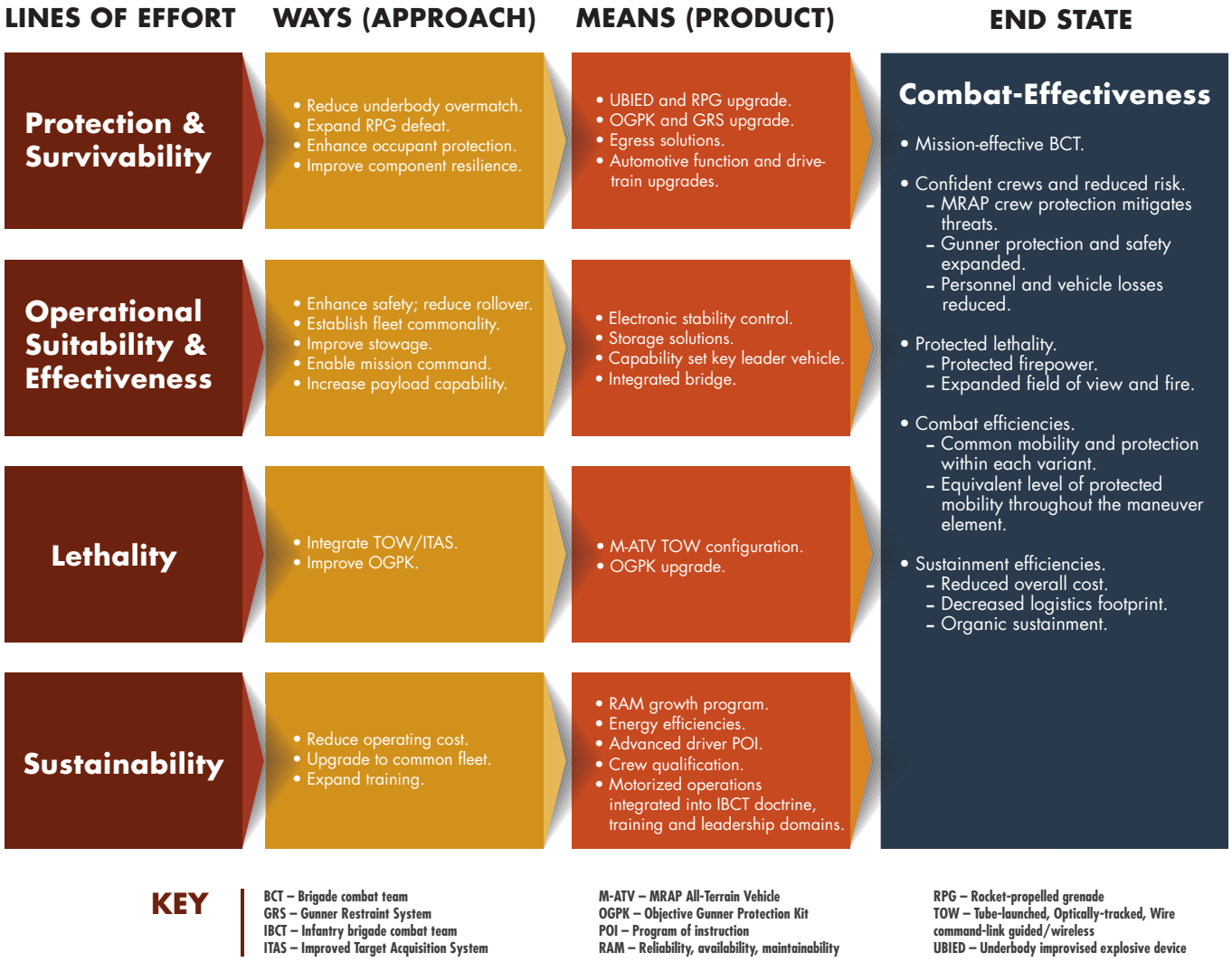
- **Survivability (AOC tech first principle 4 – design redundant systems that improve effectiveness under conditions of uncertainty).** Sustain the effort to reduce effects of underbody overmatch and increase probability of defeating rocket-propelled grenades and other direct fire projectiles and munitions by leveraging new, lighter-weight solutions that increase the level of protection per square foot without degrading vehicle performance. Increase survivability of key automotive functions and drivetrain components to mitigate cheap mobility kills from small arms fire and fragmentation.

OPERATIONAL SUITABILITY AND EFFECTIVENESS

- **Capability Set (CS) Support (AOC tech first principle 1 – emphasize integration of technology with Soldiers and teams).** MRAPs move, power and protect the Army's CS that provides mission command with on-the-move reach and reach-back networking communications and connectivity into the Warfighter Information Network – Tactical infrastructure. The enduring MRAP fleet will require integration of the networking communication systems down to company-sized units to enable reach-down to the Soldier equipped with Nett Warrior. MRAP variants must be programmed and planned for non-recurring engineering requirements over time, aligned with the network, mission command and tactical data radio modernization strategy.

- **Fleet Commonality (AOC tech first principle 7 – reduce logistical demands).** Bring each variant to a common level of mobility and protection to streamline sustainment and operational employment and ensure complementary capability on the battlefield.

FIGURE 2



PROPOSED SOLUTIONS

Each line of effort in the proposed MRAP modernization strategy has its own approach, expected products and anticipated dividends. (SOURCE: Harry Jackson, MCoE)

- **Safety Enhancements (AOC tech first principle 1 – emphasize integration of technology with Soldiers and teams).** Mitigate risk of rollover through electronic stability control and other automotive safety enhancements. Improve Soldier human-factor integration to reduce common injury mechanisms that contribute to injuries to passengers and crew.
- **Increased Operational Payload (AOC tech first principle 8 – anticipate enemy countermeasures).** Force protection improvements have degraded the vehicle's ability to operate within the performance envelope because of axle weight limits. This will provide the ability to carry add-on armor and mission packages without losing automotive performance, while ensuring a margin for future growth.

Innovation is key to implementing the modernization strategy in a resource-constrained environment.

- **Integrated Bridge (AOC tech first principle 2 – simplify systems and integrate Soldier training into design; and principle 9 – ensure interoperability).** Provide single point of access to control vehicle and mission command equipment at common workstations to improve crew performance and ease of operation and reduce space claim. The integrated bridge facilitates seamless interface of the CS and can be leveraged for on-board power management.

LETHALITY

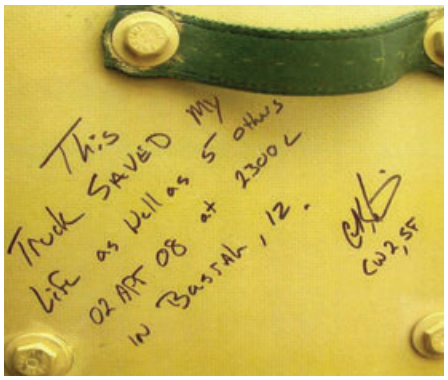
- **Tube-launched, Optically-tracked, Wire command link-guided (TOW) Improved Target Acquisition System (ITAS) (AOC tech first principle 10 – consider scale and organizational implications).** Field the TOW ITAS Integration Kit on the M-ATV to allow the infantry BCT (IBCT) to safely employ the weapon system when operating as an MRAP reinforced brigade. Integrating the TOW ITAS system onto M-ATVs provides mobile protected firepower for weapons companies and scouts. The TOW ITAS provides responsive, dedicated long-range precision direct fire, observation and targeting capabilities organic to the formation.

SUSTAINABILITY

- **Ownership and Operating Costs (AOC tech first principle 3 – maximize reliability and reduce life-cycle costs; and principle 7 – reduce logistical demands).** Reduce operating costs through a reliability, availability and maintainability growth program, and lower consumption of fuel and other forms of operational energy. A formal reliability growth plan with documented strategy will enable continuous tracking of each enduring MRAP system's reliability throughout the modernization process, with the intent

PUNCHING ABOVE ITS WEIGHT

Planned updates to the MRAP include looking at space usage to ensure that all necessary crew protection hardware fits on the vehicle, without exceeding weight limits that keep the MRAP mobile and agile—preventing cheap mobility kills from small arms fire and fragmentation. (U.S. Army photo)



STEWARDS OF A LIFESAVING LEGACY

MRAPs have saved the lives of thousands of U.S. Soldiers and coalition partners. The MRAP fleet is an invaluable legacy—and as it is brought home for modernization, acquisition professionals become stewards of that legacy. (U.S. Army photo)

BETTER GUNNER PROTECTION

The Army has invested significantly in MRAPs, adding protective features to keep Soldiers safer, such as the Objective Gunner Protection Kit on this M-ATV. Among other safety improvements, the Army will explore ways to prevent turret separation and protect the gunner from attack. (U.S. Army photo)

TOP OF THE LINE

The Army's enduring MRAP fleet boasts 8,585 vehicles in three models: the MaxxPro Dash, MaxxPro Ambulance—pictured here—and M-ATV. Only the newest and most capable are being modernized for the long haul; the oldest vehicle in the enduring fleet is just four years old. (U.S. Army photo)

ENABLING POWER PROJECTION
During recent MRAP-enabled combat operations in Zabul province, Afghan logisticians of the 205th Corps successfully supported units without assistance from coalition forces—underscoring the increasing ability of Afghan forces to project power into historically insurgent strongholds. The MRAP capability is likely to be needed in future contingencies as well. (U.S. Army photo)

For the acquisition professional, modernizing the fleet is a unique opportunity to provide careful stewardship of the MRAPs that have saved U.S. and coalition partners' lives over eight years of combat in Iraq and Afghanistan.

of exceeding threshold capabilities to the extent that resources and priorities permit. Improvements in maintainability are expected to be realized through the reduction of failures; engineering or design changes to reduce repair time where deemed practical; and maturity of maintenance procedures as technical manuals transition from commercial off-the-shelf status to military standard. System availability, as a function of both reliability and maintainability, will likewise increase with improvements in those areas.

- **Training (AOC tech first principle #2 – simplify systems and integrate Soldier training into design).** Implement advanced driver training, crew training and qualification, and expanded collective training within operational force through integration of mounted operations into IBCT doctrine, training and leader development.

CONCLUSION

The MRAP program is a great success story, having saved a significant number of U.S. and coalition partners' lives in more than eight years of combat in Iraq and Afghanistan by fielding approximately 21,000 MRAPs to Army units alone and approximately 27,000 to joint and coalition forces. The Army is taking advantage of our nation's investment in MRAP capability and is retaining 8,585 of the newest, most capable MRAP variants. Modernizing this critical capability requires innovation and thoughtful stewardship.

The TRADOC MCoE-proposed MRAP modernization strategy complements overarching Army modernization efforts

ROUTE CLEARANCE
This MaxxPro Dash with mine rollers performs the MRAP's core mission: to keep Soldiers safe from mines and ambushes while on patrol. The Army plans to invest in strategic additions and updates to keep this capability available as late as 2029. (U.S. Army photo)

by directly supporting Soldier and squad operations in highly survivable vehicles with improvements to mobility, safety, sustainment and lethality. The Army is expected to operate effectively and efficiently in the current and projected fiscally constrained environment. In these circumstances, the Army cannot and will not invest in new MRAP vehicles anytime in the foreseeable future. The modernization strategy leverages innovation and preserves the protected mobility capability of our force by efficiently making improvements to the vehicles the Army already owns. This translates directly into combat-effectiveness as our units deploy as part of a regionally aligned force or the Global Response Force in support of the national defense strategy.

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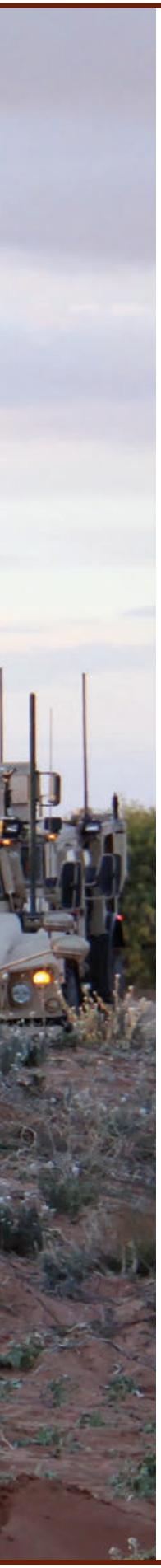
ON THE GO AND IN THE KNOW
Through mobile communications technology that connects all echelons of a brigade combat team, the network reduces units' reliance on fixed infrastructure, extends their range of communications and improves battlefield awareness at the lowest levels. (Photo by Nancy Jones-Bonbrest, PEO C3T)



Modernizing MISSION COMMAND

COL Michael Thurston, Project Manager for Mission Command, lays out the essentials to achieve the Army's vision for decisive, state-of-the-art battlefield communications

by Ms. Nancy Jones-Bonbrest

There's a fundamental rule on the battlefield: To command effectively, you must be able to communicate.

The Army continues its push to modernize mission command capabilities and embrace rapidly emerging technology against a backdrop of fiscal constraints and a volatile global security environment. At the same time, it remains focused on delivering to commanders and Soldiers the information they need to execute decisive actions anytime, anywhere and on any device.

To implement this vision, the Army's Project Manager for Mission Command (PM MC), assigned to the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T), is working aggressively to transition stand-alone mission command systems into an integrated, Web-based environment. User-friendly apps deliver warfighting functions merged with a common and shared view of the battlefield. Much as many people use their smartphones, tablets and laptops interchangeably, commanders will be able to plan a mission in the command post, then view

COMMUNICATING IN MANY DIRECTIONS
Featuring satellite-linked situational awareness data and easy-to-use battlefield chat rooms, the JBC-P displayed on this Mounted Family of Computer Systems hardware provides users a highly intuitive Google Earth-like interface that allows a close zoom-in to view precise locations, provides icons to pinpoint improvised explosive devices on a map, and uses instant messaging to call for medics. (Photo by Edric Thompson, U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC) Corporate and Public Communication Office)

and execute this plan while mobile in their vehicles and even dismounted with troops, viewing the same relevant information on a handheld device.

The Army is approaching mission command modernization holistically, incrementally refining requirements and executing development, integration, testing and fielding to drive to the larger vision of one Common Operating Environment (COE). As we converge servers and migrate stand-alone mission command system "boxes" into common infrastructure and adaptive apps using a commercial development approach, this cost-effective modernization process will leverage competition, encourage innovation and broaden opportunities for industry.

With 27 years of experience in tactical and strategic communications, including leading major networking and radio programs, COL Michael Thurston, now PM MC, is charged with overhauling much of the Army's tactical application infrastructure. Thurston recognized early that in striving to attain the vision of an effective, agile and decisive mission command capability supporting expeditionary operations, a "business-as-usual" approach wouldn't cut it. Changes are needed in organization, resourcing, processes, technology and testing if the Army is to seize this unique opportunity effectively. Thurston provided his perspective on these changes and how to implement them in a Q&A discussion on July 9.

Q. How do you see mission command changing to meet the needs of a lighter, more expeditionary force?

A. The fundamental changes we are making in mission command today to meet expeditionary operations are to separate the functional warfighting applications from the infrastructure; consolidate common services such as collaboration and visualization; and create an authoritative, synchronized data source common to all applications. We are also driving toward a common user experience across the tactical formation and the ability for application mobility across environments. Web-based applications will now be available to all authorized staff instead of the few system operators and can be tailored across a family of commercial-based clients, whether in the command post or mobile.

The Army is also working to bring mobility and simplicity to the command post initiatives by consolidating computing hardware, adapting wireless technologies, converting systems into software applications and adding remote administration capabilities. The vision is to make the command post more agile and operate more effectively

While we can look to industry to assist in app, services and infrastructure development, it's our responsibility to perform the lead system integrator role for all of our products within CP CE and MCE, to bring in all the capabilities and orchestrate all the moving pieces.

EXERCISING THE NETWORK
Soldiers of the 2nd Brigade Combat Team, 1st Armored Division use the Army's tactical network to stay connected and adapt quickly to a range of expeditionary military operations during NIE 15.2 this past spring at Fort Bliss, TX. (Photo by Nancy Jones-Bonbrest, PEO C3T)

with less equipment. The Army is also investigating solutions that enable corps and division main command posts to operate primarily from home station, while deploying smaller "right-sized" formations armed with leaner mobile tactical command posts.

Q. You oversee an organization that only last year was two separate project management offices. What are you doing to organize PM MC to meet the changing needs of the Army?

A. It always starts with organization and people. With any reorganization, you have to quickly establish the organizational vision and set goals. For us, it is mission command modernization, which is an initiative to homogenize mission command capabilities across formations and echelons. The merger provided the opportunity to bridge organizational and technological barriers between PM MC's role in the Command Post Computing Environment (CP CE) and the leadership of PM Joint Battle Command – Platform (JBC-P) in the Mounted Computing Environment (MCE).

This merger was the result of the Army's natural progression over time from individual battle command systems to unified mission command capabilities for all echelons.

You also have to instill a culture of innovation in your team. This goes beyond technical innovation and includes innovation in everyday business practices such as contract development, programmatic structure and resource management. You do this by empowering people at all levels and creating collaborative teaming environments. The merged PM MC embraces a system-of-systems approach, which has improved the ability to innovate, challenge the status quo and adopt new technologies that will greatly improve the effectiveness of our systems.

Q. What are some of the innovative tools you put in place, specifically in development, integration, testing and fielding, to move your organization to that vision?

A. We started with the organization itself. Following many in industry, we realigned internally as a matrix organization. This method pools resources in the technical, business and

IN SUPPORT OF MISSION COMMAND
Soldiers from the Fort Benning Experimental Force, 1st Battalion, 29th Infantry Regiment assess capabilities that enable mission command, during the E15 field-based risk reduction event at Fort Dix, NJ, in July. (Photo by Edric Thompson, CERDEC Corporate and Public Communication)

readiness management divisions to better share ideas and respond to program priorities.

We then created outcome-based, multidisciplinary integrated product teams (IPTs), and aligned resources from the functional pools and in many cases from external agencies and stakeholders such as requirements, science and technology and life cycle sustainment communities. This method brings together experts across the organization to work with the test, fielding and sustainment communities in a holistic manner. The outcome goals of the IPT are typically achieved within six months to two years and include milestone decisions, software builds, operational tests and fieldings to a first unit equipped.

Competition is another driver of innovation and is instilled in every acquisition strategy. We compete all aspects of the program and even compete government developers and contracting agencies. Well-defined and moderately sized efforts reduce risk and contractor overhead and thereby improve execution. In our experience, providers who compete for and win these opportunities are more eager to perform well so that they are better postured for subsequent contracts. The PM has also adopted innovative contracting techniques to support the program's acquisition strategy. Using the full range of contract options available, PM MC is creating the ability to rapidly secure developers to provide a variety of competitively awarded engineering services and software deliverables needed in agile acquisition.

Q. How does the COE play a role in development of mission command capabilities?

A. The Army's COE establishes mission command networking standards. It identifies cross-cutting capabilities used by many systems, such as geospatial visualization, and it allocates responsibility to subordinate CEs to implement. The COE provides the governance to the CEs, ensuring that the Army is developing capabilities effectively with the goal of reducing development and long-term sustainment costs, while improving overall system integration in the earliest stages of systems acquisition. Each CE then provides its own derived standards and governance to the programs within its purview and may even define technologies to be used if necessary to ensure compatibility.

PM MC has responsibilities within the MCE and CP CE, and works closely with the other four CEs that are part of the Army's COE. We are building applications and infrastructure to comply with COE and CE standards, but we are also looking across the three principal computing environments of COE that support the command post, mounted and dismounted leaders to bring greater commonality and simplicity to the maps, messaging and capabilities we deliver to Soldiers.

Q. How is PM MC working with vendors and government developers to make military tactical apps more user-friendly, resembling commercial applications? How is this a unique partnership?

A. Our goal is to make applications easier to use—with a more intuitive user interface, a common map and common services across all the warfighting

With any reorganization, you have to quickly establish the organizational vision and set goals. For us, it is mission command modernization, which is an initiative to homogenize mission command capabilities across formations and echelons.

functions—but also more robust so that Soldiers don't need to know everything about the systems in order to make them work together. Through the Army's CP CE and MCE, we have one development environment to create emerging technologies, allowing us to share experiences and knowledge.

We are also providing software development kits (SDKs) to our vendors and government developers so they can make the apps interoperable up front, and on the back end more cost-effective to integrate and easier to use. These SDKs are in place for both CP CE, which leverages the Ozone Widget Framework [an in-browser pub-sub event system that allows Web apps to share information] for apps in the command post, as well as for the MCE, which leverages the Android CE for apps inside tactical vehicles. CP CE and MCE will allow developers to provide new apps that ride on top of common software, which alleviates the need for separate programs with unique operating systems and services.

While we can look to industry to assist in app, services and infrastructure development, it's our responsibility to perform the lead system integrator role for all of our products within CP CE and MCE, to bring in all the capabilities and orchestrate all the moving pieces. We have to get back to the government taking a larger role in the integration—not so much in the technologies—as we don't need to re-create apps or build the hardware, which should be commercial. Let industry do that. But how it comes together to support the warfighting mission is absolutely government's role.

Q. What has been a good success story for you?

A. There have been several this past year, including fielding of improved mission command applications and hardware to dozens of Army units, supporting PM Warfighter Information Network – Tactical (WIN-T) in providing en-route mission planning capability to the XVIII Airborne Corps, and several engagements with other nations' forces to improve coalition interoperability.

JBC-P, fielded to the first unit this year, delivering improved situational awareness, chat and graphics capability to the mounted Soldier. Soldiers say it is simple, intuitive and reliable, which is a testament to the fact that JBC-P was built over time, using direct feedback from Soldiers at the Network Integration Evaluations (NIEs) and several user juries. In fielding JBC-P, we took the first step into COE. JBC-P is the basis of the MCE and will soon host an Android environment that will enable rapid integration of applications on the more than 130,000 platforms in the field.

A final great news story is the convergence of operations, intelligence and network-based transport server architectures on a single Tactical Server Infrastructure (TSI) as part of the CP CE effort. TSI will replace separate server stacks in the command post, reducing the burden on Soldiers and creating efficiencies in fielding, training and sustainment. The TSI is undergoing development test and is expected to debut at NIE 16.2 next spring.

Q. Is there anything you would like to add in closing?

A. To encourage innovation, you have to empower your people and you have to create an organization in which your people have the resources and feel they can be effective. You give them the vision and direction and let them go. You check them along the way, but you let them come up with creative approaches and creative ideas. Challenge the status quo and give them the power to do that. Clearly I'm not claiming success in all of this: We are still a work in progress. But we're heading in the right direction and making real strides as we charge forward with the Army's goal to achieve mission command anywhere, anytime and on any device.

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

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(SOURCE: U.S. Army Acquisition Support Center/ iStock/Thinkstock)

GROUND TRUTH

Acquisition lessons learned foster innovation

by Ms. Jennifer Adair

An essential part of keeping the Army as the force of the future is developing innovative acquisition skills and effective approaches to leadership. These successful acquisition improvements and methods deserve to be shared among the entire Army Acquisition Workforce for others not only to discover, but also learn from. The Army Acquisition Lessons Learned Portal (ALLP) is the knowledge management tool for doing just that. Championed by the Army acquisition executive and deployed in October 2012, the ALLP is a knowledge management tool that enhances the performance of the entire Army acquisition enterprise. It can be used to influence Army acquisition policies, planning and decisions. Following is a sample of lessons from the ALLP related to innovation in acquisition.

CONTRACTING

LL_849: If the contract scope doesn't specify a certain item or requirement, it cannot be asked for without a cost.

Background

Contract scope of work products are developed at least three years before execution, which does not allow for adding ever-changing regulations in order to be retroactive (i.e., effects of rapid action reviews). If the performance requirements are too vague, scope creep occurs, and contractor disputes arise.

Recommendation

To prevent scope creep and contractor disputes, ensure that contract performance requirements are properly defined and do not simply state "perform until someone is

By using a robust mix of potential facilitating agents now, the Army could realize near- and mid-term advances that will contribute to long-term successes.

satisfied." Don't over-specify. For example, define what constitutes basic issue items (BII) but do not describe the BII for the system. Also, ensure that the integrated master schedule tracks exactly to the project's scope and deliverables.

LL_885: During development of the test and evaluation master plan (TEMP), we found value in conducting a TEMP "lockdown" meeting with all stakeholders. This meeting forces the stakeholders to provide their required information at one time.

Background

A three-day, in-person meeting was held with all of the program's test and evaluation stakeholders to determine what information was required from each service to develop the TEMP. Each section of the document was reviewed and action items were assigned. Additionally, stakeholders provided information about their roles in the development of the TEMP. Most of the TEMP was completed at this time, reducing the time and work associated with emailing the document to all stakeholders for review and comment.

Recommendation

Consider conducting a TEMP meeting to streamline the development of the document and reduce the time required to generate the final product. Ask stakeholders to provide information about their roles and responsibilities, and ensure that meeting attendees are authorized to make decisions on behalf of their organizations. Finally, consider using a similar process to develop other acquisition documents that require input from multiple stakeholders.

OVERSIGHT, REVIEW AND DOCUMENTATION

LL_662: The Weapon Systems Acquisition Reform Act requires a competitive prototyping waiver for a major defense acquisition program entering the technology maturation and risk reduction (TMRR) phase, not competitively awarding prototype development contracts to industry.

Background

Early in the materiel solution analysis (MSA), a program determined that using the government organic industrial base to accomplish technical development during TMRR would be the most cost-effective method. Therefore, no new contracts would be awarded during the TMRR phase. With the absence of contract awards, program management officials believed that the program did not require a competitive prototyping waiver. However, legal reviews late in the MSA process identified the requirement for a competitive prototyping waiver on the basis that multiple sources were not competitively developing prototypes.

MORE BANG, LESS BUCK

Soldiers with the 2nd Battalion, 319th Airborne Field Artillery Regiment conduct testing June 4 on the M119A3 Light Towed Howitzer at Fort Bragg, NC. One PEO was able to reduce its costs by consolidating its purchases after determining that two programs within its office used the same muzzle velocity system used by systems such as the howitzer. (U.S. Army photo by CPT Joseph Bush, 82nd Airborne Division Artillery)

SIMPLIFYING TURN-IN
Tactical vehicles sit on the flight line before being transported to support retrograde operations in March 2015 at Kandahar Airfield, Afghanistan. ALLP data indicate that incorporating the appropriate personnel in retrograde and turn-in operations enables the process to operate much more smoothly. (U.S. Air Force photo by SSgt Whitney Amstutz, 27th Special Operations Wing Public Affairs)

Given the timeline to meet this requirement, the program did not benefit from an independent cost-benefit analysis to substantiate the competitive prototyping waiver (already being executed to support Milestone B). Further, the defense acquisition executive (DAE) required the final competitive prototyping waiver at the Milestone A Defense Acquisition Board (DAB). The result was an extraordinary effort to staff and develop the competitive prototyping waiver package.

Developing the program's competitive prototype waiver before the acquisition decision memorandum was signed by the DAE required a detailed cost-benefit analysis to verify the costs for government and industry throughout the entire life cycle of the program, not just during prototype development and fabrication. Since the product office was unaware of this requirement at the start of MSA, a cost-benefit analysis was not completed before Milestone A. Program officials planned to complete the cost-benefit analysis as part of the TMRR activities in support of preparations for the Milestone B decision leading into the engineering and manufacturing development phase of the program. As a result, the program office was not able to use an independent agency to develop a comprehensive cost-benefit analysis. Extraordinary effort and management focus were required because of the limited time allowed for completing the waiver and having it reviewed by Army and Office of the Secretary of Defense (OSD) staffs so that it was ready for DAE signature at the Milestone A DAB.

Recommendation
Ensure that a cost-benefit analysis considers all technology development costs during TMRR, including prototype development, as well as all costs across the life cycle of the program, and is completed by an independent agency within sufficient time to inform a competitive prototyping waiver before Milestone A.

BETTER BUYING POWER

LL_289: Programs that need to transition into programs of record (PORs) and do not have research, development, test and evaluation (RDT&E) funds may be able to acquire

FINDING FUNDING
The High Speed Container Delivery System JCTD earned OSD's 2014 JCTD Team of the Year award. OSD's JCTD program provides programs looking to transition into PORs a way to access RDT&E funds that might otherwise be unavailable. (Photo courtesy of Yuma Proving Ground)

funds through OSD's Joint Capability Technology Demonstration (JCTD) program.

Background
The goals of the JCTD program are to address the needs of the combatant commands in forming partnerships that leverage funds to help create enduring capabilities, and to aid program transitions to PORs. Programs funded through JCTD have approximately two years to demonstrate their potential solution.

Recommendation
If RDT&E funding is not available through the Army, find other means to obtain funding, such as OSD's JCTD program.

LL_694: Look across programs for similar or identical items that could be commonly procured at lower cost.

Background
Two programs within the same program executive office (PEO) used the same muzzle velocity system (MVS), but they were purchased for each platform separately. By breaking out the MVS and competing it as a common item, both programs realized cost savings because of the resulting economy of scale.

Recommendation
Find programs within the PEO that use common items, and compete them jointly across the programs. This will give program officials leverage to negotiate a better price and could save both programs money as a result.

MORE EFFICIENT ARMY ACQUISITION

LL_908: Learn from the private sector, the acquisition workforce and research and experimentation to identify new and better ways to execute acquisition, to meet requirements, conserve resources and adapt for future challenges.

Background
The Army's vision for Force 2025 and Beyond lays out the path forward, and Army acquisition needs to proactively pursue new and improved processes to meet these emerging challenges. By using a robust mix of potential facilitating agents now, the Army could realize near- and mid-term advances that will

contribute to long-term successes. Those agents include systematic benchmarking and other approaches from the private sector, the use of focus group sessions, beneficial suggestions, productivity gain sharing and other tools from the acquisition workforce, and applying academic research and structured experimentation.

Recommendation
Leverage the private sector, the acquisition workforce, academic research and experimentation to identify new and improved processes that can be implemented now and in the future to contribute to more efficient and effective Army acquisition.

LL_848: When planning to receive fielded equipment for a modernization effort, the product office should have a representative on the ground during de-installation, retrograde and return of the equipment.

Background
A program began retrograding during Operation Enduring Freedom in FY13. To ensure that equipment was properly accounted for during turn-in and prepped for reset and modernization, the product office provided detailed de-installation instructions to regional support center, theater provided equipment (TPE) and Redistribution Property Accountability Team (RPAT) organizations. Additionally, Army G-8 guidance was approved and provided to the logistics readiness center and TPE drawdown teams. However, once units began turning in systems to the TPE/RPAT yard, there was no subject-matter expert to properly account for system items. As a result, many systems were returned in nonoperational condition or had a high number of shortages with no financial liability investigation of property loss (FLIPL) documentation. Once the first set of systems arrived at the original equipment manufacturer and the issue was identified, the product office assigned a logistics and training technician to help deployed units turn in their systems. This cleared technician was closely involved in the process and worked with unit maintenance and supply personnel, enabling the unit and the TPE team to accept systems with minimal shortages.

Recommendation
Ensure product office representation and close coordination with all involved parties during the de-installation, retrograde and return of systems. Having a representative who knows the intricacies of your product and understands its future role will better posture your office for supporting follow-on efforts. Additionally, be sure that qualified logistical and system personnel are in contact with local turn-in points to catalog and inventory shortages and to initiate FLIPL if required.

To prevent scope creep and contractor disputes, ensure that contract performance requirements are properly defined and do not simply state "perform until someone is satisfied."

LL_907: The Army should use the basis of issue plan (BOIP) process to document software capabilities to allow authorization, funding, training and manpower requirements for maintaining and sustaining software.

Background
The Army tracks the tangible materiel it develops by assigning standard study numbers (SSNs) and line item numbers (LINs), which feed into BOIP development. In more recent years, the Army has moved toward software-only materiel solution requirements in the Joint Capabilities Integration and Development System. The SSN/LIN/BOIP process has not been applied to software or software-only solutions, which has led to an inability to authorize where the software goes, who is supposed to receive it or how maintenance and sustainment are performed.

Treating software and software-only capabilities as tangible items will promote transparency across the Army by including them in the logistics inventory. This may also provide a mechanism to capture other data, such as software license requirements, to support future cost estimates.

Recommendation
Adapt the BOIP process to document software capabilities or software-only capabilities for the Army using the standard process that supports authorizations, requirements and funding aspects.

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

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AIMING FOR UNIFORMITY

Dragoon Troopers assigned to 1st Squadron, 2nd Cavalry Regiment fire 40 mm practice rounds from a M320 grenade launcher in November 2014 during their grenade launcher qualification range at Grafenwoehr Training Area near Rose Barracks, Germany. Particularly in ammunition procurements, a TDP can benefit the program manager and Soldier in purchasing items that are identical; however, that benefit might be offset by an increased overall cost and potential production risks. (Photo by SGT William Tanner, 2nd Cavalry Regiment)

Whose Design Is It, *Anyway?*

PM CCS changes its procurement strategy from performance specification to a technical data package, and while the approach isn't right for every procurement because it can be expensive and time-consuming, it's expected to provide the shop with real competition in future procurements and higher quality in the ammo itself.

by Mr. Ken R. Schulters

Its name notwithstanding, the M1006 40 mm Non-Lethal Sponge Grenade, which is intended for close-quarter engagement and is fired from standard M203 and M320 grenade launchers, is no Nerf toy. Indeed, it can be lethal. Over the years, the M1006 was manufactured by a single contractor by means of a document called a performance specification (P Spec), which simply demands a particular set of performance parameters. The problem with that approach is that the grenade's final form and look may change from contract to contract. Overall costs can be high because the contractor has no competition. That's why the Project Manager for Close Combat Systems (PM CCS), under the Program Executive Office (PEO) for Ammunition, changed its acquisition strategy.

When a program manager develops an acquisition strategy, he or she may be faced, based upon market research, with the choice to use one of two ways to order ammunition: a P Spec or a government-owned technical data package (TDP). A P Spec enables the government to buy an end item without dictating the design; generally, the government is primarily concerned with the performance of the item. For munitions, it is a difficult choice when dealing with critical aspects like safety, reliability, interoperability and configuration management. A TDP may have an initial cost and schedule impact because it requires contractors to have or acquire the correct tooling and equipment

NONLETHAL CAPABILITY
U.S. Marines from 2nd Battalion, 6th Marines fire their M203 and M32 grenade launchers with nonlethal rounds downrange in March during a riot control exercise at Camp Lejeune, NC. (Photo by Cpl Kaitlyn Klein, Defense Media Activity)

to build the item according to the TDP. However, it can reduce the risk of follow-on procurements and provide greater configuration control for the program manager. Another significant upside is that the competition a TDP enables can reduce costs.

Looking for ways to reduce costs and to enable competition, PM CCS undertook a three-year project with a team of 10 core and shell members to develop a TDP for the munition. In the meantime, production continued using the P spec.

THE TDP ALTERNATIVE

As an alternative, especially for ammunition procurements such as the 40mm or 12-gauge nonlethal munitions, a TDP—a set of detailed drawings, dimensions and assembly instructions that, when followed, leads to identical parts and finished products—gives the government the ability to control the design of the end item. With ammunition, having each piece look and perform the same reduces confusion, increases confidence and eliminates the need for new training.

However, potential production risks belong to the TDP owner—the government, in this case. Dimensional tolerances, compatibility of parts and components and even the end-item performance are part of the technical data and the government's responsibility. The overall cost of the end item is usually higher as well, since inspections during production can be more rigorous and frequent than with P Spec in order to ensure quality.

The M1006 40 mm Non-Lethal Sponge Grenade is an example of a munition that was procured using both approaches. With the TDP, rather than having bidders submit their own designs that would have to be evaluated against the P Spec requirements, bidders received a drawing package and PM CCS evaluated their proposals based on their ability to produce in accordance with the TDP requirements. The TDP also enables more contractors to bid because they may have the capability to do the work, but may not have the capability to create their own design to compete in a P Spec solicitation.

PM CCS derived multiple lessons learned from this effort in the areas of time and cost:

TIME SAVED

Developing this TDP and detail specification (DTL) took approximately three years, including the inspection of every drawing for correctness, dimensions, tolerances, notes, clarity and availability of parts and material.

PM CCS contracted an independent third party to build, test and verify that the TDP and DTL were producible.

COST CONSIDERATIONS

Using a third party to build, test and verify the TDP before using it saved the government many thousands of dollars. Without this effort, the production contractor would very likely transfer to the government the cost of:

- Identifying the flaws or errors in the TDP.
- Making changes to their equipment and tooling.
- Replacing any materiel ordered associated with the erroneous TDP.
- Paying for idle assembly line workers.

Furthermore, this approach eliminated travel costs for government employees to witness the build and tests. It also eliminated the additional cost for members of the shell integrated product team to update the TDP and DTL.

CONCLUSION

Ultimately, the government benefited from this change in acquisition strategy. The TDP gives the government greater control over the end item, which will provide greater flexibility when dealing with launcher changes or future improvements. When using a P Spec, there was always the potential for added cost in qualifying a new design. A government-owned TDP avoids this cost.

Despite the additional time and costs associated with procuring an ammunition item from a TDP, under the right circumstances, the government can derive much value from owning the design of munitions. It maintains control over their form, fit and function and can use the TDP to promote competition and drive down future procurement and support costs.

*For more information, contact the author at **ken.r.schulters.civ@mail.mil** or go to the PM CCS website at **http://www.pica.army.mil/pmccs/MainSite.html**.*

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HANDS-ON LEARNING

Army National Guard LTC Sean Klahn takes a kneeling position with the M203 grenade launcher fitted with the M1006 sponge grenade and ground dispersal rounds, in April as part of a U.S. Army War College elective. The sponge grenade was procured using a TDP, a potentially less costly approach than the previous acquisition strategy that involved the use of a P Spec. (U.S. Army photo)

EQUIPPING SISTER SERVICES

SrA Avery Scott, a weapons specialist from the 169th Maintenance Squadron, reloads 20 mm rounds in a South Carolina Air National Guard (SCANG) F-16 fighter jet after it completed a successful training mission in support of Operation Atlantic Resolve at Łask Air Base, Poland, in June. That 20 mm ammunition is among the types PD MC is responsible for procuring. (SCANG photo by SMSgt Edward Snyder, 169th Fighter Wing)

Solidifying THE BASE

PEO Ammunition creates greater flexibility to procure medium-caliber ammunition with an innovative acquisition strategy to make 'family buys,' reducing ammunition costs and keeping its industrial base warm.

by MAJ Edwin Churchill

As the pace of combat operations has become widely variable, the Program Executive Office for Ammunition (PEO Ammunition) has created the flexibility to quickly ramp up medium-caliber ammunition production in response to rapidly changing requirements by having multiple manufacturing sources with warm lines.

With the Medium Caliber Family acquisition (MCFA) strategy, PEO Ammunition is focusing on key capabilities specific to the production of medium cannon-caliber ammunition, reducing the administrative costs of the contract vehicle and maximizing the buying power of the combined services' requirements. Through long-term strategic planning and a novel view of the acquisition planning process, the MCFA revamped the conventional methods of acquiring cannon-caliber ammunition for the Army and its sister services.

While the MCFA was designed to specifically address the security of critical capabilities in the medium-caliber ammunition industrial base, it also holds potential for PEOs across the Army as they deal with budget constraints. The strategy recognizes the realities of fiscal austerity; instead of fighting for more funding to maintain the status quo, it focuses on maintaining the production capabilities needed to operate within a tight budget.

PEO Ammunition's Product Director for Medium Caliber Ammunition team looked within its operations to identify inefficiencies, such as multiple contract vehicles and

SUPPORTING MULTIPLE PLATFORMS
PEO Ammunition is the single manager for conventional ammunition. In its supporting role, PD MC is responsible for procuring medium-caliber combat and training ammunition for the Army, Air Force, Navy and U.S. Special Operations Command (SOCOM) to use on a variety of platforms. (SOURCE: PM MAS)

their administrative costs, then took action to eliminate those areas of waste, bucking "business as usual."

MULTIPLE CHALLENGES

In July 2005, the PEO authorized its Project Manager for Maneuver Ammunition Systems (PM MAS) to establish a Product Manager for Medium Cannon Caliber Ammunition (PM MCC) to provide life-cycle management of combat and training ammunition for 20 mm, 25 mm and 30 mm caliber ammunition. In 2010, PM MCC was designated as the Product Director for Medium Caliber Ammunition (PD MC) with the addition of the 40 mm Grenade Program. Given that PEO Ammunition serves as the single manager for conventional ammunition, PD MC is responsible for procuring medium-caliber combat and training ammunition for the Army, Air Force, Navy and U.S. Special Operations Command.

When the PD MC office was established, all types of medium-caliber ammunition were being procured as single items for a single year's budget. There are dozens of different types of ammunition in PD MC's portfolio, and each had its own contract vehicle for procurement. Contracting and ammunition prime contractors could only react to the release of the Army budget as well as the release of funds for execution from various joint-service program offices. This acquisition approach required immense resources from the program office as well as from multiple contracting personnel at U.S. Army Contracting Command – Rock Island [IL], the Joint Munitions Command and the Defense Contract Management Agency.

In late 2007 and early 2008, the United States was in the middle of the Iraq surge and had a second major front in Afghanistan. While the ammunition industrial base was healthy in the short term, it had the potential to become extremely unstable. The medium-caliber training ammunition stockpiles were filled and, in some cases, exceeded inventory authorizations. In addition, the Army and sister services' operational tempo had drastically reduced the amount of available training time, which led to decreased use of training ammunition.

These two factors were leading to decreased funding for training rounds to be available in the out-years. Although the military was still engaged on two separate fronts, the operations in Iraq and Afghanistan were meeting with increased public and political resistance, contributing to a strong expectation that operations would diminish significantly in scope or end outright in the next five to eight years.

As the combat efforts diminished, the expenditures of tactical ammunition would also decline. Since the tactical stockpiles had already been replenished with supplemental funds for overseas contingency operations and by reprogramming, the funding for medium-caliber tactical ammunition would also see a major reduction.

As a result of the MCFA, the NTIB for medium-caliber ammunition has sustained dual-source capabilities for all eight critical capabilities and has maintained the lines and facilities to produce all required medium-caliber ammunition for DOD.

THE FAMILY BUY STRATEGY

The PD and deputy PD, in conjunction with the PM MAS team, conceived a new method of acquiring medium-caliber ammunition as a "family" as opposed

to individual cartridge types. MCFA was designed to preserve and protect the shrinking medium-caliber industrial base by consolidating all medium cannon-caliber rounds into one buy and restricting the competition to the only proven suppliers with the capability to produce all of the rounds.

To further protect the industrial base, all awards and options would be based on maintaining key production capabilities to reduce production risk to suppliers and sub-tier suppliers. This strategy would also reduce administrative costs to the U.S. government and maximize the buying power of the combined services' requirements through economies of scale, resulting in lower unit costs.

The national technology and industrial base (NTIB) is responsible for the production of high-quality medium-caliber ammunition in an efficient, timely and affordable manner. The NTIB had developed significant capabilities and capacity during the previous five years. But, with growing uncertainty and reduced budgets as well as unknown requirements for tactical and training rounds, the NTIB for medium-caliber ammunition production faced tough decisions.

If the government's requirements for ammunition fell too low, it was likely that the ammunition producers would consolidate or go out of business entirely. Such a contraction in the NTIB could lead to multiple single points of failure, as well as significantly reduced capacity in the United States or the complete loss of U.S.-based suppliers.

The single most important facet of the MCFA was the protection of the NTIB's critical capabilities for producing medium-caliber ammunition for DOD. Critical capabilities are those functions that require defense contractor proficiency to produce the medium-caliber ammunition to exacting standards and precision.

The program office gathered the subject-matter experts in medium-caliber ammunition and created a list of eight critical capabilities: 20 mm load, assembly and pack (LAP); 25 mm LAP; 30

EFFICIENT AND EFFECTIVE
Army pilots assigned to 2nd Battalion, 159th Attack Reconnaissance Regiment, 12th Combat Aviation Brigade fire the M230 30 mm automatic cannon on an AH-64D Apache Longbow during an aerial gunnery at the 7th Army Joint Multinational Training Command's Grafenwoehr Training Area, Germany, in August. The MCFA strategy consolidated Army and sister-service requirements into one, with two IDIQ contracts awarded for all tactical and training ammunition over a five-year period. (U.S. Army photo by Visual Information Specialist Gertrud Zach, Training Support Activity Europe)

A WIDE ARRAY OF AMMO
PD MC is responsible for dozens of different types of cannon-caliber ammunition, and before implementation of the MCFA strategy, each had its own contract vehicle for procurement. Through long-term strategic planning and a novel view of the acquisition planning process, the MCFA revamped the conventional methods of acquiring cannon-caliber ammunition for the Army and its sister services. (SOURCE: PM MAS)

mm x 113 mm LAP; 30 mm x 173 mm LAP; mechanical and pyrotechnic fuze design and production; high-explosive pressing; and cartridge trace. There were only two NTIB contractors with the requisite facilities and expertise to handle all eight critical capabilities.

The MCFA consolidated all medium-caliber ammunition items under a multiple-award, indefinite-delivery indefinite-quantity (IDIQ) contract and included contract language to allow for industrial base considerations to ensure dual-source capabilities for the identified critical capabilities. This methodology allowed the Army not only to consider price, but also to make awards to mitigate the risks of creating a single-source producer for any one capability. The MCFA also improved economies of scale and reduced administrative costs for the government and the contractors. It ensured that the significant reduction in all services' requirements did not negatively impact unit prices or critical capabilities.

Before the MCFA, there were 22 separate contract vehicles to control the production of the 33 medium-caliber rounds. The MCFA approach consolidated Army and sister-service requirements into one, resulting in the award of two IDIQ contracts for all tactical and training ammunition over a five-year period (FY13-17) with a total ceiling of $1.5 billion.

CONCLUSION

As a result of the MCFA, the NTIB for medium-caliber ammunition has sustained dual-source capabilities for all eight critical capabilities and has maintained the lines and facilities to produce all required medium-caliber ammunition for DOD. This provides flexibility in the manufacture of medium-caliber ammunition through the availability of warm production lines operating below their capacities. As stated in the 2014 Army Strategic Planning Guidance, "it is inevitable that there will be a next crisis at an unanticipated time, in an unforeseen place, unfolding in an unforeseen manner, requiring the rapid commitment of Army forces."

In ammunition, it can take 36 to 60 months and millions of dollars to stand up a capability from a nonoperational line. The MCFA strategy created the ability to respond rapidly to the changing operational requirements of warfighters through multiple sources with warm lines. Through careful management of the critical capabilities in the NTIB, the government protected more than $100 million of its prior investments.

The MCFA also provided the product director a means to create economies of scale when purchasing medium-caliber ammunition. Instead of having to buy small, individual lots of ammunition for each service, the office was able to combine the services' requirements into larger lots, which lowered the

ammunition unit cost. Also, combining the services' orders tempered the volatility of one service's requirements through the others' orders, allowing steady operations for the NTIB ammunition producers. The economies of scale also created a cost avoidance. For example, component-level first article tests (FATs) for like cartridges now are done once, instead of each time a purchase is made on an individual contract, which avoids the expenditure of $20,000 to $50,000 per FAT, depending on the component.

Another advantage of implementing the family-buy strategy was to lessen the administrative and managerial burdens with the reduction in contracts from 22 to two. Previously, each time a contract clause changed for the medium-caliber ammunition, the change had to be made to 22 separate contracts. The MCFA strategy also reduced acquisition cycles because the primary contracting officer had to handle only two contracts. Based on the average cost for administering a contract, the MCFA strategy of consolidation saves an estimated $3.5 million annually.

Through strategic foresight and careful planning, the PM MAS team and its newly created product office created an innovative solution that protects the PEO's ability to procure the most lethal, accurate and reliable medium-caliber ammunition in the world for the Army and its sister services. The MCFA strategy ensures the flexibility to ramp up production immediately to respond to future contingencies. The end result of the MCFA is a protected, stable industrial base capable of producing the highest-quality medium-caliber ammunition for the warfighter, now and into the future.

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SHOTS HEARD ROUND THE WORLD
A Bradley Infantry Fighting Vehicle crew of 2nd Battalion, 7th Infantry Regiment, 1st Armored Brigade Combat Team, 3rd Infantry Division engages targets downrange with the vehicle's 25 mm chain gun during a live-fire exercise near Tapa, Estonia, in June. PD MC's procurement of medium cannon-caliber ammunition has global impact; this live-fire event was part of Operation Atlantic Resolve, an ongoing series of training exercises demonstrating the continued U.S. commitment to the collective security of NATO and to enduring peace and stability in the region. (U.S. Army photo by SFC Joshua S. Brandenburg, 13th Public Affairs Detachment)

STRYKER SAVINGS
A Trooper assigned to 2nd Squadron, 2nd Cavalry Regiment fires a mortar from a tube mounted onto a Stryker combat vehicle during a live-fire exercise in April at Smardan Training Area, Romania. Reusing complex software to develop systems like the Stryker's gives Soldiers a high-fidelity training experience. (U.S. Army photo by SGT William A. Tanner)

More Bang *for* GOVERNMENT BUCKS

With CMMI Level 5 processes, RDECOM's ARDEC pursues reuse of government-owned IP and hardware to drive down the costs and shorten schedules for software-intensive weapon systems to more quickly field systems to Soldiers.

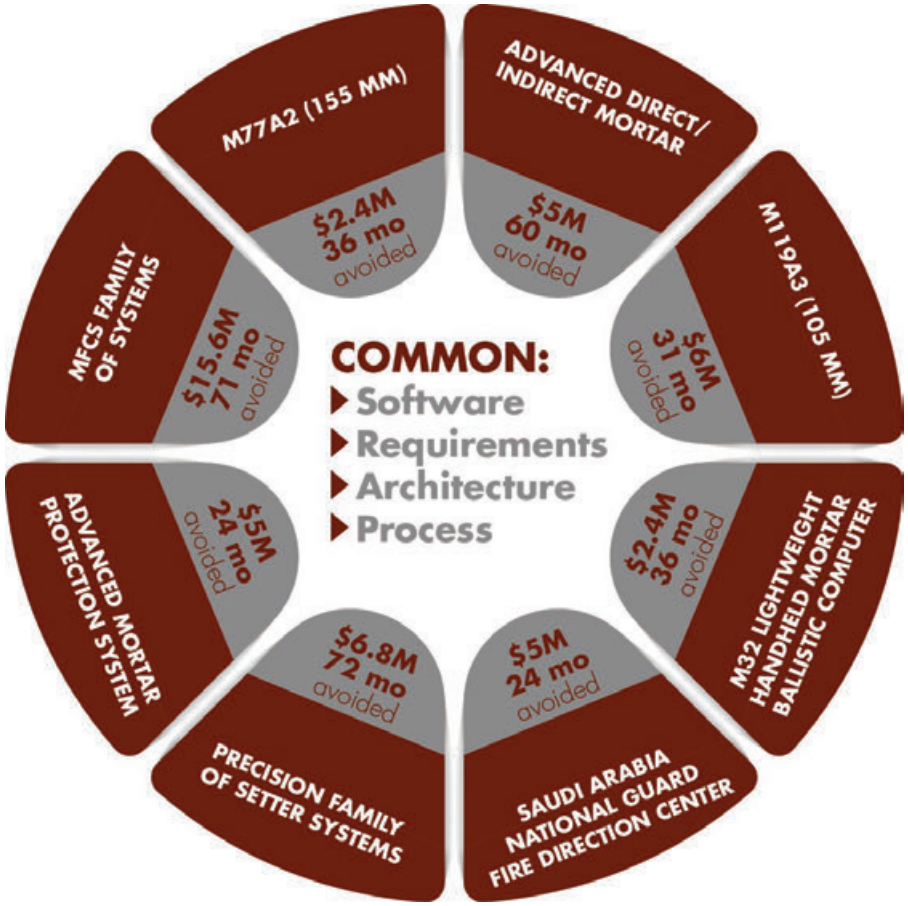
by Mr. David R. Castellano and Mr. Michael A. Zecca

The basic components of armament systems—weapon, ammunition and fire control—are essentially the same, but vary in how they are implemented and their degree of automation. However, as simple as the basic components are, several factors create the potential for complication. Different system contractors, the increased use of electronics in armament systems and implementation of functions through software—these factors can lead to a proliferation of unique armament systems.

This proliferation creates the associated burdens of maintaining different operating systems, system component obsolescence and redundancy, paying licensing fees and having to depend on a particular contractor's unique product and intellectual property (IP).

To sidestep these problems, the Armament Research, Development and Engineering Center (ARDEC) of the U.S. Army Research, Development and Engineering Command (RDECOM) is pursuing efforts to reduce the cost of weapons development while providing greater ability to field weapons more quickly. Teams of engineers and scientists at ARDEC, in partnership with various weapon system project managers, are developing new armament systems in-house that maximize the reuse of software and hardware components to produce systems with common features, and minimize the use of unique components requiring individual maintenance.

FIGURE 1



$53.2 MILLION, 354 MONTHS IN COST AND SCHEDULE AVOIDANCE
Grouping weapon systems into families at the design stage can help reduce costs by ensuring that reusability is baked into the original product. (SOURCE: ARDEC)

ARDEC's success with reuse and in-house development started with a failure. A project manager (PM) at ARDEC put out a contract for a mortar fire-control system (MFCS), with ARDEC engineers helping out as part of the integrated product team (IPT). But after the contractor missed multiple milestones and was over budget and behind schedule, the PM terminated the contractor for default and handed all of the work to ARDEC.

KNOWLEDGE AND PROCESS IMPROVEMENT

Two key factors enabled RDECOM's success with MFCS and other in-house development projects: the domain knowledge built up over years of providing support to many Army armament systems (even when a contractor builds a given system, RDECOM engineers might provide assistance as part of the IPT), and Capability Maturity Model Integration (CMMI) High Maturity processes. Because ARDEC provides engineering support to many Army armament systems and has the domain knowledge for those systems, we can look for opportunities for technology refresh using developmental technologies across the domain of systems we support. For those systems that are in sustainment, we can incorporate technologies that are in development at a much lower cost and shorter time frame than just maintaining the current configuration through obsolescence management techniques.

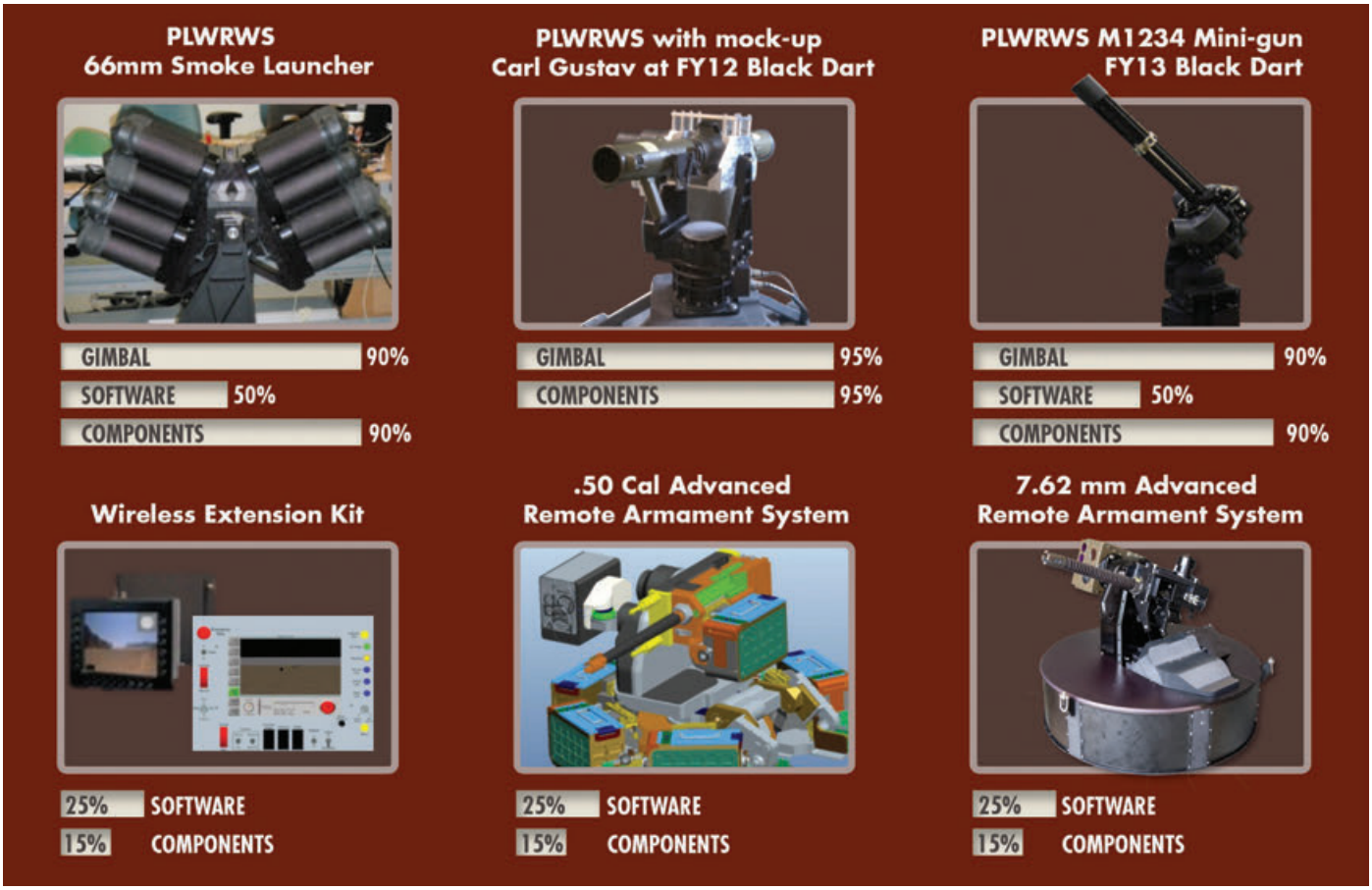
CMMI is another enabler for ARDEC's Weapons and Software Engineering Center. We became the first DOD organization to receive a Maturity Level (ML) 5 rating in June 2006 and were reappraised at ML5 in CMMI V1.3 for development in May 2013. CMMI in general is about optimizing and improving processes, and Maturity Level 5 specifically is about learning from past performances; we applied this ML 5 principle to reduce the number of defects cropping up later in development, when they require more rework to fix. We leveraged mature code from past projects—code that has already been tested and successful—and optimized "within phase" verification to catch defects early.

As a result, we went from catching only 26 percent of defects in the phase they originated in, to catching 91 percent in the originating phase. Since 2005, ARDEC has fielded every system defect-free; CMMI processes allow us to deliver this quality at lower cost.

CONSISTENT DELIVERY

CMMI best practices have enabled several programs at Picatinny Arsenal, NJ, to consistently develop and deliver high-quality products that stay within cost and schedule estimates. The associated

FIGURE 2

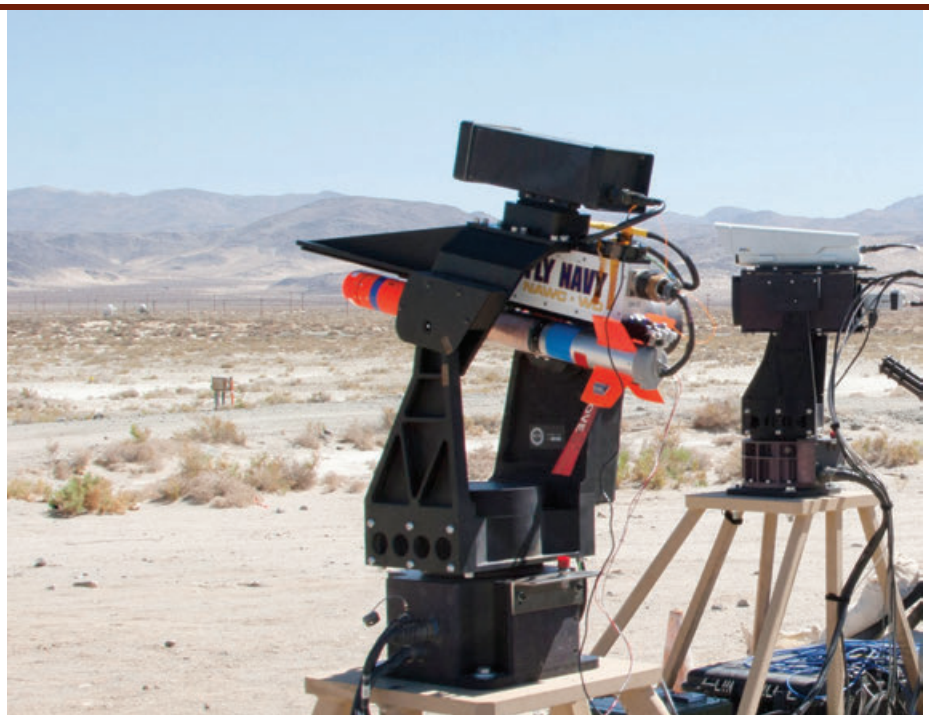


REDUCE, REUSE, RECYCLE
This figure depicts the percentage of software and hardware reused during the development of the Picatinny Light Weight Remote Weapon Station (PLWRWS) and other associated remote weapon systems. For instance, the 7.62 mm Advanced Remote Armament System used 25 percent of the lines of code from the PLWRWS. (SOURCE: ARDEC)

benefits related to development costs, operational and support costs, schedule and product performance are significant. One example of this can be found in the MFCS that ARDEC took over when the contractor was terminated.

We were able to avoid more than $15.5 million per system in development costs, on average, and more than 3.5 years on average per system in development time across the eight MFCS variants for the several fielded mortar systems and major components. We know how much time and money we saved by reusing software and hardware across the family of systems because CMMI processes involve documenting steps and processes very thoroughly, in addition to learning from past performances. With that documentation and a decade's experience, we know exactly how long it will take to, for instance, write a given number of lines of code, so we are able to generate a robust and accurate cost and schedule estimate. This estimate lets us calculate how much it would cost to start from scratch and what we save by starting with mature, government-owned software and hardware already developed.

ARDEC began to develop and maintain government-owned intellectual property (IP) in the early 2000s; the organization took control of the organic domain expertise and has been continually reusing existing software and hardware components and IP across multiple armament systems, including MFCS, to significantly



IN-HOUSE DEVELOPMENT
A forward-firing miniature munition, known as Spike, is loaded on a rail launcher developed by ARDEC for a recent counter-unmanned aerial vehicle demonstration on the land range at the Naval Air Warfare Center Weapons Division in China Lake, CA. When RDECOM develops a system or technology, the government owns the intellectual property—and can use it to design and procure new systems with common software or hardware that can be reused. (U.S. Navy photo)

HOWITZER HARDWARE REUSE
U.S. paratroopers load a M777A2 howitzer during a live-fire exercise at the Joint Multinational Training Command's Grafenwoehr Training Area in Germany in April. Exploiting software and hardware commonalities keeps development and maintenance costs low and allows the Army to field weapon systems faster. (U.S. Army photo by Markus Rauchenberger)

reduce development time and save money. In comparison, to use outside contractors to develop all the MFCS variants would cost considerably more and extend the time it takes to develop and field systems. While the government can send out a technical data package using already developed, government-owned IP, a contractor would have to spend time and money getting up to speed. In addition, contractors often prefer to develop proprietary systems, using their own IP; they then have the option to reuse it themselves, lowering their overhead costs, and the maintenance and upgrades to a proprietary system often offer the possibility of future work. More than one contractor might be involved, increasing administrative costs, at the very least.

Conversely, ARDEC has the institutional knowledge to get a system fielded quickly. Figure 1 on Page 54 depicts the cost and schedule avoidance achieved by numerous programs in ARDEC's Weapons and Software Engineering Center through the reuse of both hardware and software.

THE HARDWARE ANGLE

Common hardware components are used across several of the systems, and new components are introduced with backward compatibility. Identical MFCS software is used in the M113 (MFCS Heavy), Stryker and Dismounted 120mm Mortar Fire Control System, which has the capability to function in either a gun- or fire-direction-center mode with a simple user command. The weapon system software can also be used for computer-based trainers, which lowers the cost of training Soldiers on the system since the identical software and associated updates apply to both.

Figure 2 on Page 55 depicts the percentage of software and hardware reused during the development of the Picatinny Light

FIGURE 3

TACTICAL TRAINING
Repurposing the same software that makes a weapon work to train Soldiers on the use of that weapon has been a substantial money-saver for ARDEC. The cumulative cost and schedule avoidance resulting from the use of software and hardware across the family of armament system trainers shown here averages $11.2 million and more than 1.7 years per system. (SOURCE: ARDEC)

Weight Remote Weapon Station and other associated remote weapon systems, also based on an in-house approach, and estimates the costs avoided by this reuse.

Figure 3 depicts cost and schedule avoidance achieved through the implementation of flexible product line architectures, standardized developmental processes and using the tactical software as the starting point to build multiple trainers—each of which would have to be built from scratch, if the tactical software from the weapon system was not reused. These architectures enable the development and reuse of modular tactical software components and the ability to "plug in" weapon-system specific content to a configurable training framework. Additionally, the ability to reuse complex and developed tactical weapon system software provides for high-fidelity training.

The cumulative cost and schedule avoidance resulting from the commonality of software and hardware across a family of armament system trainers shown here is, on average, more than $11.2 million and more than 1.7 years per system, respectively. As with the savings from the MFCS program, ARDEC is able to estimate how many dollars and years were saved because of a combination of experience, learning from past projects, and CMMI best practices.

As we look toward the future of multi-role armament systems, we can continue to advance our savings using these best practice examples and CMMI ML 5 processes. We are now looking at repurposing existing armament systems to

PUTTING PROCESSES TO WORK
A PC trains Soldiers on the M777 howitzer. RDECOM attributes significant efficiencies in time and money to software reuse across systems and trainers and to following the tenets of CMMI ML 5, which emphasizes learning from past performances. (Image courtesy of Joshua Zawislak, ARDEC)

expand the target sets they currently service. We are also designing new armament systems that can manage multiple target sets previously covered by several individual weapon systems integrated on the various types of combat vehicles.

CONCLUSION

Using ARDEC's best practices and robust CMMI ML 5 processes, any government research and development agency could achieve similar results if they control government-owned IP and possess the domain experience in their specific commodity area. Even an agency that doesn't currently own any of the IP can start now on future research and development efforts by adding the appropriate contract clauses to procure government data rights or grow its organic domain expertise.

By implementing these best practices, the Army can not only reduce procurement costs, but also accelerate development of our weapon systems. Reusing software and hardware components and developing robust system-level processes is one path to acquisition success.

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CODE ONCE, USE TWICE
By reusing the tactical software from the M777 howitzer to create the associated trainers, including the PC trainer pictured here, RDECOM estimates it avoided $18 million in costs and 24 months in development time. (Image courtesy of Joshua Zawislak, ARDEC)

Agile Acquisition

The Indirect Fire Protection Capability Increment 2 – Intercept is a complex merger of four major systems, each with its own associated software, and integrating the software to create a "plug and fight" capability proved to be the most serious risk. The CMDS Project Office used an innovative approach, applying Agile software development methodology to software acquisition, to mitigate the risk and deliver the new capability quickly—moving from authorization to TMMR in just over two years.

by Mr. Ranjit Singh Mann, PE, and Mr. Michael A. Hanners

In a system as complex as the Indirect Fire Protection Capability Increment 2 – Intercept (IFPC Inc 2-I), designed to defeat unmanned aerial systems (UAS) and cruise missiles, integrating software components from multiple major systems posed the biggest program risk for the Program Executive Office for Missiles and Space (PEO MS). Agile software acquisition proved to be the single most effective way to mitigate risk and support the Better Buying Power (BBP) initiative.

Block 1 of IFPC Inc 2-I provides mobile, plug and fight, robust protection capability to defend critical assets within fixed and semifixed locations against UAS and cruise missiles. The brand-new program for the Cruise Missile Defense Systems (CMDS) Project Office within PEO MS, not yet a major defense acquisition program, is going from authorization in March 2014 to the completion of the technology maturation and risk reduction (TMRR) phase in June 2016. Engineering demonstration for technology readiness level 6 is planned for March 2016, three months prior to completion of the TMRR phase. The aggressive TMRR schedule is driven by the need to close capability gaps for our warfighters.

The IFPC Inc 2-I product will tie the existing Integrated Air and Missile Defense Battle Command System (IBCS), Sentinel sensor and Air Intercept Missile (AIM) 9 class together with a new Multi-Mission Launcher (MML). The

FIGURE 1

THE HUB OF ACTIVITY

The IFPC Inc 2-I Product Office developed its software acquisition methodology by applying the fundamentals of Agile software development. In that construct, IFPC Inc 2-I, the center cog, turns the outside cogs and regulates their speeds. (SOURCE: Ranjit Mann and Laura Brezinski, CMDS Project Office)

MML is being developed organically by the Army at the Aviation and Missile Research, Development and Engineering Center (AMRDEC) to meet user requirements for supporting the counter-UAS and cruise missile defense mission.

APPLYING AGILE

The IFPC Inc 2-I Product Office developed the software acquisition methodology by applying Agile software development fundamentals to aspects of acquisition, as shown in Figure 1. IFPC Inc 2-I drives the center cog, turns the outside cogs and regulates the speed. This methodology includes Agile software development, Agile software independent verification and validation (SIV&V) and Agile integration and testing to confirm software accuracy and interoperability, and enables early detection and resolution of defects. Agile software acquisition methodology provides working software products monthly to the product office with required functionality and on schedule.

The IFPC Inc 2-I software integrated product team (SWIPT) recognized the complexity of the system software. First was that the system development included multiple software teams. Next, the sequential waterfall development method had failed in the SWIPT's previous experience. Finally, the SWIPT needed very close collaboration and communication to ensure software success. These factors required an innovative method to acquire software. Using the manifesto (See "Agile Alliance" on Page 62.) and other guiding principles developed by the Agile Alliance, the IFPC Inc 2-I SWIPT developed a six-step process to implement a new Agile software acquisition process in October 2013.

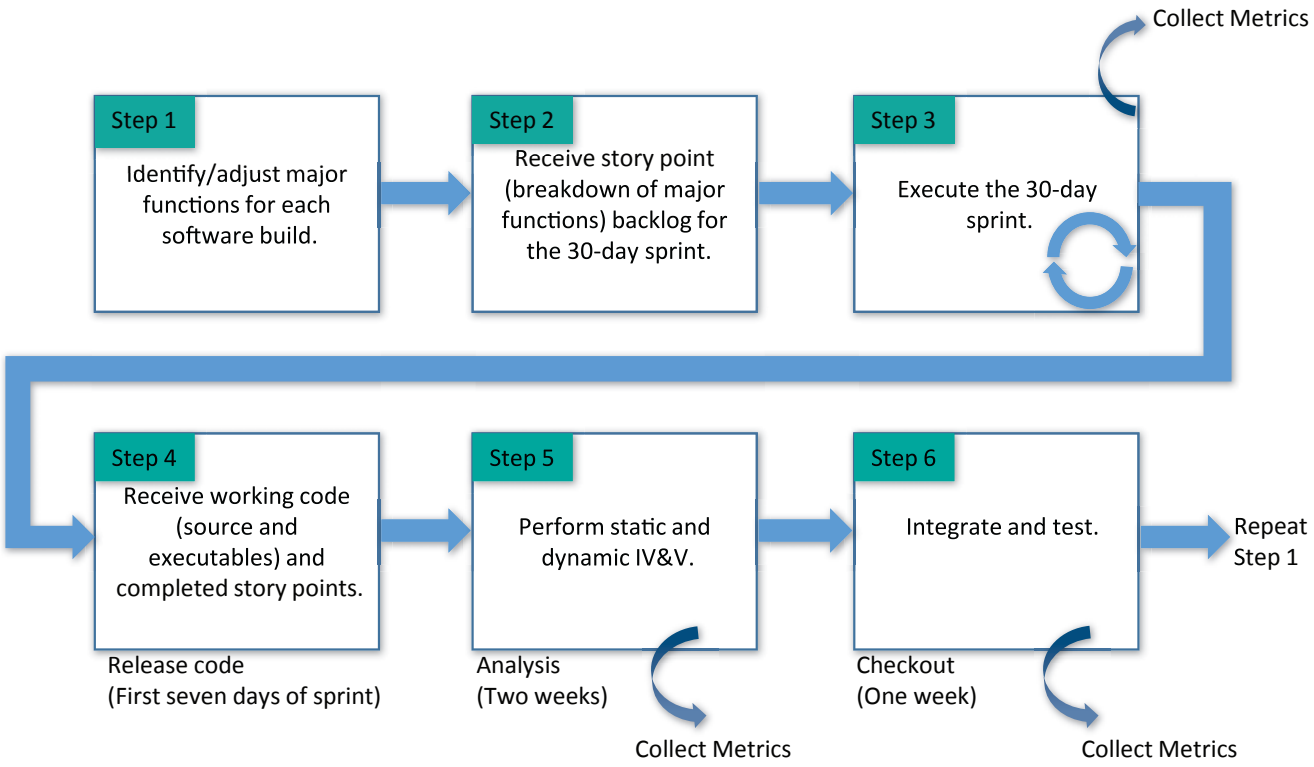
The six-step process is repeated monthly, and each cycle is called a "sprint." For each sprint, major functions are developed and decomposed into tasks called "user stories," which detail software features for the developer to use as a guide in implementing software functionally required for the IFPC Inc 2-I system.

A prioritized list of these user stories, called a "backlog," allows developers to understand the software functionality required and provides a means for the IFPC Inc 2-I SWIPT to monitor progress using "story points." A story point is a unit of measure to determine the size and complexity of the user story. Teams "scrum," or meet daily to discuss the tasks and issues for the day.

Each sprint produces executable software that becomes increasingly robust each month. The Agile SIV&V process verifies that completed user stories provide the planned functionality with each sprint release. Agile integration and testing then follows, allowing for detection of defects and resolution.

For example, using the six-step process in Figure 2, the launcher connection to the command-and-control node was identified and adjusted as a major

FIGURE 2



STEP BY STEP

This image details the six stages of Agile software development, beginning with identifying the functions for each build and ending with testing and integration. (SOURCE: Ranjit Mann and Laura Brezinski, CMDS Project Office)

function (Step 1). This function was decomposed into user stories by major end item (MEI) (e.g., command-and-control node, launcher, interceptor) and provided to the product office (Step 2). The developer applied the user stories to develop the executable code during the 30-day sprint cycle (Step 3). The MEI developer delivered this executable code, which implemented the launcher-connection functionality, to the product office (Step 4). Next, the SIV&V team performed dynamic and static analysis to verify and validate the launcher-connection functionality (Step 5). Finally, the IFPC Inc 2-1 product office integrated and tested the executable software from MEI developers, and communication between the launcher and command and control node was proven in the System of Systems Integration Lab (SoSIL) by the IFPC Inc 2-I Product Office. The SWIPT collected the metrics and provided them to the product office and each MEI developer in Steps 3, 5 and 6.

RISK REDUCTION

Software development is a primary program risk for IFPC Inc 2-I. Early defect detection, using Agile processes, reduced the need for rework and decreased software risk.

The SWIPT maintains the schedule with functioning software verified monthly. The SWIPT also monitors the performance with each sprint release by verifying functionality planned in the backlog (i.e., user stories). This approach ensures that the final software meets performance requirements while maintaining cost and schedule. The SWIPT estimates that the IFPC Inc 2-I program saved more than 2,000 hours in software rework by using Agile processes, which resulted in $400,000 in cost savings during a six-month software build. This savings was realized when a message format issue was discovered while implementing the launcher-connection functionality.

AGILE ALLIANCE

The Agile Alliance, which defines itself as a nonprofit organization with global membership committed to advancing Agile development principles and practices, developed a manifesto for software development. Written and published in February 2001 at a summit of 17 independent-minded practitioners of several programming methodologies, "The Manifesto for Agile Software Development" states:

We are uncovering better ways of developing software by doing it and helping others do it. Through this work we have come to value:

- **Individuals and interactions** over processes and tools.
- **Working software** over comprehensive documentation.
- **Customer collaboration** over contract negotiation.
- **Responding to change** over following a plan.

And while there is value in the items on the right, we value the items on the left [bold] more.

IMPROVING SOFTWARE STABILITY

Software stability is the ability to make modifications to software without breaking it. The SWIPT ensured software simplicity through Agile acquisition and Agile development by iteratively inspecting, integrating and testing the code.

The SWIPT measured software stability by tracking modularity, complexity, defects and hours spent reworking the code. The message-format modification for the launcher-connection message was made without breaking the remaining working code, demonstrating the stability of the IFPC Inc 2-I system-of-systems software.

REDUCING REQUIREMENTS VOLATILITY

The IFPC Inc 2-I software and requirements development began concurrently. As shown in Figure 3, requirements development initiated the process of software development (design, code, unit test and integrate). As the development process proceeds, the SWIPT continuously analyzes and refines the requirements. The SWIPT receives requirements from the development team's systems engineer monthly to review and monitor changes.

Collaboration between the acquisition and development teams in each sprint reduces requirements volatility. As an illustration, this collaboration refined the requirement for the launcher-connection-message format. The requirement for this function has not changed and it is not expected to change, indicating low volatility. Some requirements continue to change as the system software matures. The requirements are developed, implemented and refined during each sprint.

DETECTING DEFECTS EARLY

Agile SIV&V represents a paradigm shift. Conventionally, SIV&V is conducted on a six-month software build-cycle, leaving little reaction time to address issues. The SWIPT modified the SIV&V process from the traditional approach to meet the agile acquisition paradigm.

As the development team delivers software, the SIV&V team analyzes the code to gather metrics and to verify and validate functionality. The development team uses this information to resolve issues. When they identify issues, they add them to the user-story backlog and track them until resolution.

The core of SIV&V is static and dynamic analysis. Static code analysis identifies defects in the software source code. Dynamic code analysis identifies vulnerabilities in the runtime environment and false negatives in the static code analysis,

ANOTHER PIECE OF THE PUZZLE
The acquisition and software development teams work together to reduce volatility and delays on the IFPC Inc 2-I project. Rather than using a linear schedule, the team works in a series of 30-day cycles, or sprints, testing and verifying software at the end of each sprint, and generating a list of functions enabled by that sprint's work—and which need to be addressed in the next. (Photo courtesy of PEO MS)

and validates static code analysis findings. For instance, the SIV&V team analyzed, verified and validated the sprint containing the launcher-connection functionality to discover the message-format issue. This issue was added to the user story backlog until it was fixed in the following sprint. Once the message-format issue was resolved, the SIV&V used static and dynamic analysis to confirm the repair.

AGILE TESTING AND INTEGRATION

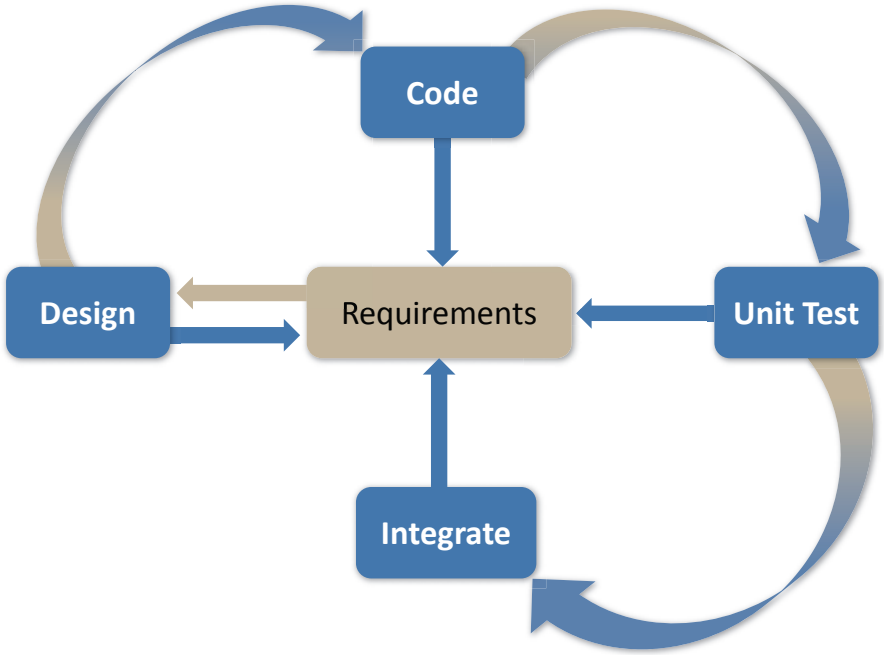
The interface integration begins early in the Agile integration process. The IFPC Inc 2-I MEI software developers submit software products to the IFPC Inc 2-I product office for integration. The IFPC Inc 2-I SoSIL team integrates the major software components with support from developers. After six sprints (i.e., six months), the integrated software build for each MEI is complete. The integration process used for IFPC Inc 2-I is shown in Figure 4.

This Agile integration and testing have led to early defect detection and resolution. SWIPT confirmed this process with the early discovery of a message-format defect. This continuous integration is expected to reduce the time required to conduct final integration and checkout, with fewer defects at the end of each build, and promises fewer defects in the field.

AGILE SOFTWARE SAFETY

Agile software safety supports early and incremental recognition and management of safety-related risk that may cause injury or death. This allows sufficient time for the acquisition team to understand the software safety impact of each sprint and develop mitigation plans as the code is being developed during the sprint. The software safety lead reviews the user story backlog provided by MEI developers, and ensures the software

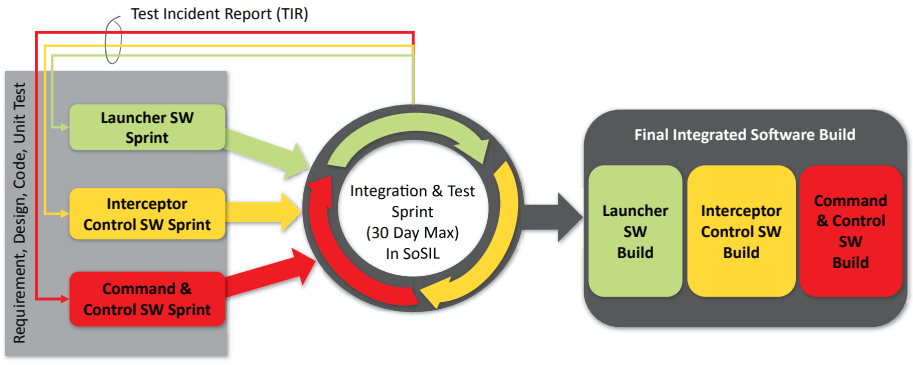
FIGURE 3



AROUND WE GO

In the Agile software development process adopted by the CMDS Project Office, requirements initiate the process of software development. As development continues, an integrated product team continuously analyzes and refines the requirements, which it receives each month from the development team's systems engineer. (SOURCE: Ranjit Mann and Laura Brezinski, CMDS Project Office)

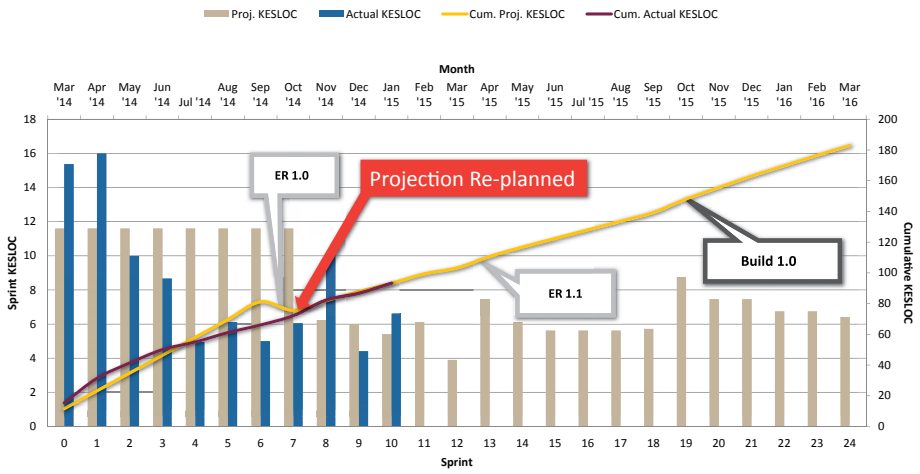
FIGURE 4



SAFETY FIRST

The Agile software safety process, outlined here, gives the acquisition team sufficient time to understand the software safety impact of each sprint and develop mitigation plans as code is developed. (SOURCE: Ranjit Mann and Laura Brezinski, CMDS Project Office)

FIGURE 5



CHARTING PROGRESS

IFPC Inc 2-I development teams use historical data to make projections about the later stages of the software build. Data for the early phases of the project are used to develop completion dates for later phases, and after the completion of engineering release 1.1, later projections will be revised using actual data instead of forecasted numbers. (SOURCE: Ranjit Mann and Laura Brezinski, CMDS Project Office)

SENTINEL STANDING WATCH

This Sentinel sensor is part of the IFPC Inc 2-I, designed to fill a critical capability gap in Soldiers' ability to defend against UAS and cruise missiles—and thus is being rolled out on a very aggressive timeline. The Agile methodology's emphasis on meeting milestones of not just lines of code written, but actual user needs addressed, is a good fit for the project's aggressive schedule and critical importance. (Photo courtesy of PEO MS)

hazard mitigations are implemented in the code. The Software Safety Working Group identifies software safety issues, which are then resolved by the SWIPT early in the following sprint, thereby ensuring a safer software product for the warfighter. Each MEI software developer implements safety features in the software based on issue resolution provided by the SWIPT and tags the code file as "safety critical" during every sprint.

The MEI code with safety impact (safety-significant, safety-related and safety-critical) is assessed for every sprint in the IFPC Inc 2-I SoSIL with a focus on specific safety-critical functionality. This ensures compliance with Military Standard 882 and Aviation and Missile Command Safety Regulation 385-17.

EFFECTIVE METRICS AND MEASURES

Peter Drucker, the management consultant and author, once stated, "What gets measured gets done." The IFPC Inc 2-I product office uses this as a fundamental principle for software acquisition to measure progress from the MEI development teams. To apply this principle, the SWIPT, in consultation with James Wessel, a staff member at the Software Engineering Institute (SEI), created a dashboard to provide leadership with a single view of the software status. This dashboard lists metrics on the left and measures performance on those metrics on the right; metrics include story points completed, number of software risks placed on a watch list, number of software risks dealt with, and "effective software lines of code" (ESLOC) written.

Traditionally, software lines of code (SLOC) are used to track progress of software development. But the SLOC measurement alone does not provide an adequate measure of development

A MULTIMISSION APPROACH
The multimission launcher pictured here will be combined with three other major systems—the Sentinel sensor, the IBCS and the AIM 9 class interceptor—into the indirect fire protection capability (IFPC Inc 2-I). Combining so many major systems and their supporting software presents major risks. PEO MS found Agile software methodology to be a useful way to manage the associated challenges. (Photo courtesy of PEO MS)

progress. For example, if 20,000 SLOC are developed for a sprint, the measure, in the absence of other data, does not show how many functions and requirements were implemented. The story points completed and requirements implemented, along with ESLOC, provide a complete picture to accurately measure software progress.

The original ESLOC projection was built by the SWIPT using historical data and experience. Figure 5 shows how IFPC Inc 2-I development teams use historical data to make accurate future projections. In this example, the SWIPT collected and analyzed data for sprints 0 through 6, which it then used as a basis to project ESLOC for sprints 7 through 24. After engineering release 1.1 is complete, the SWIPT will revisit the projection for sprints 13 through 24 based on actual ESLOC data from sprints 1 through 13.

CONCLUSION

Innovative Agile acquisition by IFPC Inc 2-I led the way for Agile development to acquire robust software with increased efficiency in the current budget-constrained environment. Through this innovation, PEO MS supported the Better Buying Power initiative.

Implementation of this Agile process has resulted in on-time and on-budget software with required performance for IFPC Inc 2-I. This success required a high degree of communication and assurance to get buy-in from leadership, development teams and acquisition teams to implement a new way of acquiring software.

To effectively employ the Agile process, acquisition and development teams must scrum, or meet daily, to communicate and collaborate. Also, embedding an SEI staff member into the SWIPT significantly helped to deploy the Agile process to acquisition and development teams. The software acquisition success using the Agile process in the TMRR phase has convinced the IFPC Inc 2-I SWIPT to continue with more of the same into the engineering and manufacturing development phase.

*For more information on Agile software acquisition, contact the authors at **Ranjit.s.mann.civ@mail.mil** or **Michael.a.hanners.civ@mail.mil**. To learn about the Agile Alliance, go to **www.Agilealliance.org**. For information on SEI capabilities for software acquisition, contact **info@sei.cmu.edu**.*

MR. RANJIT SINGH MANN is the software IPT and SoSIL lead for the IFPC Inc 2-I product office at the CMDS Program Office, PEO MS. He holds an M.S. and B.S. in electrical engineering from, respectively, Michigan Technological University, and Wayne State University, and an M.S. in embedded systems from Oakland University, Rochester, MI. He is a registered professional engineer and has more than 24 years' experience in systems and software engineering. He is Level III certified in system planning, research, development and engineering (SPRDE), Level II certified in program management and Level I certified information technology.

MR. MICHAEL A. HANNERS is a computer engineer for the IFPC Inc 2-I at the CMDS Program Office, PEO MS. He holds an MBA from the Florida Institute of Technology Huntsville and a B.S. in computer science from Athens State University. He has more than six years' experience in systems and software engineering and is Level III certified in SPRDE.

SPOTLIGHT:

MR. THOMAS W. NEFF

CHESS PD tracks players, pieces

MR. THOMAS W. NEFF

COMMAND/ORGANIZATION:
Computer Hardware, Enterprise Software and Solutions, Program Executive Office for Enterprise Information Systems (PEO EIS)

TITLE:
Project director

DAWIA CERTIFICATIONS:
Level III in program management and information technology; Level I in logistics

YEARS OF SERVICE IN WORKFORCE: 10

YEARS OF MILITARY SERVICE: 6 years as an Active Guard Reserve officer

EDUCATION:
M.S. in national resource strategy, Eisenhower School of National Defense University; M.S. in information management, Syracuse University; M.Ed. in curriculum and instruction, Loyola University (Chicago); B.A. in international relations and government, Lehigh University

AWARDS:
Civilian: Superior Civilian Service Award, Commander's Award for Civilian Service. Military: Meritorious Service Medal (3 Oak Leaf Clusters (OLCs)), Army Commendation Medal (1 OLC), Army Achievement Medal (9 OLCs)

Before becoming project director (PD) for Computer Hardware Enterprise Software and Solutions (CHESS) in July 2014, Tom Neff had worked on a lot of large-scale information technology (IT) projects, including the General Fund Enterprise Business System, Reserve Component Automation Systems (RCAS) and the Joint-Automatic Identification Technology program (J-AIT), a product directorate that has since merged with the Product Director for Automated Movement and Identification Solutions. "I thought I knew all there was to know about contracting for commercial IT," he said, "but after a year as CHESS PD, I'm realizing how much more there is to learn."

CHESS doesn't have "a traditional program management mission where you manage cost, schedule and performance of a new system," Neff explained. "Instead, our role is enabling users across the Army to get easy access to high-quality, commercial off-the-shelf hardware, software and services at reasonable prices."

All CHESS contracts are strategically sourced, "and that can make for intense and somewhat overwhelming competition from our industry participants," said Neff. A CHESS industry day in June drew some 800 attendees, and he expects more than 100 responses to a request for proposals scheduled for release in January 2016. "As budgets decline, we see a lot of companies clamoring to get involved with CHESS," Neff said. "For some, especially small businesses, a contract with CHESS can mean the difference between success and failure."

CHESS is looking to increase small business participation, another factor that increases the number of proposals Neff and his team receive. "We try to maintain communication with industry that's as frequent and transparent as humanly possible, so that everyone, especially small businesses, knows whether a proposal will be viable. While we like to see competition, we don't want to see small businesses spending valuable business development dollars on proposals [for which] they don't have the capabilities they need to win."

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

CHESS' mission statement is: "Be the primary source to support the warfighter's information dominance objectives by developing, implementing and managing commercial information technology contracts that provide enterprisewide net-centric hardware, software and support services for the Army." The Army Chief Information Officer (CIO/G-6) has mandated the use of CHESS contracts, and we are charged with making the vision of strategic sourcing a

reality. Perhaps the best example of CHESS customer service would be the end user not even being aware they were leveraging CHESS-managed contracts to get what they need when they need it.

How did you become part of the Army Acquisition Workforce, and why?

My first acquisition assignment was in August 1999, when I was assigned to the RCAS Project Office, an acquisition category (ACAT) 1AM program then managed by the National Guard Bureau. *[Editor's note: An ACAT 1AM program is a major automated information system for which the milestone decision authority is the defense acquisition executive.]* My division chief, Angela Green-Mack, had the patience to show me how the acquisition process worked and, as my skills grew, she showed her faith in me by giving me the responsibility and authority to do my job. I have tried to never forget that lesson.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

Without a doubt, the most memorable point in my career was my time serving as an assistant product manager (APM) for PM J-AIT. It was a fast-paced assignment, taking over what amounted to a demonstration project from HQDA just as the conflict in Iraq was starting. While it certainly was stressful forming an organization and relationships under time-constrained conditions, it was very rewarding to see cost-effective, commercially available technology enhance the visibility of the supply chain and transportation pipeline. I will never forget those two years as an APM: it is great for any military or civilian acquisition professional to really see and influence the fielding and sustainment of new systems that help Soldiers perform their jobs.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I have been very fortunate to have several people who have been instrumental in my professional development and personal growth. One dates back to my time as a field artillery officer assigned to the 25th Infantry Division and my battery commander, then-CPT Warren O'Donell. He showed me what it meant to overcome adversity, and he went on to serve with distinction as a Centralized Selection List program manager at the O-5 and O-6 levels.

The other person who sticks out is BG Patrick Burden. I had the opportunity to serve as his deputy during his product manager assignment. He showed me what it meant to lead, plain and simple. I have tried to apply what BG Burden and COL O'Donell (Ret) taught me when I have been lucky enough to lead program offices. The relationships I have been able to keep intact as I have moved on to other assignments tell me I have been at least somewhat successful in mentoring others.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

Knowing that when we do our job correctly, we are providing Soldiers with the technology they need to help them perform their job and return home safely with the mission accomplished. Unfortunately, sometimes, it is too easy to forget that, particularly when your duty location is in the national capital region, where so many other organizations that have (often competing) interests in the acquisition process get involved—you can lose sight of why you do what you do.

What advice would you give to someone who wants to get where you are today?

People are what make the acquisition process work, not the technology or the contracts. It took me a long time to really understand that and practice it. Do not be afraid to try new things. When I was first assigned to the RCAS Program Office in 1999, the most advanced computer technology I had ever used was probably a dial-up AOL account. I was fortunate enough to be surrounded by leaders and co-workers who were supportive, and that assignment provided the foundation of a rewarding career. While I did not appreciate it enough at the time, it was the quality of those people in that first program office that has made this journey so much fun.

—MS. SUSAN L. FOLLETT

THAT'S THE SPIRIT
Neff, left, in Army service uniform, with CHESS staff participating in the PEO EIS Spirit Day May 29: from left, Sammi Foong, Stacy Watson, Deidre Harris, Irina Nguyen, Dawn Bare and Keith Copeland. (Photo by Miguel Campos, PEO EIS)

Improving the CAPABILITY SET FIELDING PROCESS

by CPT Keith Jordan

CHALK IT UP TO LSS
An LSS Black Belt project identified a number of variations that caused work stoppages in the CS integration process: rework, maintenance issues, field problems and miscommunication. Here, vehicles from the 82nd Airborne BCT await integration. (Photo by CPT Keith Jordan, SoSE&I Directorate)

Capability set fielding is all about getting technological innovations and improvements to Soldiers, but SoSE&I needed a process innovation to make the fielding more efficient. That's why it launched an LSS Black Belt project aimed at reducing installer downtime, improving communications and making the installation of thousands of pieces of equipment much more streamlined for everyone involved.

In spring 2014, a brigade combat team (BCT) from the 101st Airborne Division (Air Assault) became the first in the Army to receive a nearly complete capability set (CS) of new communications equipment. From a network perspective, this made them the most complete and capable unit in the Army. But integrating pieces of new equipment into the BCT was anything but easy.

Upon completion of the fielding, the Army's System of Systems Engineering and Integration (SoSE&I) Directorate, which is responsible for synchronizing and coordinating fielding activities between the unit and the program managers, recognized that the fielding process overall needed improvement. SoSE&I initiated a Lean Six Sigma (LSS) Black Belt project with the goal of making the CS fielding process more efficient. By improving the fielding efficiency, the overall CS fielding process is shortened, saving money by reducing government travel expenses. Additionally, the government gets better value for the contractor's time because he or she is not being paid for downtime. Most importantly, however, the unit is affected for a shorter period of time, which allows the Soldiers to focus more on their operational missions.

A CS package comprises thousands of individual network components, equipment and software that together create an integrated tactical communications capability. To ensure that these systems work together, approximately 400 vehicles from the BCT had to have upgrades to their power generation; receive new radio racks, cables and connectors; and have new antennas installed or replaced. Within a BCT, each vehicle serves a unique role within the Army's intended network basis of issue. Each vehicle requires a specific

set and type of equipment to ensure that it can function as intended for its specific role. This meant that a critical function of SoSE&I was to ensure that each vehicle (for example, that of the brigade's operations officers) received its correlated set of unique equipment. If this is not done thoroughly or is done incorrectly, the brigade can be negatively impacted indefinitely as it waits to have the correct roles and components properly matched and installed. Matching the right vehicle with the right CS components proved to be one of the most critical tasks during the CS fielding process.

Ideally, a CS integration would be very similar to a Toyota manufacturing plant employing the "just in time" (JIT) manufacturing concept, which looks to eliminate waste in the production process. Units would supply their vehicles in the exact number that could be integrated daily, exactly when they are needed, so that the integrators would never have to sit idle while waiting for the right vehicle or part. However, when dealing with operational units whose primary mission is not CS integration, this concept isn't feasible.

During the CS integration, the BCT's operational requirements could not be put on hold so that the CS fielding could be completed. This required the integrations to be carefully managed and balanced with the unit's many operational events during the fielding. Determining when and where a vehicle was needed became the crux of why the JIT method could not be employed.

IDENTIFYING AREAS FOR IMPROVEMENT

Coordinating delivery and integrations for more than 500 of the unit's vehicles proved to be challenging for all stakeholders. When vehicles in demand for other purposes did not arrive at the integration site as scheduled, the integrators would sit idle and work often came to a halt. This was a clear signal to SoSE&I that there were problems in the process. Understanding why these work stoppages were occurring and putting controls in place to mitigate them became the focus of the LSS project.

QUALITY CONTROL

Workers at the Fort Bragg, NC, Integration Facility check the installation of new CS 15 equipment onto a unit's vehicle. This station was one of several stations that each vehicle moved through as workers upgraded a multitude of parts in different configurations. (Photo by CPT Keith Jordan, SoSE&I Directorate)

Work stoppages are stressful times for everyone during a tightly scheduled integration event. The integrators wanted to work so they could finish the job and return home; the government was spending money on labor and travel; the unit was not getting its equipment modernized as scheduled; facilities were tied up longer than they should have been; and the fielding lasted weeks longer than necessary. As we observed the process, it became clear that full employment of the integrators is the metric that is most crucial to determining if the plan is functioning as it should. To reach full employment, we had to identify the root causes of the work stoppages and mitigate them as much as possible.

Fortunately, during the fielding we kept good statistics on when the vehicles came to the integration site and, if they didn't arrive as scheduled, why. This data—along with interviews from participating parties—provided the necessary material to conduct the LSS project, which was titled "Lower Tactical Internet Fielding Cycle Time Improvement." The lessons learned from this LSS project would then be implemented during the next CS fielding event in 2015.

ROOTING OUT DELAYS

When doing the same thing over and over again, it's easy to study a process and identify differences from one event

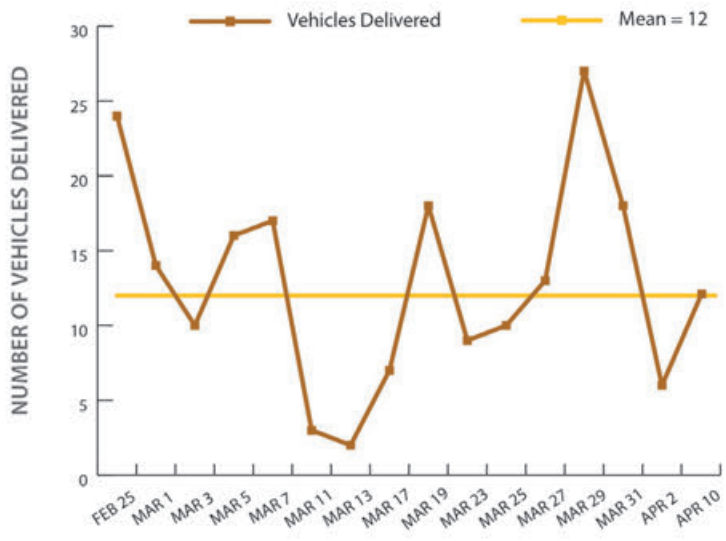
to the next. These differences are called variation. Every process has some variation and, as long as the variation is within a prescribed tolerance for that process, everything is fine. It's when variation gets outside the control limits that the process needs an intervention to get back on track. Minimizing variation reduces errors and increases the speed and efficiency of the work being performed. In this case, vehicle-delivery variation was the root cause of the work stoppages. Now SoSE&I had to find ways to bring the variation into acceptable tolerance levels.

SoSE&I had little control over how the work was actually being performed on the vehicles themselves, but did have influence over when and how many vehicles came to the site. Our goal was to have the unit deliver each day the exact number of vehicles that the integration team could integrate that day. Unfortunately, vehicle availability conflicts made this a rarity.

Figure 1 shows the vehicle delivery size in the first few weeks of the integration. Throughout the fielding, the standard deviation of the "chalk sizes" was seven: in other words, the chalk sizes were swinging approximately seven vehicles in any direction from our target chalk size. This wide variation overwhelmed the workers during some periods and idled them at others.

Knowing that worker utilization was key to a shorter process and that chalk-size variation was the reason we weren't achieving full utilization, we set about finding ways to smooth out this delivery pattern and reach full worker utilization.

FIGURE 1



LEVELING THE LOAD

Figuring out how to level out variations in vehicle flow rates—the number of vehicles delivered for equipment installation each day—was key to reducing installer downtime and improving the efficiency of the CS 15 fielding process. (SOURCE: CPT Keith Jordan, SoSE&I Directorate)

VARIATIONS OF WORK STOPPAGE

To understand the causes of the variation, we relied on interviews with personnel from SoSE&I, the unit and the contractors who were installing the equipment. We also analyzed the delivery data that showed how many vehicles were expected to arrive versus what actually did arrive. Using these sources, a picture formed of the reasons the vehicles weren't coming over in the proper amounts. Figure 2 on Page 72 categorizes these reasons and shows what proportion of errors could be attributed to each category.

The chart shows the five variations that caused the work stoppages. **Rework** meant that a vehicle arrived at the integration site but was missing critical legacy radio components such as radio antennas, specific racks or wiring. That prevented an installation from being completed. Rework required the unit to take the vehicle back to the motor pool and locate or replace the missing radio components.

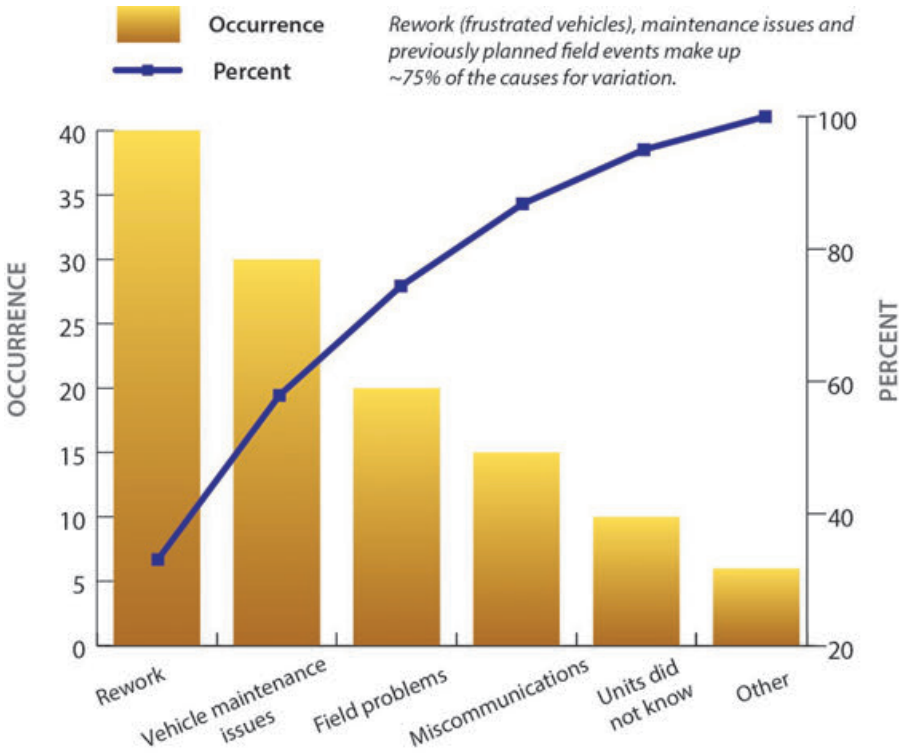
Vehicle maintenance issues meant the vehicle was not mission-capable and couldn't even leave the unit's motor pool.

Field problems meant the vehicle was taken on a training mission and was unavailable to be integrated.

Miscommunications meant that units did not know when, where or in what condition to move the vehicle to the integration site; and **units did not know** means that the unit simply had no idea the vehicle needed to be integrated and thus did not move it to the integration site.

Now that we understood the root causes of the variation, we could make a plan to address these common errors and improve our process.

FIGURE 2



TROUBLE SPOTS

Data analysis and interviews with SoSE&I, the unit and the contractors who were installing the equipment yielded five causes of delivery errors, which the team worked to mitigate or eliminate for subsequent CS 15 fieldings. (SOURCE: CPT Keith Jordan, SoSE&I Directorate)

ASSEMBLY REQUIRED

Approximately 400 vehicles were processed through multiple integration states and bays at the CS 15 Integration Facility at Fort Bragg, NC. Once integration is complete, the CS 15-enabled vehicle is ready to perform as a fully networked system of systems. (Photo by CPT Keith Jordan, SoSE&I Directorate)

After the CS fielding for the 101st BCT was completed, a BCT from the 82nd Airborne Division was next to receive a CS fielding similar to the 101st's in size and scope. For the 82nd's fielding, we focused heavily on mitigating the chalk variation to address the first five categories.

To reduce the number of vehicles needing rework, SoSE&I conducted several inventories and inspections of the unit's vehicles months ahead of the fielding to identify and rectify issues with legacy communication equipment. To mitigate maintenance issues, we inspected the unit's vehicles up to two weeks ahead of their scheduled integration to ensure that they were functional, and reported any identified issues to unit leadership.

Next we developed a "by serial number, by day" vehicle delivery schedule, covering all 550 vehicles needing work. This ensured that all the units involved were aware of the integration timelines and could plan accordingly. SoSE&I worked extensively with the brigade's plans section to create an operational order outlining the execution timeline of the event, as well as all the minor requirements that seemed to cripple the integration lines. SoSE&I conducted multiple rehearsals and walkthroughs at several echelons to ensure that leaders throughout the brigade understood the concept of the plan.

Finally, using feedback from the contractors, SoSE&I implemented several internal integration site changes that improved overall vehicle flow through the process. These included allowing licensed contractors to move vehicles within the motor pool and to operate forklifts, staging equipment close to the installation point, and logically configuring the vehicle flow from station to station within the building. After all

this, it was time to see if these changes made our process better.

CONCLUSION

In July, the next BCT's approximately 550 vehicles began the CS integration process. The first chalks came as scheduled, and our integrators found themselves engaged approximately 90 percent of the time versus 55 percent for the previous unit. This proved that the changes in the process were effective improvements.

The most critical metric of success was the standard deviation of the daily chalk size. Our chalk standard deviation went from 7 to 2.1, showing a much tighter process than before. By reducing chalk-size variability, the integration process became more efficient and saved the government time and money. However, the most important benefit derived from the process changes was the rapid improvement to the operational capability of the unit being fielded.

Using LSS to improve the quality of a process helps complete projects faster and more efficiently than before. In today's "Do more with less and faster" Army, LSS and continuous process improvement methods are relevant and effective means to enable our Soldiers to win in today's complex world.

For more information, contact the author at ***keith.a.jordan24.mil@mail.mil****.*

CPT KEITH JORDAN is a synchronized fielding military trail boss with the SoSE&I Directorate. He holds an MBA from the Naval Postgraduate School and a B.B.A. in finance from Texas State University. He is Level II certified in program management and an LSS Black Belt.

FIRST TO UPGRADE

A Soldier from the 1st BCT, 101st Airborne Division (Air Assault) trains on a Warfighter Information Network – Tactical Increment 2 Tactical Communications Node system at Fort Campbell, KY, in March 2014. The 1-101 was the first unit fielded with the complete CS 15 tactical network, and the fielding process yielded lessons learned for future installations. (Photo by Claire Heininger, Program Executive Office for Command, Control and Communications – Tactical)

SPOTLIGHT:

MR. PAUL MANZ

Keeping an eye on 'the right next thing'

MR. PAUL MANZ

COMMAND/ORGANIZATION:
Program Executive Office for Ammunition

TITLE: Chief scientist

DAWIA CERTIFICATIONS:
Level III in engineering, program management, science and technology management, life-cycle logistics, business, cost estimating, financial management, and systems planning, research, development and engineering (SPRDE). Also serves as Army DAWIA SPRDE acquisition functional reviewer for all engineering acquisition career fields.

YEARS OF SERVICE IN WORKFORCE: 31

EDUCATION:
MPA (public administration), Fairleigh Dickinson University; B.S. in electrical engineering, New Jersey Institute of Technology; Lean Six Sigma Black Belt

AWARDS:
Meritorious Civilian Service Award; Superior Civilian Service Award (2); Commander's Award for Civilian Service (2); Achievement Medal for Civilian Service (2); Army Research and Development Achievement Award; Outstanding AMC Personnel of the Year Award; Ancient Order of St. Barbara; Holds 7 U.S. patents

In the 30-plus years since he joined the Army Acquisition Workforce, Paul Manz has transitioned from being the "oldest of the young" to the "youngest of the old." But the chief scientist for the Program Executive Office for Ammunition (PEO Ammo) is quick to note that that isn't such a bad thing. "I frequently find myself in the role of a mentor, which I also enjoy, discussing and sharing the underlying whys and hows of solutions to problems with my younger colleagues using the experiences and knowledge I've gained over my career."

Manz has held positions across the joint munitions, battle command, fire support, enterprise architecture, systems engineering and electronic devices communities, and has supported numerous major acquisition category (ACAT) systems. "I've been fortunate that my career has touched the entire materiel development life cycle, from science and technology through production and deployment, which in turn has helped me become a better problem-solver," he said.

Manz has seen a great deal of change since 1984, the biggest being the role that information technology plays in the workforce. "Omnipresent information technology creates an ever-increasing demand for producing and delivering timely critical information so leaders can make informed decisions in a fast-moving strategic environment. As a young engineer, I saw how difficult it was for leadership and senior staff to maintain a healthy balance between their work life and family life. It's even more difficult to maintain that balance when people are now constantly electronically connected, especially in our current climate of international conflict, fiscal uncertainty and significant potential organizational change," he said.

"I have also seen a general and growing preference by many people to communicate via email versus picking up the phone or walking down the hall to talk to someone in person," Manz added. "I know there is goodness in being able to inform all stakeholders at the same time with the same information via email to make sure that everyone is on the same sheet of music, but that can also create communication inefficiencies: it's easier to hit the 'send' button instead of taking the time to truly filter who should get what information at that specific point in time in the overall process."

Manz admits that he thought about leaving government work for the private sector a few times over the past 30-plus years. "But looking back, each time I made the decision to remain a federal civilian employee, it was the right decision. I think everything you do and every experience you gain has a bigger purpose leading you to the right next thing in your life, and I

can trace a bunch of choices throughout my career that have led me to where I am today. I'm glad I made the choices I did along the way to get me here."

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

I oversee and facilitate the transition and insertion of enabling technologies across a $3 billion-plus munitions and armaments portfolio. A large part of my job focuses on identifying difficult or systemic technology transfer inhibitors and system-of-systems issues, developing corresponding innovative solution paths within the programmatic constraints and realities faced by the Army and DOD, and expediting the delivery of new or improved combat capabilities to the joint warfighter while also reducing long-term life-cycle costs borne by the U.S. taxpayer.

How did you become part of the Army Acquisition Workforce, and why?

As an electrical engineer with strong interest in semiconductors, I started working for the Army in the Electronics Technology and Devices Laboratory (ETDL) under the auspices of LABCOM [the predecessor to the U.S. Army Research Laboratory] back in 1984. I was an original member of the Army Acquisition Corps.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

There are several points in my AL&T career that represent significant parts of what I am and motivate what I do today. First was working as a hands-on engineer in the labs during the early part of my career, since it gave me a good technical foundation—and one that I still use today—as well as firsthand appreciation of our knowledgeable government science and technology workforce. Second was working on ETDL's headquarters staff, where I was exposed to the program, planning and budget execution processes, gained a strong understanding of portfolio management (and its relationship to people, resources, facilities and intellectual property) and greatly refined my oral and written communication skills. Third was working in the Army Systems Engineering Office during the inception of the Army enterprise architectures and subsequently as Deputy Project Manager for Field Artillery Tactical Data Systems.

Those positions opened my eyes to the complex system-of-systems challenges facing the Army and the corresponding rigorous system-engineering efforts required to solve these complex problems. Additionally, I worked with then-COL Harry Greene as his technical director in support of six ACAT I and II programs. Through word and deed, Harry instilled an ever-present core value in me that you'll see on my email signature: "We have two primary customers: the warfighter and the U.S. taxpayer." Harry is sorely missed by all who had the privilege to know him.

Finally, in my current job as chief scientist for PEO Ammo, I'm deeply engaged in several major Army and DOD efforts to solve critical problems that have significant operational impact.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

While [I was] working as a hands-on engineer earlier in my career, Tom AuCoin (then deputy director of the Research Division within ETDL) pulled me out of the labs and onto the division staff via a developmental assignment. When Tom was promoted to operations director for the entire laboratory, he made me a part of his new permanent core headquarters staff. He included me in multiple senior-level engagements with the assistant secretary of the Army for acquisition, logistics and technology and the Office of the Secretary of Defense for Acquisition, Technology and Logistics, and empowered me to manage and oversee numerous high-visibility programs. Since becoming a supervisor almost 18 years ago, I have tried to emulate the mentorship best practices that I observed from him and truly enjoy providing career-enhancing learning experiences to new members of our AL&T Workforce.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

I get a tremendous amount of personal satisfaction working with a diverse, highly knowledgeable, professional AL&T cadre committed to doing good things each and every day for our joint warfighters and the U.S. taxpayer. I definitely enjoy my job.

What advice would you give to someone who wants to get where you are today?

Don't just stay in one job. Always learn. If you stop learning in your current assignment, it might be time to look for a new job. Don't be afraid of change. There are numerous career opportunities across the AL&T Workforce. Take advantage of them to expose yourself to a broader scope of functional, organizational and topical subject matter. Find yourself a good mentor and learn from him or her. Be proactive with your career in positive ways, since the best person to take care of your career is you.

—MS. SUSAN L. FOLLETT

NIGHT MOVES
Soldiers lead an endurance operation to test the limits of technologies and system capabilities over a 24-hour period at the TSOA experiment 15-3 at Marine Corps Base Quantico, VA. (Photo by Jeff Swensen, Human Habits Inc.)

the 'ART' *of the* RED TEAM

Building on the success of the Deployable Force Protection program, the Army S&T Systems Adaptive Red Team initiative not only challenges conventional approaches to development with a multidisciplinary team to identify and mitigate vulnerabilities, but also incorporates the Soldier at each step.

by Dr. Niki C. Goerger, Dr. Patrick J. Driscoll, Mr. Michael E. Ferreira and Mr. John P. Klopfenstein

In 2011, on behalf of the Assistant Secretary of Defense for Research and Engineering, the Army led an initiative in science and technology (S&T) that focused on force protection for service members deployed at small, austere bases in Afghanistan. As part of the initiative, the Deployable Force Protection (DFP) Red Team program created effective methods and venues for experimentation to address issues beyond technical performance—interoperability and integration, transportability, logistics supportability, training effectiveness, human factors—that harbored hidden vulnerabilities at system interfaces.

What made this initiative different was including hands-on interaction with and input from warfighters early and continuously throughout the development process so that they could provide direct feedback to the developers regarding what worked and what didn't. Having warfighters use developing systems and work to accomplish their missions in scenarios that included adaptive adversaries helped reveal a wide variety of issues. These included not only vulnerabilities such as susceptibility to jamming and spoofing, but also lack of feedback as to whether systems were operating properly. Specialized parts and the inability to make fixes in the field surfaced as well. Warfighters also identified issues with weight and bulk, performance at night and in driving wind and rain, screen glare, lack of interoperability with other systems and the need for more intuitive interfaces.

JAMMING TIME
SFC Willie Carter, left, the 3rd Infantry Division (ID) Electronic Warfare (EW) noncommissioned officer (NCO), Phillip Crandell, the 3rd ID EW trainer, and SGT Jacob Stauber, the EW NCO of the division's 2nd Battalion, 69th Armor Regiment, 3rd Armored Brigade Combat Team (3-3 ID), observe the spectrum of frequencies being used in a red-teaming exercise designed to test units' reaction times by jamming their communications. (U.S. Army photo by SSG Aaron Knowles, 3-3 ID Public Affairs)

The Systems ART initiative addresses critical but often overlooked issues beyond technical performance and at systems' seams, keeping the operator tightly integrated in the processes.

This approach helped improve and accelerate the development of several force protection technologies that help detect, assess and defend against attacks.

Building on the success and capability of the DFP Red Team program, the Office of the Deputy Assistant Secretary of the Army for Research and Technology (ODASA(R&T)) created a more broadly focused Army S&T Systems Adaptive Red Team (ART) initiative in FY14 that addresses emerging priorities, anticipates problems, exposes potential vulnerabilities early in the materiel development life cycle, informs S&T design decisions, inspires effective threat countermeasures and avoids surprise.

THE 'ART' OF TEAMING

Like its predecessor, the Systems ART initiative is organized in an innovative manner, comprising professionals selected from across the Army and beyond with direct oversight from the ODASA(R&T).

The program director comes from the U.S. Army Engineer Research and Development Center; program management team members are from the U.S. Army Special Operations Command, U.S. Army Communications-Electronics Research, Development and Engineering Center, and the United States Military Academy at West Point. In addition, the group includes members from various Army organizations, the Departments of the Navy, Energy, Homeland Security and others. There

RED-TEAM TEST BED
PVT Christopher Creighton from 2nd Battalion, 20th Field Artillery Regiment, 3rd Armored Brigade Combat Team, 4th Infantry Division takes down communication equipment during a decisive-action rotation at Fort Irwin in November 2014. Threat emulation, a well-known form of red-teaming, is used at venues such as this to sharpen individual and collective warfighter skills. (U.S. Army photo by SPC Randis Monroe, Fort Irwin Operations Group)

are members with special and conventional force experience and those with expertise outside the military.

The effect is a high-performance, multidisciplinary team that brings a variety of specialized experiences and perspectives, a high degree of adaptability and creativity and a drive to continuously seek new challenges and opportunities.

The Systems ART initiative adopted the Red Team Journal (**http://redteamjournal.com/about/red-teaming-and-alternative-analysis/**) definition of red-teaming: "the practice of viewing a problem from an adversary's or competitor's perspective." The idea was generally to eliminate bias from thinking, enhance decision-making and avoid surprise. One well-known form of red-teaming, threat emulation, is used at venues such as the National Training Center, Fort Irwin, CA. In this form, red-teaming is leveraged to sharpen individual and collective warfighter skills. Another form of red-teaming used by military command groups involves challenging, or deconstructing, plans or concepts to find holes that can be exploited by adversaries and to widen options.

The need for more red-teaming and unscripted experimentation has been underscored in various reports and studies, including the Defense Science Board's 2008 Summer Study on Capability Surprise (**http://www.acq.osd.mil/dsb/reports/ADA506396.pdf**) and its "Report on Technology and Innovation Enablers for Superiority in 2030," October 2013 (**http://www.acq.osd.mil/dsb/reports/DSB2030.pdf**). The latter emphasizes experimentation as a means to enable innovation. It also calls out the benefits of having technologists and operational personnel work collaboratively, looking at concepts and exploring uncertain futures.

THINKING LIKE THE ENEMY

Distinctive among the several implementations of red-teaming, the Systems ART initiative approach incorporates multiple types—threat and competitor emulation, and acting as devil's advocates. Moreover, it does so in a recursive manner that adapts and evolves during the execution of experiments to identify and pursue vulnerabilities lurking in second- or higher-order system responses to threat challenges. The Systems ART initiative embraces a philosophy that holds that all systems exist within a dynamic

THREAT EMULATION
Soldiers assigned to 3rd Battalion, 75th Ranger Regiment assault a town during a live-fire exercise at Fort Irwin in February. The Rangers specialize in raids and assault missions deep inside enemy territory. One of the innovative features of the Systems ART initiative is its organization, bringing together perspectives from conventional and special operations forces, other services and Cabinet departments and interests outside DOD. (U.S. Army photo by PFC William Lockwood)

environment where interactions with and dependencies on other systems across the full doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy spectrum are unavoidable. These interactions and dependencies define seams between systems that are often insufficiently addressed during development and frequently harbor vulnerabilities left to be discovered by the warfighter end user.

The Systems ART initiative advocates for a culture that does business from multiple perspectives. Technologists, developers, operators and analysts work together to expose and eliminate potential vulnerabilities early in the materiel development life cycle, inform S&T design decisions, inspire effective threat countermeasures and avoid surprise regarding emerging DOD priorities.

BEYOND THE TECHNICAL

The Systems ART initiative addresses critical but often overlooked issues beyond technical performance and at systems' seams, keeping the operator tightly integrated in the processes.

For example, when developers design the interface for a system that might, say, sense movement in a sector, there are certain assumptions about how easy or intuitive it will be for someone to use the system effectively. To help expose assumptions, the team developed and uses a methodology that measures the gap between a well-trained user, a user who was quickly instructed by his or her predecessor, as might be seen in a unit rotation in theater, and a "cold novice" who had to use the system without the benefit of training.

This has proven to be very insightful to developers, resulting in streamlined user-interface designs, interfaces tailored to a user's skill level, and changes to training and help guides for threat-detection systems and to mission planning and execution aids.

This is accomplished through live experiment venues, called technical support and operational analysis (TSOA) events, for government and commercial developers, and virtual experiments or vulnerability-discovery exercises (VDEs) to explore beyond the bounds

TESTING IN THE WEEDS
The S&T ART initiative involves Soldiers closely throughout the process of addressing critical but often overlooked issues beyond the technical performance of systems. The initiative zeroes in on interactions and dependencies among systems, for example, that may receive insufficient attention during development, leaving problems for the end user, the Soldier, to discover later. (U.S. Army photo by PFC William Lockwood)

This atmosphere of openness and cooperation has become the hallmark of live engagements with the Systems ART team. In this field environment, when the barriers to collaboration are decreased, organizations can work together to solve a common problem.

of live experimentation and delve into future possibilities. It is also accomplished through systems intensives (SI), which involve red-teaming and experimentation on specific, high-priority technologies or systems, emerging programs or even concepts.

For example, through feedback and red-teaming at TSOA events, "RADAR System X" (a fictional name for a real system) found and hardened vulnerabilities to jamming and spoofing and added waterproofing based on stressors from the TSOA environment; "360 Degree Camera Y" found and resolved design weaknesses for sensor cooling and simplified user interfaces to improve the ability of operators to accomplish key tasks with minimal training; and "Coordination System Z" altered tactics, techniques and procedures, added encryption to reduce vulnerabilities to attacks and modified the user interface so that operators could better navigate using gloves—part of their normal gear.

The live and virtual experiments and SI are mutually supportive, and all are underpinned by development and implementation of assessments and analytics. By combining TSOA every 90 days and virtual experiments multiple times a year, the Systems ART initiative routinely identifies vulnerabilities that could threaten a system's successful fielding, use and operational effectiveness if left untreated. The SI effort creates an enhanced capability in which red-teaming engagements focus on an emerging program of record, a prototype or even a concept for a more in-depth look over time. This could involve

LIVE-EXPERIMENTATION LANDSCAPE
This site at Stennis, MS, where TSOA live experiments took place in February 2014, and other TSOA venues represent a variety of challenging operational environments. (Photo by Jeff Swensen, Human Habits Inc.)

taking the system to a TSOA to look at interoperability and integration with other systems as well as concepts of operation in increasing complex scenarios. It could also involve injecting a component into VDE. There could also be individually designed experiments and exercises that are not TSOA- or VDE-specific, as well as a host of other investigations and assessments.

LIVE, EXPERIMENTAL, COLLABORATIVE

Live experiment venues balance assessment with development, are extraordinarily collaborative based on feedback the team has received from participants, and are designed to push systems to the next level of interoperability and integration. As a result, developers from both industry and government can make fixes "in the dirt," working with the TSOA red team on the ground. During the in-brief on day one, personnel are encouraged to integrate systems into the common operational picture and to interoperate with other systems through scenarios. There are dedicated team members on the ground who support developers in integration and interoperability. These venues are conducted at military ranges across the country and have included Camp Roberts, CA; Stennis, MS; and Marine Corps Base Quantico, VA. They are not formal test and evaluation events, or developmental or operational tests. They provide developers the means to experiment and red-team without having to create the infrastructure, establish an actual red team, requisition warfighters or develop scenarios.

This atmosphere of openness and cooperation has become the hallmark of live engagements with the Systems ART team. In this field environment, when the barriers to collaboration are decreased, organizations can work together to solve a common problem. This collaboration has led to the two developer groups working together to increase the effectiveness of an unmanned aerial system by incorporating algorithms to improve video quality. Pursuing integration encourages developers to maximize the use of data standards such as the Integrated Sensor Architecture and to reduce the need for operators to look at multiple displays.

The Systems ART initiative combines technical experts in engineering, radio frequency communication, computer network security and other areas with systems engineers and operators, and uses robust, structured assessments. These experts identify vulnerabilities from jamming, network attack, spoofing and other techniques used by adversaries. Vulnerabilities are further identified using a warfighter technology trade-space methodology, which is an assessment tool that probes technical, usability, user interface and logistic factors. The assessment team collects data, conducts analysis and provides feedback to developers for system improvement.

The Systems ART initiative has assessed more than 200 technologies, including unmanned systems, sensors, radars, blast protection and power generation systems, among others. For more than 40 percent of these assessments, the team returned to demonstrate mitigated vulnerabilities or other improvements based on feedback, or to continually learn how the system performs against realistic and adaptive threat emulation.

'ART' APPRECIATION

The operational community, for one, has noted the value of the Systems ART initiative. For example, a theater special operations command has deployed three different ART-vetted systems for use in operations.

One such system is the Virtual Accompany (VA) kit, which allows the small unit to accompany teams through a virtual presence, provide guidance and receive timely information. The VA kit consists of several ART-vetted technologies that were improved, selected and integrated into operationally relevant kits.

The operational command funded the integration and fielding of these kits, which are credited with enabling pinpoint accuracy and destroying hundreds of targets with no friendly fire casualties.

LESSONS LEARNED

In reflecting on the System ART initiative's progress, we offer the following

recommendations and observations based on lessons learned:

- Hand-pick the "A team." Having wide latitude to carefully select and structure the red team based on needed skills, experience and dynamic perspectives, and across a wide range of organizations, is critical to success.
- Develop effective ways to educate warfighter end users and facilitators on assessment methodologies; identify and communicate purpose and payoff; insist on their active participation; and garner buy-in from them.
- Secure the direct and continuous involvement of the warfighter end user throughout the process. This is essential for fleshing out unrecognized assumptions and aligning design choices with warfighter expectations.
- Adopt red (threat), white (analyst), blue (friendly), black ("unknown unknowns") and green (influence base) perspectives, and integrate warfighters, analysts and developers into experiments. This creates an effective, robust atmosphere for discovery.
- Find the balance between "controlled" and "free play" experiments to build a collaborative environment for discovery and exploration of the system's overall potential as a warfighter solution.
- Provide rapid feedback, conduct multiple assessments and have warfighter after-action reviews to ensure the adequate capture of key information.
- Allow the team adequate execution and reporting time to minimize the probability of team burnout that is often experienced by high-tempo action groups.
- Ensure access to warfighters and rapid, constructive feedback to create a continuous learning environment and keep participants, such as developers, evaluators and warfighters, returning for events.
- Develop structured assessment processes rooted in systems thinking and trade-space analytics that include exposing vulnerabilities at the systems' seams.
- Provide opportunities for continuous professional development.
- Red-team the red team for continuous improvement.

CONCLUSION

The Systems ART initiative will continue to evolve as we work to infuse change in the culture to see "breaking" systems and shaking out vulnerabilities as necessary and good for the development process.

On the horizon, efforts will examine dominating mobility, electronic warfare and unmanned aerial threats as subjects of exploration and red-teaming. Our hope is that we can have a positive impact and help our forces maintain overmatch in a complex and uncertain future.

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FLEXIBLE OFFICE
A Soldier accesses her laptop using a modular workspace that can be stowed to create an unobstructed pathway for paratroopers to exit the plane, as part of the EMC2 demonstration on May 14 at Pope Army Airfield, Fort Bragg, NC. EMC2, which benefited from a collaborative prototyping effort by PM WIN-T and CERDEC, provides in-flight network communications and mission command capabilities to increase the situational awareness of the Global Response Force. (U.S. Army photo by Amy Walker, PEO C3T)

ITERATIVE INNOVATION

Just as no mission plan survives contact with the enemy, few chalkboard designs survive first contact with the Soldier. Because of that, CERDEC is leveraging its prototyping integration capabilities to prove out engineering and technology designs and put early prototypes into the hands of Soldiers, to obtain invaluable feedback and implement it more cheaply and quickly.

by Mr. Christopher P. Manning and Mr. James G. Sroczynski

Battle-tested and technologically savvy, today's young Soldier is the most knowledgeable source available to provide relevant assessments and feedback on emerging Army platform systems. However, typical acquisition processes can delay how quickly Soldiers receive these technologies for testing.

To accelerate the process from concept to delivery, government organizations are collaborating with prototype integration facilities (PIFs), where engineers design and fabricate cutting-edge capabilities and integrate them onto military platforms. Engineers and their customers use an iterative development process to quickly transition ideas into testable prototypes, allowing Soldiers to validate cutting-edge capabilities relevant to the Army's force much sooner than waiting for full-rate production and deployment.

Prototyping offers several advantages to the Army, from accelerating schedules to advancing technology and informing requirements. For example, the Program Manager for the Warfighter Information Network – Tactical (PM WIN-T) recently transitioned two prototypes into final solutions for its Enroute Mission Command Capability (EMC2) by working closely with the U.S. Army Research, Development and Engineering Command's Communications-Electronics Research, Development and Engineering Center (CERDEC) to quickly fabricate airplane-worthy hardware components. The center's Command, Power and Integration (CP&I) Directorate led

GOT YOUR BACK
CERDEC is building an apparatus to test the Energy Harvesting Assault Pack, a Soldier-wearable intelligent power manager that would power situational awareness capabilities such as GPS and Nett Warrior. The WaTTS/LKEH test apparatus will simulate Soldier movements in a range of environments and at different positions and speeds. (Photo courtesy of CERDEC)

the effort for CERDEC and leveraged its PIF to complete the requirements.

WIN-T and the PIF reside at Aberdeen Proving Ground, MD, enabling WIN-T project staff to maintain eyes-on status of their prototype during each phase of the process and allowing for course corrections prior to establishing requirements.

At the end of any PIF engagement, customers such as WIN-T generally produce a small number of fielded products to help prove the concept, and then either help customers transition the product to an Army depot or provide a technical data package that the customer can use to solicit production from industry. In either case, by integrating the prototype up front, the technology is more mature and less susceptible to major redesign, saving both time and money.

ACCELERATING SCHEDULE

Typically, when a product manager organization leads and manages its customer's product development effort, it often outsources the specific product engineering work. However, by engaging directly with a PIF rather than spending the time and money to outsource, customers can accelerate their development schedules.

WIN-T's EMC2 project, also known as the "command post in the sky," featured a C-17 aircraft integrated with full network and mission command capabilities—from takeoff to jump—to give paratroopers and their commanders reachback to their home station and eyes on the destination. These critical systems required protection from the powerful vibrations and aerodynamic forces that occur during a cargo aircraft's flight. In addition, the communications equipment could not produce electromagnetic interference with other command-and-control or airplane systems, yet still had to be light enough to meet a four-man weight-lift limit per military standards.

CERDEC PIF engineers designed prototypes for ruggedized transit cases to house the systems and a modular workstation to provide a flexible workspace for the Soldiers. Seemingly small fabrications can make the difference in a product's success or failure, and the key to ruggedizing the cases came down to creating specialized brackets to connect the cases to the racks. PIF engineers created plastic versions of the brackets on a 3-D printer to rapidly evaluate design revisions rather than expending valuable metal fabrication time for each revision. The design also allowed easy access to the equipment inside the cases and, most importantly, special filters integrated inside the cases blocked electromagnetic interference.

For the workstation design, CERDEC PIF engineers fabricated a modular apparatus that is configurable for up to seven users, provides power and Internet connections and ties securely to the C-17 floor—yet collapses to create a clear exit path for paratroopers to facilitate their jumps. PIF engineers

To accelerate the process from concept to delivery, government organizations are collaborating with prototype integration facilities (PIFs), where engineers design and fabricate cutting-edge capabilities and integrate them onto military platforms.

are currently designing separate video screens configured to hook directly onto the workstations to provide Soldiers with live, full-motion video feeds of their drop zone environment.

Most prototypes at the CERDEC PIF undergo testing in its environmental test lab. For the transit cases and workstation, engineers performed rigorous pull and vibration tests to simulate extreme flying conditions for the C-17. The MIL-STD 810 testing lab is equipped to simulate many harsh environments, including shock, temperature, humidity, salt fog, altitude and immersion.

In just nine months, the collaboration between CERDEC and PM WIN-T yielded a fielded capability that was successfully tested onboard a C-17 with the 50th Expeditionary Signal Battalion, 35th Signal Brigade, which supports the XVIII Airborne Corps' Global Response Force.

ADVANCING TECHNOLOGY

Science and technology organizations also leverage PIF capabilities to support their mission areas. These organizations may be working with a more "fuzzy" set of requirements and thus require true research and development activities to prove what is possible. The PIF helps these customers advance their technology so that they can, in turn, develop specific solutions for their customers.

For example, CERDEC's Power Division required a mechanism to test its Energy Harvesting Assault Pack, a Soldier-wearable intelligent power manager that would generate electricity from the natural movements of the Soldier and power situational awareness capabilities such as Nett Warrior, GPS and radios. Should the prototype advance to a true requirement, Soldiers could obtain increased energy independence, reduced resupply logistics, on-the-move charging and biomechanical and ergonomic advantages.

PIF engineers are designing the Warrior Torso Test Stand (WaTTS)/Large Kinetic Energy Harvester (LKEH) test apparatus, which will house a custom-built mannequin wearing the pack. Engineers will attach the mannequin to a linear actuator, which can simulate Soldiers' movements in a variety of environments, at different speeds and angles, while carrying various payloads.

INFORMING REQUIREMENTS

On a larger scale, the Army is using prototyping—via technology demonstrations—to help the U.S. Army Training and Doctrine Command (TRADOC) inform requirements for overarching capability gaps. For example, TRADOC recently teamed with CERDEC to explore expeditionary command post concepts. The intent was to design, develop and demonstrate various command post prototypes from which TRADOC could derive and transition requirements to the Army's proposed program of record for Command Post 2025.

SHELTER ASSEMBLY
Dave Boonstoppel, left, and CERDEC's Brad McNeilly-Anta erect a tent for the EXP BN CP, which includes preconfigured power and Internet capabilities required to set up the current operations cell's components. (U.S. Army photo by J. Tyler Barton, CERDEC CP&I Directorate)

TRUE TRANSFORMER
The L-MCP converts into a TAC on wheels within minutes at-the-halt, as designed by CERDEC PIF engineers and technicians who also integrated the TAC components into three existing platforms. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

CONVENIENT SETUP
The L-MCP includes a quick-erect tent, a fold-out, Internet-configured table, monitors and a large screen. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

The Expeditionary Command Post Capabilities program (ECPC), includes three separate technology demonstrators—a light vehicle, a tracked vehicle and an expandable shelter—designed to address the Army's transition from fixed to maneuver-oriented command posts. In just nine months, PIF engineers and technicians designed and integrated tactical command post (TAC) components onto the three existing platforms, then shipped them to the Network Integration Evaluation to allow Soldiers of the 2nd Brigade, 1st Armored Division to assess the systems during live exercises.

For brigade and below, ECPC introduced the Light-Mobile Command Post (L-MCP), which allows Soldiers to transform a High-Mobility Multipurpose Wheeled Vehicle (HMMWV) into a TAC within five minutes at-the-halt. Onboard vehicle power supports the integrated tactical network and mission command components, eliminating the need for the vehicle to tow a trailer-mounted generator and therefore adding another layer of expeditionary capability to the TAC.

The L-MCP was developed to scale to the Joint Light Tactical Vehicle, the Army's longer-term light vehicle solution to replace the HMMWV, allowing the Army to retrofit its current fleet to provide expeditionary command post options.

ECPC also introduced the Combined Arms Battalion (CAB) Mobile TAC, which is an M1068 tracked vehicle with integrated mission command and radio capabilities, allowing commanders to "command from the hatch." The CAB Mobile TAC prototype took into account another planned vehicle acquisition—the Armored Multi-Purpose Vehicle—to provide the Army with a viable option for today's forces. WIN-T's partnership with

the PIF helped to facilitate the integration of WIN-T Increment 2 Point of Presence onto the vehicle to provide on-the-move network connectivity, both line-of-sight and beyond-line-of-sight.

The third component of ECPC addresses battalion through corps operations, and required engineers and technicians to integrate a prototype shelter structure that establishes the current operations cell. The Expeditionary Battalion Command Post (EXP BN CP), uses an expandable shelter system that requires two Soldiers just two minutes to expand each side, and approximately 30 minutes to set up the entire structure. It includes worktables, projectors, laptops, mission command systems and a preconfigured interior with power and Internet. PIF engineers designed the transit cases to house most of the command, control, communications, computers, intelligence, surveillance and reconnaissance (C4ISR) components, and used other design techniques to ensure that all equipment required to run the current operations cell fit inside the unexpanded shelter for ease of transit.

In each of these three examples, developers leveraged PIF prototyping agility to answer the questions, "How can we enable Soldiers to command the fight from the fight?"; "What are the right components to establish expeditionary command post capabilities?"; and, most importantly, "What is possible?" When the results from this fall's Network Integration Evaluation 16.1 are published, the Army will have clearer answers with which to draft validated requirements that address these questions.

CONCLUSION

Soldiers rely on the Army's innovative solutions to achieve overmatch against their adversaries.

COLLAPSIBLE COMMAND AND CONTROL
Specially designed cases house most of the C4ISR components of the EXP BN CP, shown here fully deployed. That and other design techniques were used for the prototype shelter structure to ensure that all the equipment fit inside the unexpanded shelter for easy transport. (U.S. Army photo by J. Tyler Barton, CERDEC CP&I Directorate)

The technological innovation they seek begins as ideas in the science and technology world, where engineers are not tied to specific requirements. The Army's programs of record and other entities are tapping into this innovation by collaborating with CERDEC PIF's in-house engineering, fabrication and integration staff to create prototypes for initial testing.

By implementing an iterative, government-to-government development process, engineers can experiment on a small scale to determine how best to design and integrate a solution onto a specific platform. The results of these efforts are stronger requirements, which, in turn, produce better products. By systematically maturing ideas into tangible, fielded technologies, the Army is quickly providing Soldiers with proven, state-of-the-art solutions to give them the technological edge they need to tackle both current and future threats to their missions.

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

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TECHNICALLY SPEAKING

POP *on* JOB

A father adopts his daughter's perspective to describe what he does at work all day and why he loves it.

by Mr. Alan Clayton (LTC, USA, Ret.) and Ms. Ashley Buzzell

A lot of very smart people work in Army acquisition—scientists, technicians, engineers—and many are the best in the world at what they do. That work is often mind-bogglingly complex, given the nature of the systems that they help to design, develop and deliver for the benefit of the Soldier. They often speak in technical language that people outside their area of expertise just wouldn't understand. But it's important that taxpayers and members of Congress and their staffs understand it—not just because taxpayers have a need and a right to know, but also because it's really hard to have a conversation when only one party speaks the language.

And then there are children. So, what's a father—who spends his days working in the alphabet soup of DOD—to do when his very inquisitive daughter asks, "What do you do at work, Daddy?" Perhaps even more important than explaining to adults what science and technology are all about is explaining it to children. One father, Alan Clayton, wrote this poem to illustrate the strategy he would use to try to explain to his 5-year-old daughter what he does at work.

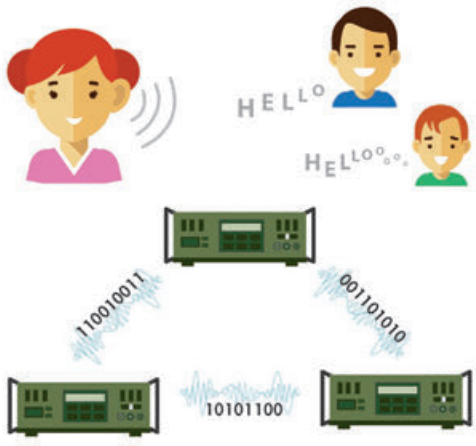
Pop works on something like a phone. In fact, he works a lot.
But with something he calls "soft-where," mostly like a phone it's not.
It was hard for Pop the other day, when I asked him "why?"
To explain it all again, but I asked him to please try!

S-D-R and S-C-A and A-P-I mean nothing to my ear.
Instead he tells of songs or talk, sent from far to near.
Each of the many songs the not-a-phone can make,
Could be songs on other not-a-phones, if his computer-speak they take.

S-C-A, he says, is his computer-speak playground.
Little bits of brain are safe to stay, play and run around.
A-P-I is sort of a "between the mouth to ear thing,"
The class of call, the red, the black and other stuff to bring.

I want to understand why this takes Pop away from home,
To a place that he calls work, where I don't think he's alone.
Computer-speak is the thing, and it concerns my Pop.
To make the "soft-where" run, takes a lot of time in the shop.

His wish and mine, they are the same. It is simply to always hear
And understand just what was spoke when the sound touches the ear.



He tells again with easy words, of how they make a ring.
These computer-speak things work together, and sense sometimes do bring.
Each computer that is not-a-phone speaks to many others.
To make sure they understand the call, like when I hear my brothers.
They use the same words almost all the time, but in a different way.
When the expression is always done the same, I hear what it is they say.

So the not-a-phone is a computer, but really hard it's not.
The A-P-I does tell someone how to speak a lot.
I see this approach can make it small, stop too many a situation
Where people make totally different things and stop the conversation.

I see where A-P-I is "how," and S-C-A is "what,"
What way to speak, and what to say, it stays in or it gets cut.
Can S-C-A please tell me, like "and," "but" and "or,"
How to control the "soft-where" from the top down to the floor?

Remember A-P-I is "how to speak," the S-C-A has reason why.
I think doing things together is easy if you try.
No problem need be had, if enough of this you follow.
Pop says S-C-A with A-P-I is the road to our tomorrow.

What they are and how they work, you may not care too much.
Important is that work it does, on not-a-phones and such.
When not-a-phones talk together and all say the same things,
Then my Pop is happy, and from work a smile he brings.

He gives away the computer-speak, the "soft-where" is all free.
Because he always wants others to understand, you see?
Even when the box they change, or give it a different name,
If that "soft-where" they will use, the speak will be the same.

I will look at him and understand a part of what he'll say.
I know that what he does, is to make tomorrow a better day.

MR. ALAN CLAYTON (LTC, USA, Ret.), provides contract support for G2 Software Systems Inc. to the Program Manager for Tactical Radios at the Joint Tactical Networking Center (JTNC) in San Diego, CA. He holds an M.S. in program management from the Naval Postgraduate School, an M.A. in national security and international relations from the Naval War College and a B.S. in engineering science from the University of Florida. He is registered as a mentor for science, technology, engineering and math education in the Nova and Supernova awards through the Boy Scouts of America.

MS. ASHLEY BUZZELL provides contract support for G2 Software Systems Inc. to JTNC. She has more than 11 years of experience supporting DOD in the areas of public affairs, corporate communications, media relations and event planning. She holds a B.A. in sociology from the University of Delaware.

SIMPLY PUT

Software-defined radios (SDRs) are systems that can change their radio emission and reception functions through programming that can be modified and updated. They can change the type of modulation and encoding, or the frequency band and the intended effect, from data transmission to jamming, or change from reception to sensing. The new tactical radios being procured by the U.S. military are SDRs. Technology advances faster today than it did during the procurement of the current voice (Single-Channel Ground and Airborne Radio System (SINCGARS)) or data (Enhanced Position Location Reporting System (EPLRS)) radios that were the mainstays of the Army for many years.

To explain simply the difference between the newer, software-defined radios and the older, hardware-defined radios, consider a smartphone. If you had a truly software-defined cellphone, it would have required only a software update to progress from 2G to 3G, 4G or LTE. However, current cellphones are hardware-defined and use hard-coded modulation techniques, such as LTE, Wi-Fi or Bluetooth. The original iPhone, for example, worked only with 2G and is not upgradable.

There are good reasons for manufacturers of smartphones to do this. One is profit. If your phone could be upgraded to the latest and greatest with nothing but a software update, there would be little reason to go out every year or two and buy a replacement. But as compelling as profit may be, so is the speedy advance of technology: Cramming all that tech into such a small space requires sacrifices. The chip that runs the phone—its computer brain—has to be very small. Technological advances make it possible to produce smaller and faster chips that significantly increase speed with each new model.

However, what is true of consumer electronics isn't necessarily true of military electronics. For tactical users, there are several reasons for wanting to be able to change the signaling software or waveform. These include corrections for security, improvements in efficiency and changes to adapt to new technology, among others. Military radios are expected to have a life span of 10 to 15 years for a vehicular model and five to 10 years for a portable one. And they don't have to fit in a shirt pocket. Plus, improvements must be made in parallel with all other military radios at the same time to maintain interoperability. Not so with smartphones, despite their expense. Big changes to the technology require replacement of the entire phone.

TACTICAL SMARTPHONES
Soldiers used SDRs during Network Integration Evaluation 15.2, one in a series of Soldier-led evaluations designed to further integrate and rapidly advance the Army's tactical communications network. (Photo courtesy of the Program Executive for Office Command, Control and Communications – Tactical)

The software communications architecture (SCA) is a specification that defines a software architectural framework for management, control and configuration of an SDR. Although it is often misunderstood to be an operating system (OS), like Windows, the SCA specifications are actually only an explanation of what the manufacturer's own OS needs to include and be able to do. The specifications tell the manufacturer how the software they develop using the application program interfaces (APIs) must interact with the waveforms' software. Both—the SCA and API specifications and the actual waveform software—are mature technologies available for the manufacturers to implement.

SDRs themselves can be thought of as a collection of components that are commanded or employed by the software. Examples include GPS, Ethernet, encryption and even the processors. Radio services are persistent libraries of software code that provide common software functions to the waveforms. APIs are standardized so that every manufacturer's radio has the same exact protocols;thus, the different software packages can talk to each other in the same way.

—MR. ALAN CLAYTON (LTC, USA, RET.) and MS. ASHLEY BUZZELL

SPOTLIGHT:

MS. MITZI F. WALL

Sticking close to home

MS. MITZI F. WALL

COMMAND/ORGANIZATION:
U.S. Army Contracting Command – Aberdeen Proving Ground

TITLE:
Contract specialist/team leader

DAWIA CERTIFICATIONS:
Level III in contracting

YEARS OF SERVICE IN WORKFORCE: 32

EDUCATION:
M.S. in management/contracts and acquisitions, Florida Institute of Technology; B.S. in sociology, Towson University

AWARDS:
Numerous service, special act and performance awards

In a career field often characterized by change and movement, Mitzi Wall has managed to progress simply by staying in one spot. She's been with the U.S. Army Contracting Command – Aberdeen Proving Ground (ACC-APG), MD, since 1983, starting as a secretary and eventually advancing to her current position: contract specialist and team leader. "I know that mentors often say that it's important to move to other locations to get more experience," she said, "but as a mother with a husband who was constantly traveling, that was not an option for me. I found plenty of opportunities to cross-train and expand my level of expertise while staying here in Aberdeen. I even had the opportunity to work part time when my children were younger. I've been incredibly fortunate in that regard."

In 2011, ACC-APG resulted from the merger of two contracting centers, "and that changed our organization from a small one to a bigger one, with more layers of oversight and less autonomy. But as a larger organization, we serve more customers, and that means a lot more opportunities to work with different requiring activities and on different commodities."

Wall's work has earned her numerous awards over the years. "But the most meaningful awards are the ones I have received from customers who felt genuine appreciation for our work supporting the warfighter mission," she said.

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

As a team leader with an unlimited warrant, I coordinate and manage the distribution of work to provide acquisition guidance to support several customers across the Army and DOD, including the Threat Systems Management Office; Director, Operational Test and Evaluation; the Test Resource Management Center; the Program Executive Office for Enterprise Information Systems; and the National Ground Intelligence Center. These offices all have different missions and therefore require different procurement strategies. Ensuring that deploying brigades have state-of-the-art equipment through development, production and, ultimately, fielding has been my ultimate goal in the acquisition field.

STAYING THE COURSE
Wall has been with ACC-APG for more than 30 years, progressing from her first post as a secretary to her current position as a contract specialist and team leader. (Photo by Betsy Kozak-Howard, ACC-APG)

How did you become part of the Army Acquisition Workforce, and why?

I became a part of the workforce in the early 1980s. As a college graduate, I had many opportunities for upward mobility in the procurement field. I stayed in the field because of the amazing people who mentored me—they had experienced contracting through the Vietnam [War] era. They had a passion for the process and encouraged a team approach with the customers who needed to field services and products. They were so generous with their knowledge, time and general interest in me that it motivated me to learn as much as I could and to be an integral part of an acquisition team.

The most meaningful awards are the ones I have received from customers who felt genuine appreciation for our work supporting the warfighter mission.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

By far the most important part of my job is to help my customers traverse the acquisition minefield of regulations and procedures to ultimately get the service or product for their mission. This could be as simple as office furniture or a weapon system, or involve the research required to decrease the weight of a body armor system.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I have had numerous mentors throughout my acquisition career who have fostered my interests and kept me motivated to continue to strive to make the process more efficient and expedient for the organization enlisting my services. Helen Morrison and Richard Gravely were very influential in the early part of my career, and I've been privileged to work with Kathy Bankerd from midcareer until now. Everyone who's mentored me in one way or another helped me understand that my job is an important part of the acquisition process and inspired me to work hard, be cognizant of what needed to be achieved and to be proud of the work product.

I have been a mentor to interns throughout the years and found it gratifying to give back to people eager to learn. It is a challenge to mentor interns who come to you with no experience because of the time factor and your own workload, but to see someone begin to make independent decisions based on rules and procedures along with common sense brings a tremendous amount of satisfaction and pride in what we are all trying to accomplish.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

Executing contract actions that provide systems and equipment that directly help the warfighter in theater during Operations Iraqi Freedom and Enduring Freedom provides the most job satisfaction.

What advice would you give to someone who wants to get where you are today?

Because of the changes in federal contracting that I have seen over the years that I have been in this field, I would recommend that people entering the 1102 [contracting] series be very patient. There is a lot to learn, and it can be burdensome and overwhelming. Take advantage of all advanced learning opportunities and educational assignments to further your understanding of the process and how to grow in this field.

—MS. SUSAN L. FOLLETT

FLEXIBLE CONTRACTING SUPPORT

MAJ Ken Bulthuis, right, LOGCAP administrative contracting officer, meets with LTC Lee Hicks, U.S. Joint Forces Command engineer, and 1LT Nathan Zimmerly, center, contracting officer's representative with the 62nd Engineer Battalion, in support of OUA in Barclayville, Liberia. Within a week of the request for support, a site assessment team was on the ground scouting locations for the 3,000 U.S. Soldiers who deployed to help control the spread of Ebola. (Photo by Garry Carter, U.S. Africa Command LOGCAP program deputy director)

CUSTOMER CONTACT

Responding to unique contracting challenges, DOD has made a major strategic change in contingency contracting administration services to support U.S. forces in Africa—from the fight against the Lord's Resistance Army and Joseph Kony to the Ebola outbreak—that makes it easier to get needed services and supplies to the customer, much more rapidly.

by MAJ Justin L. De Armond

Africa is an extremely challenging environment that requires contracting officials know their craft and be able to understand and adapt to each customer's requirements.

This is especially true for those in the noncommissioned officer (NCO) 51C acquisition military occupational specialty. The 51C's roles and responsibilities encompass contract administration, employing different contracting actions to support customers' requirements and providing sound business advice within the construct of federal regulations to support customer needs. These NCOs must be knowledgeable in contracting and adaptable enough to adjust their skills to meet the demands of each unique situation.

A key geographical term for central Africa that describes the difficulty of doing business there is "pole of inaccessibility." Put simply, Africa is a very large continent with many countries, many with porous borders, and everything in central Africa is very hard to reach quickly. For example, it is faster to fly in a special holiday meal than transport it over land.

So it came as a welcome change when, in the midst of the effort to remove Joseph Kony and the Lord's Resistance Army from the battlefield in central Africa, DOD undertook a major strategic shift in contingency contracting administration services (CCAS). The requirement to support special operations forces (SOF) in that effort—Operation Observant Compass (OOC), which began in October 2011 and continues today—created a unique contracting challenge for the civilian-led Defense Contract Management Agency (DCMA).

In a first for the U.S. Army, CCAS support and responsibilities transitioned from the DCMA to the U.S. Army Contracting Command (ACC) and U.S. Army Expeditionary Contracting Command (ECC) with its first activity coming under the 414th Contracting Support Brigade (CSB) headquartered in Vicenza, Italy. This change supports the existing regional alignment of CSBs with combatant commands.

"ACC's assumption of the CCAS mission will allow the Army to provide full-spectrum contracting support for an expeditionary Army, including the award and on-site contract administration

ALLIED PARTNERS
De Armond, right, takes part in a site visit during the mission with the Uganda People's Defence Force. As OOC matures, the ability to turn contracted support services on and off at forward operating sites is crucial. (Photo courtesy of MAJ Justin L. De Armond)

of complex services, allowing the Army to more effectively project global power very quickly in support of combatant commanders," said MG Theodore C. Harrison, commanding general of ACC until August 2015.

CCAS ROLES, RESPONSIBILITIES

CCAS is essentially the management, oversight and execution of a contract in a contingency environment. It serves a vital role in ensuring that the U.S. government receives the required services while at the same time warfighters are fully supported to achieve their mission objectives. Traditionally, CCAS missions consist of civilian personnel who manage awarded contracts. Previously, two DCMA civilians filled the support roles for OOC, which transitioned to two 51Cs in June 2014. The typical positions based on each mission include administrative contracting officer, quality assurance representative, property manager, management analyst, information technology personnel, operations officer and others as deemed necessary.

The Logistics Civil Augmentation Program (LOGCAP) uses CCAS, in conjunction with its own personnel, to manage the service contract supporting OOC. LOGCAP, using CCAS, helps customers develop requirements for OOC with a team of subject-matter experts. The significance of the strategic shift in CCAS support lies in the existing regional alignment of contracting and operational forces, as well as the military contracting force assuming greater responsibilities in the ECC that fit its capabilities and skills.

Before the change, the DCMA civilian personnel supporting the mission had no ties to the region or connection to the combatant commands and often came from different offices; military contracting personnel, however, have an inherent relationship with the combatant commands as the result of regional alignment, and often come from the same unit.

TACTICAL OPERATIONS

In a noncontingency environment such as OOC, providing contracting support with an underdeveloped infrastructure is a challenge. However, to meet the needs of the SOF teams, LOGCAP is using the contract structure from the wars in Iraq and Afghanistan for base life-support services. The contract includes a laundry list of available services that can be executed by the contractor; these services, such as pest management and water production, can be turned on or off as needed.

One of the main challenges is continuing to meet emerging customer requirements as the mission matures in its effort to remove the Lord's Resistance Army—continuously on the move through central Africa's porous borders—from the battlefield. As such, the LOGCAP effort can adjust rapidly to ensure that there's no degradation in the services provided. However, advance planning is necessary to prevent a gap in support. The capability to turn on a service required to support a particular need is vitally important to continuing mission support.

The Soldiers identify a requirement, and the LOGCAP team can act quickly to meet that need. For example, the team installed a new structure at a forward operating site within weeks of notification. Emerging requirements in Africa necessitate that U.S. Army Africa prepare for operations against threats as they arise throughout the continent. The LOGCAP role for these requirements is to maintain an expeditionary posture and provide customers with solutions to enable them to execute missions and operations rapidly.

As an example, the OOC team prepared to support the initial actions for Operation United Assistance (OUA), as the LOGCAP task order covers the entire African continent. The OOC team prepared to support up to 3,000 U.S. Soldiers in response to the Ebola outbreak in western Africa.

The logistics management specialist (LMS) immediately started working on the requirements with the U.S. Army Africa planning cell to ensure quick activation of a LOGCAP solution. In less than a week, the OOC team moved a site assessment team to Liberia to start reconnaissance for base life-support service, including initial site preparation for tent cities that would house the units supporting the effort at various locations in Liberia.

Key stakeholders—which included the contractor, LOGCAP planners in U.S. Army Africa and U.S. Africa Command, the LOGCAP Project Management Office in Rock Island, IL, and the administrative contracting officers (ACOs) in Africa—had daily OUA LOGCAP synchronization meetings to ensure seamless coordination for the support effort.

KEY FORWARD CCAS ROLES

In the operational and tactical environment, there are three key positions that play a large role in CCAS. First, an ACO's duties supporting OOC encompass the typical post-contract-award functions. However, a LOGCAP contract is different in that making changes to customer needs occurs more quickly and seamlessly than making a change to a traditional contract. A LOGCAP contract uses change management "to reduce the administrative burden by clearly establishing what will constitute a change or modification requiring an equitable adjustment," (from the April 13, 2012, LOGCAP Change Management

URBAN OBSTACLES
On-the-ground contracting support staff head to a meeting with local contractors. As ACC assumes the CCAS mission in Africa, 51C NCOs, in addition to other ACC and ECC staff, are assuming the on-site contract administration of complex services. (Photo by MAJ Justin L. De Armond)

DEVELOPING A LOCAL SUPPLIER BASE
A post-award conference with a vendor supporting OOC. Developing a strong contractor base to support African requirements is essential to meeting emerging customer requirements. (Photo courtesy of MAJ Justin L. De Armond)

PROJECTING POWER ACROSS THE CONTINENT
The African continent's vast stretches of wilderness and porous borders present unique challenges to the SOF teams working to remove the Lord's Resistance Army from the battlefield—and to the contracting teams that support the SOF mission. (Photo by MAJ Justin L. De Armond)

THE LAY OF THE LAND
Flying is often the quickest way to transport goods throughout the area covered by OOC. Requirements on the ground can shift very quickly and Soldiers can find themselves setting up a forward operating site in a remote, undeveloped part of Africa. (Photo by MAJ Justin L. De Armond)

SITE VISITS WITH A VIEW
Flying over the Blue Nile while conducting site visits in Central Africa, QARs make sure the government gets the services it pays for. They travel to forward operating sites to inspect vehicle maintenance services, water production services, fuel management services and more. (Photo by MAJ Justin L. De Armond)

Guide). The ACO can turn services on and off based on the listing within the task order. Larger requirements, such as runway repairs, can be executed in weeks rather than the several months needed to execute the same requirement using normal contracting actions.

The LOGCAP process to make contract changes allows for a faster "flash to bang," effectively allowing customers to adjust quickly to requirements as necessary. For one change management method, the customer initiates a letter of justification for a service; then a project planning request is sent to the contractor, who in turn submits a project planning estimate. A technical evaluation is completed and, if funding is available and the contractor's estimate is acceptable, the ACO issues an undefinitized change order and the contractor can begin work on the requirement.

A challenge is coordinating with all stakeholders to ensure that mission needs are met in a timely manner. Integrating with the Special Operations Command Forward – Central Africa and Joint Special Operations Air Detachment staffs, to provide business guidance and recommendations became key to the overall success of the mission.

Secondly, the role of the quality assurance representative (QAR) is to ensure that the services provided meet the government's needs. Monthly inspections take place where services are occurring, which means traveling to the forward operating sites. A site has upward of 20 services that are inspected each month. For instance, the QAR will inspect the vehicle maintenance, water production, fuel management and production services. The QAR coordinates with the contractor site manager to ensure access to the services being inspected.

Additional QAR duties may involve managing field ordering officers and conducting traditional contract specialist and contracting officer duties.

The LMS is the primary requirements developer and planner supporting LOGCAP on the ground in Africa. This is a vital role; the LMS works work directly with the customers to develop a clear and concise requirement based on need. In addition, the LMS helps customers with their justification documentation to commanders and with actions under the change management processes, which include the letter of technical direction and undefinitized change order.

The LMS also plays an important role in planning with Special Operations Command Africa and U.S. Army Africa for emerging requirements. The LMS uses years of LOGCAP experience to provide recommendations and guidance for the Africa operations. Thanks in part to the regional alignment of the CSBs and combatant commands for OOC and OUA, planning and execution happen in a more seamless and face-to-face fashion.

STRATEGIC SHIFT, REGIONAL ALIGNMENT

This strategic shift from DCMA to the Army marks the first time that the Army is taking the lead for CCAS responsibilities. Previous LOGCAP CCAS positions were filled under DCMA. The importance of the shift is that it reinforces the existing regional alignment of CSBs and combatant commands. Having two military organizations working closely together aids in developing and supporting operational requirements by virtually putting the two entities that speak the same language in the same room to conduct business.

BG Michael D. Hoskin, ECC's commanding general, reiterated the importance of the alignment, saying, "Regionally aligning the CSBs with their COCOMs [combatant commands] and providing a CCAS capability will enhance contracting efficiency and effectiveness." He added, "Regional alignment will inherently create relationship-building and provide either command with further insights in each other's role in supporting Soldiers."

With additional workload requirements now under the purview of ACC, a subordinate organization of the U.S. Army Materiel Command, how to support the various operations, missions and exercises worldwide for the military contracting force will require greater attention to detail.

There will be challenges to the ACC/ECC and the 51C workforce as they assume the CCAS mission from DCMA. The transition will require training for ACOs, QARs and property administrators, and understanding the roles and responsibilities of CCAS. ACC HQ will conduct property management and QAR training using the Defense Collaboration Services tool, which is a Web-based system (like a video teleconference system at your desk) that allows virtual training and meetings to occur with teams in the field. A strong reach-back relationship with DCMA and its subject-matter experts will also assist in the changeover. Executing ACO and QAR duties under the Army's lead for LOGCAP operations and contingencies is a new responsibility for the military's 51Cs; previously 51Cs conducted CCAS duties in an individual augmentee role.

CONCLUSION

The CCAS mission and supporting contract vehicles such as LOGCAP will become an important part of 51C capabilities, but with greater experience and knowledge 51Cs will better support their regionally aligned customers. A continual challenge with regard to the Army Operating Concept "Winning in a Complex World" is the continuation of customer education. An additional challenge is helping customers to properly define and address their requirements in support of operational objectives, especially in an environment such as Africa.

Additionally, developing a strong contractor base to support African requirements will be essential to meeting customer requirements. Hoskin pointed out that "initially there will be challenges and hurdles to overcome in transitioning the CCAS role to a military-led effort. However, the great things about our military contracting force are their capability to use disciplined initiative, take their contracting experiences and translate those skills into supporting CCAS missions." The benefits far outweigh the challenges, and the existing regional alignment of CSBs to combatant commands will posture the Army for success.

*For more information, contact the author at **justin.l.dearmond.mil@mail.mil** or 314-483-5571, or go to **www.africom.mil**.*

MAJ JUSTIN L. DE ARMOND currently serves as the battalion operations officer for the 903rd Contingency Contracting Battalion, 409th CSB, Kaiserslautern, Germany. He has an M.A. in management and leadership from Webster University, an MBA from Gonzaga University and a B.S. in chemistry from the United States Military Academy at West Point. He is Level III certified in contracting and an Army Acquisition Corps member.

A 'People Person' REMEMBERED

The Hon. Claude M. Bolton Jr., 1945 - 2015

by Ms. Margaret C. Roth

"It starts with people."

Actually, the 23½-minute welcome address that the Hon. Claude M. Bolton Jr. was about to wrap up on Nov. 27, 2006, had started with a comparison of the human brain versus the Blue Gene supercomputer. Bolton, speaking to the 25th Army Science Conference as the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and conference host, was leading the audience on an adventure in human potential.

Relaxed in a suit and tie, walking back and forth on the stage with an occasional pause, he spoke engagingly and with ease about calculations per second—10 to the 16th power in a human brain, versus 10 to the 15th for Blue Gene, which IBM had introduced in 2004—technology readiness levels, the DOTMLPF (doctrine, organization, training, materiel, leadership and education, personnel and facilities) framework and hypervelocity effects.

His point, however, was simpler than all that, and fundamental to his entire career. He was, literally, talking about brainpower. Bolton himself had brainpower to spare. His career spanned 32 years in the Air Force, including a stint as a test pilot. He retired as a major general, earning multiple degrees along the way, including two honorary

SHARED EXPERIENCE
Dean G. Popps, left, Dr. Malcolm Ross O'Neill, Paul J. Hoeper and Bolton join the Hon. Heidi Shyu, then the acting ASA(ALT), in December 2011 to discuss the "then and now" of Army acquisition, drawing on their experiences as Shyu's predecessors. (ASA(ALT) photo)

doctorates. Immediately after retiring, he served for six years as the ASA(ALT) and Army acquisition executive, followed by seven years as the executive-in-residence for the Defense Acquisition University (DAU) until he died unexpectedly at his home on July 28. An avid runner, he had been training for the Air Force Marathon, which he ran every year; his two daughters ran marathons with him.

In his address at the conference, captured by photographer and now-retired defense contractor Randall Wingett on YouTube at ***https://www.youtube.com/watch?v=50LBIDBUkVU***, Bolton playfully challenged his audience with the question: "How many watts does the average human brain consume?" After taking guesses, Bolton provided the answer, interwoven with other salient details: "You consume a whopping 15 watts of power." And from that one factoid grew a bigger principle: "Virtually everything we'll talk about at this conference … everything that we know, is the result of someone's 15 watts of power."

Bolton dedicated his life to bringing out the best from anyone and everyone's 15 watts of power. In the weeks after his death, from every corner of his life came admiration and appreciation for the uncommon generosity he showed with his time, personal interest and, when called upon, his advice on navigating the complex world of acquisition.

Bolton was a command pilot with more than 2,700 flying hours in more than 30 different aircraft. During the Vietnam War, he flew 232 combat missions, 40 over North Vietnam. He was a test pilot for the F-4, F-111 and the F-16, and the first program manager for the Advanced Tactical Fighter Technologies Program, which evolved into the F-22 System Program Office.

LTG Michael E. Williamson, the principal military deputy to the ASA(ALT), recalled how approachable Bolton was, despite his numerous titles: Honorable, Major General, Doctor. He always introduced himself as "Claude," Williamson said, and served as mentor to many officers and civilians, including Williamson as a lieutenant colonel and thereafter.

"He brought a lot of technical understanding of program management and programs to the job," said Williamson. "He knew what program managers and acquisition professionals had to produce." With extensive knowledge tempered by a dry,

self-effacing sense of humor, Bolton had the charisma of a widely respected college professor whose 90-minute class is over well before you might have expected.

Dr. Roy Wood, acting vice president of DAU and former dean of the Defense Systems Management College (DSMC), recalled an occasion when, a couple of hours before a graduation ceremony for the Program Manager Course, the invited guest speaker called to say he could not attend. "I asked Mr. Bolton if he would consider being our keynote speaker," Wood said. "Without hesitation he agreed and, speaking without notes, shared an authentic and riveting talk about individual responsibility and accountability, filled with his personal wisdom and insights gained during four decades of operational, acquisition and executive experience.

"Mr. Bolton was a great American, and he will be sorely missed here at DAU."

THE LISTENER
Bolton in a relaxed moment, listening, which friends and colleagues said he did very well. (Photo by SSG Kevin Moses, courtesy of Defense AT&L Magazine)

Joan Sable, chief of the Human Capital Intitiatives Division for the U.S. Army Acquisition Support Center, said Bolton "was a charismatic, caring leader who ensured that all the members of his team's voices were heard." Sable met Bolton, then a colonel-selectee, in 1993 when he became the commandant of DSMC, where she worked. She served on a team that he created to address initiatives in total quality management, of which he was "a huge proponent," Sable said. "I was proud to be a member of this team and have a leader like Mr. Bolton. He made a difference."

Sable, who joined the Army acquisition community in 1999, said she was fortunate to work with him again after he became the ASA(ALT) in 2002. "He was a true leader in every sense of the word. This world has lost a great man, a true patriot and a man who loved his country and the people in it. He will be missed," she said.

> *"He could strike up a conversation with anybody. He enjoyed listening and hearing what they'd done. If he could help or give advice, he would."*

Bolton would have stayed in the Air Force "until they kicked him out" if President George W. Bush had not asked him to take the job as the ASA(ALT) and Army acquisition executive (AAE), said his wife, Linda Bolton. "You could not be on active-duty status and take this job," she said. After discussing it with his wife and daughters, Bolton said yes to the White House and retired from the Air Force at Wright-Patterson Air Force Base, OH, on Dec. 31, 2001. The family drove to Washington, DC, on New Year's Day 2002, and Bolton was sworn in on Jan. 2, retiring from that job six years later to the day, an unusually long tenure, his wife said.

One of the accomplishments of which her husband was most proud was becoming a fighter pilot, then going to test pilot school and becoming a test pilot, Linda Bolton said. Flying out of Thailand

> *"In addition to his many accomplishments, he always made time for all the people he worked with and encountered. … Approachable, always caring, always positive, always thoughtful and always genuine."*

during the Vietnam War, he recalled, she said, that some of the equipment didn't perform as it should have. "He thought if he were ever in a position to influence that, then he would like to do that," she said.

That opportunity first presented itself in the Air Force and then again, in an even bigger way, in the Office of the ASA(ALT). As an Air Force acquisition officer, Bolton started the program that became the F-22. "That was quite a milestone in itself, because they had only three people and zero budget," she said. Bolton also played a leadership role in the first flight of the B-2 program and in the F-16 program as program element monitor. Mauro Farinelli, then F-16 system technical officer at Air Force Systems Command and now director of international programs at Parsons Government Services, said that Bolton, busy as he was, "always found time to help or explain the details of some issue. I considered him a mentor and a friend."

"He could strike up a conversation with anybody," Linda Bolton said. "He enjoyed listening and hearing what they'd done.

AT HOME IN HIS WORK
Bolton talks with students at DAU, where he was always accessible to students and faculty alike. (Photo courtesy of DAU)

AN ENGINEER AT HEART
Bolton, then the ASA(ALT), examines a small flexible display. The Army officially opened the Flexible Display Center at Arizona State University (ASU), Tempe, AZ on Feb. 4, 2005. (Photo by Timothy Trumble, ASU)

DEVELOPING ACQUISITION
Bolton examines a display of the Advanced Bomb Suit in a 2003 visit to the Program Executive Office (PEO) for Soldier at Fort Belvoir, VA, with LTG John S. Caldwell Jr., then-military deputy to the ASA(ALT) and now retired. They were briefed by then-MAJ Andrew MacDonald. (Photo courtesy of PEO Soldier)

If he could help or give advice he would. … If you needed some mentoring, you just needed to ask."

Bolton's service as the ASA(ALT) and AAE was remarkable for reasons other than the length of his tenure. His appointment "drew a lot of attention, first [because he was] a prior Air Force general officer, and second, an African-American," said the Hon. Katrina McFarland, assistant secretary of defense for acquisition. McFarland was working as a program manager (PM) for the U.S. Marine Corps at the time, a position that brought her in contact with all the services because the Corps so often makes joint purchases to meet its requirements and make its money go further.

"This attention quickly dissipated as he began reviewing programs," McFarland said. "His skills as a PM and leader overcame any other topic when prepping to meet with him to obtain support [or] guidance for an acquisition decision. One learned quickly that you had to have a comprehensive knowledge of your program," including the acquisition staff skills required—a first in her experience, McFarland said.

"He carried the interest in the acquisition workforce his entire career," McFarland said, which she would see as president of DAU during Bolton's tenure there as executive-in-residence. In that capacity, he filled many roles in classroom support and communications about the workforce, and "he came often to counsel me or ask for advice," she said.

"I learned a lot from him. He was a wealth of history as well as knowledge," not to mention candor, she said. "He was right there to offer an unvarnished opinion. There was an underlying theme, however, that always came clear: He cared about how we conducted acquisition, and he cared about our workforce. And he was committed to helping the Department [of Defense] improve."

"He was an experienced practitioner who understood the defense environment and the people within it," said RADM Lenn Vincent (USN, Ret.), who holds the Forrestal-Richardson Memorial Industry Chair at DAU. Vincent met Bolton in 1993, when he was commander of the Defense Contract Management Command and Bolton the DSMC commandant. "In addition to his many accomplishments, he always made time for all the people he worked with and encountered. … Approachable, always caring, always positive, always thoughtful and always genuine."

Students and faculty alike enjoyed ready access to Bolton, said Dr. Michael C. Ryan, professor of program management for DAU's South Region and DSMC's PMT 401 Enterprise Course director from September 2012 to February 2015. "His engagement with the PMT 401 course and its students helped to thoroughly enrich the PMT 401 experience for each student he interacted with, as he contributed his knowledge and experience to the course. He will be missed, not only by the students, but also by the PMT 401 faculty, with whom he spent many hours over the last few years, providing assistance and valuable feedback that directly influenced the quality of instruction and the course," Ryan said.

Educated as an electrical engineer, Bolton also shared his passion for engineering with friends and colleagues. "I always enjoyed talking with Claude about our electronics projects. He was a true-blue electronic engineer! He would rebuild antique radios, tape recorders and televisions," said David Miskimens, professor of program management and mission assistance at DAU, who worked with Bolton on many of the capstone exercises for the 400-level executive courses.

"We had a common experience, having owned an old wire recorder from the 1950s. He was so smart on the details of every facet of the electronics—almost anything military or commercial," Miskimens said. He recalled that Bolton's "man cave" at home was not decorated with sports memorabilia. "No, Claude's was full of old electronic equipment, TV cabinets, oscilloscopes, test equipment and racks of electronic projects that he was working on."

Linda Bolton recalled that her husband "used to say that one of the best days for him was the day that the warranty ran out on something, because then he could open [it] up and really see how it worked, take it apart."

Bolton found it easy to explain how the acquisition, the technology and the logistics in his line of work all came together—through people. He drove this point home in the closing minutes of his Nov. 27, 2006 welcome to the Army Science Conference.

GOING THE DISTANCE
Bolton, in 2004, chats with Paul McMahon, then DAU liaison to the Office of the Secretary of Defense in his ASA(ALT) office at the Pentagon. Bolton served as the ASA(ALT) and AAE for six years, an unusually long tenure. (Photo by SSG Kevin Moses, courtesy of Defense AT&L Magazine)

> *"His skills as a PM and leader overcame any other topic when prepping to meet with him to obtain support [or] guidance for an acquisition decision. One learned quickly that you had to have a comprehensive knowledge of your program."*

"Institutions, you know, do not transform. They don't make this thing happen. People do. Organizations and platforms do not transform. People do that. Units don't train. They don't stand ready. They don't grow and develop leaders or scientists or engineers. They don't take risks. They don't sacrifice on behalf of the nation. People do that—people just like you. People just like the young people back there, who are coming in behind us.

"Everything that we have in the Army really starts with a piece of technology. Whether it's coming off the shelf, coming out of our labs, coming out of academia, coming out of industry, some bit of technology took place there. And behind that technology is some person who has spent a lot of time thinking about that technology, or perfecting that technology, or engineering that technology, or producing that technology or fielding that technology, using that technology and maintaining that technology. People do that. And without you, we are absolutely nowhere."

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

CONTRIBUTORS:

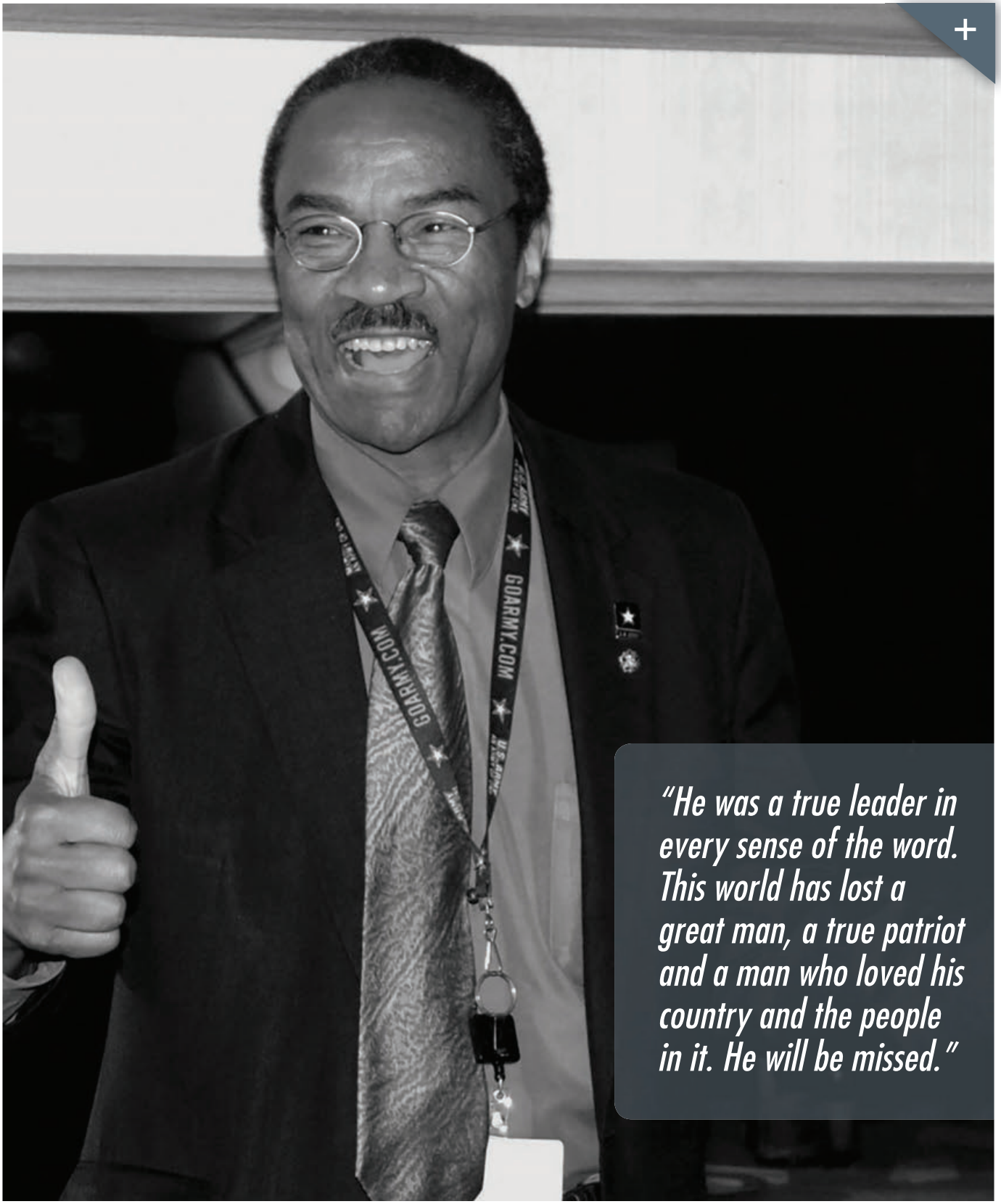
***C. Todd Lopez**, deputy chief, Army News Service; and **Robert E. Coultas**, departments editor, **Steve Stark**, editor, and **Susan L. Follett**, editor, Army AL&T magazine.*

HONORING EXCELLENCE

Robert F. Golden, Tactical Radio Communications Systems, PEO Command, Control and Communications – Tactical, receives the Project Manager of the Year Award from Bolton and LTG Joseph L. Yakovac, then-military deputy to the ASA(ALT) and now retired, at the annual Acquisition Awards Ceremony Oct. 2, 2005, in Arlington, VA. (U.S. Army photo by Richard Mattox)

HOLIDAY CHEER

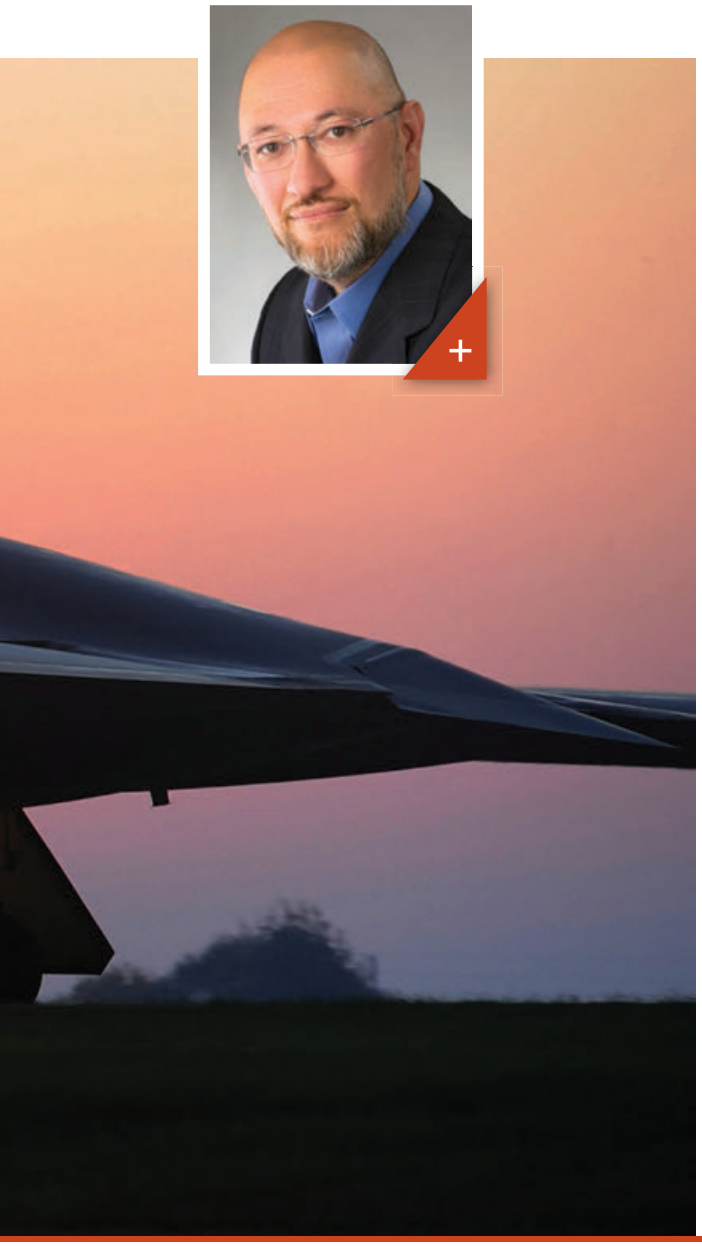
Scott Hofacker, front left, Santa Claus, Bolton and co-workers gather to enjoy at a table full of holiday food in 2006. (Photo courtesy of Scott Hofacker, via Facebook)



"He was a true leader in every sense of the word. This world has lost a great man, a true patriot and a man who loved his country and the people in it. He will be missed."

BRINGING THE THUNDER (STEALTHILY)
A B-2 Spirit bomber, with stealth capabilities that can penetrate the most secure defense systems, taxies on a flightline in October 2014 during Exercise Global Thunder 15. Innovation doesn't happen in a vacuum: The U.S. military didn't innovate stealth capabilities for the heck of it, but because the existing solutions to the problem of Soviet air defenses were expensive and imperfect. (U.S. Air Force photo by A1C Joel Pfiester, 509th Bomb Wing Public Affairs Whiteman Air Force Base)

WHAT KIND OF INNOVATION DO YOU WANT?



Corporate strategist, defense investor and student of complex systems Pierre Chao understands the many shades of innovation, particularly how it differs—widely—from the government to the commercial sector. And he has specific ideas on what makes innovation happen, what impedes it and where innovation should not take place.

Army AL&T most often looks outside the realm of defense for the Critical Thinking column, but for this issue on innovation, we thought it important to stay closer to home. That's because innovation in government and defense, and innovation in private industry—while not completely different—have significantly different incentive structures, an issue that's important to Pierre Chao, who has been involved with the topic for many years. Chao has served on several Defense Science Board task forces, on a presidential commission and as a guest lecturer at both National Defense University and the Defense Acquisition University.

For five years, Chao was a senior fellow and director of defense-industrial initiatives at the Center for Strategic and International Studies, where he is still a senior associate, before moving on in 2008 to co-found Renaissance Strategic Advisors, based in Arlington, VA, and Enlightenment Capital, based in Chevy Chase, MD. Renaissance advises clients in four areas: corporate strategy, market analytics, mergers-and-acquisitions due diligence and transaction

advisory. Those clients tend to be people on boards of directors or who have "chief" as the first word in their titles—chief executive officer, chief financial officer and so forth. Enlightenment Capital is an investor in small and medium-sized aerospace, defense and government services firms.

With an undergraduate degree in political science and management science from MIT, Chao describes himself as "a systems engineering-like thinker and pattern recognizer by genetics." He has always been fascinated with the defense industry, he said when we spoke with him by telephone on Aug. 19. "It's one of the few sectors that has a blend of technology, business, politics, finance, international relations; where they all come together and those complex intersections are relevant," he said. Interested in complex systems since he was a child, he said that the defense industry is "eternally fascinating to me to the extent that all these factors always come into play. And I would argue that if you look at the problem from just one of those lenses, you're going to miss a huge chunk of the issue."

Add to that an interest in history and military technology and an affection for multi- and interdisciplinary thinking, and it's easy to understand how Chao has participated in more than $12 billion in financial deals in the industry, including mergers and acquisitions as well as initial public offerings. We wanted to talk with Chao about innovation—what it is and what makes it happen, including the topic of acquisition reform. For Chao, you can't really talk about innovation without talking about acquisition reform, something he's intimately familiar with.

Army AL&T: Innovation is an odd thing in that it seems to mean different things to different people in different contexts. How would you define innovation?

Chao: Yeah, I agree. These days, innovation is a loosely bandied term and many times ill-defined because there are so many different types of innovation, and they're all important. I think too often people default immediately to the version of innovation that describes a massive technological breakthrough, the disruptive kind of innovation. And yet the reality is that, more broadly speaking, there's technological innovation, there's process innovation, and you have business model innovation.

Business model innovation occurs when we invent a way to do things differently. In some cases, you can get a major revolution in how things are done or how markets will work just by changing business models—for example, by rethinking tasks that were inherently governmental and then outsourcing them as a service or a product, or capabilities that are undertaken as a service or solution rather than delivered as a piece of hardware. There are also plenty of dramatic commercial examples—consider what Amazon or the other online stores did to the brick-and-mortar retail industry. Or the idea of a credit card versus carrying cash—that's a business model innovation.

Process innovation is more around the idea of, "How do you build things better, how do you manufacture, how do you improve?"—not necessarily changing the product, but finding ways to manufacture far more efficiently. Say a particular technology is well-established and well-understood—mature. It's sometimes far more important to have process innovation to try to bring the costs of mature technologies down and make them more broadly available. It's not necessarily about reinventing the technology or the product.

Finally, you have the kind of innovation that I think most people are familiar with, which is developing a new product. And there, you need to further subdivide it into two types. Disruptive innovation—I'm going to bring in a fundamentally new technology to completely change a market, which is a rare case. [Then] a more likely form of innovation, what people refer to as incremental innovation, where they're steadily improving the product.

When somebody says, "I want innovation," your first question back should be, "Well, what kind?"

Army AL&T: In an interview with Defense News at the recent Paris Air Show, you seemed to be saying that if you follow the money, you can find innovation.

The fear of failure that has crept into the system, into the culture, over the last 30 years—I believe—is a really dangerous thing. And this institutional fear of failure can only be beaten back, I would argue, by leadership and the willingness to protect those who take risks and fail.

Chao: The point was a little bit the reverse. As DOD or government is trying to encourage innovation, one of the things that in some ways make the government different than the commercial market is that, in the commercial market, you can create your own market. To the extent that you invent a product in the commercial world, it's also possible to invent the market. There was no such thing as the iPad market until Apple invented it; we all discovered that we wanted or "needed" one, and voila, the market category is created. The government market doesn't work that way: There needs to be a budget to buy an innovation and often, if a new technology is created but doesn't match a budget bucket, it takes time to create one. The creation of that technology bucket is not purely market- or demand-driven: there's politics, bureaucratic policies and other drivers.

INNOVATION SAVES LIVES
Army Reserve SGT Santiago Zapata of the 323rd Engineering Clearance Company uses the Talon tracked military robot to clear a route of IEDs in June at the Combat Support Training Exercise at Fort McCoy, WI. War makes clear which problems need solving, spurring innovation—like the counter-IED capabilities industry and government developed during the Iraq and Afghanistan conflicts. (U.S. Army photo by SFC Brian Hamilton, 108th Training Command – Initial Entry Training)

And so there you need more of a demand signal from the customer in the defense world in order to stimulate innovation: "This set of capabilities is important to me," or, "Solving this problem is important to us."

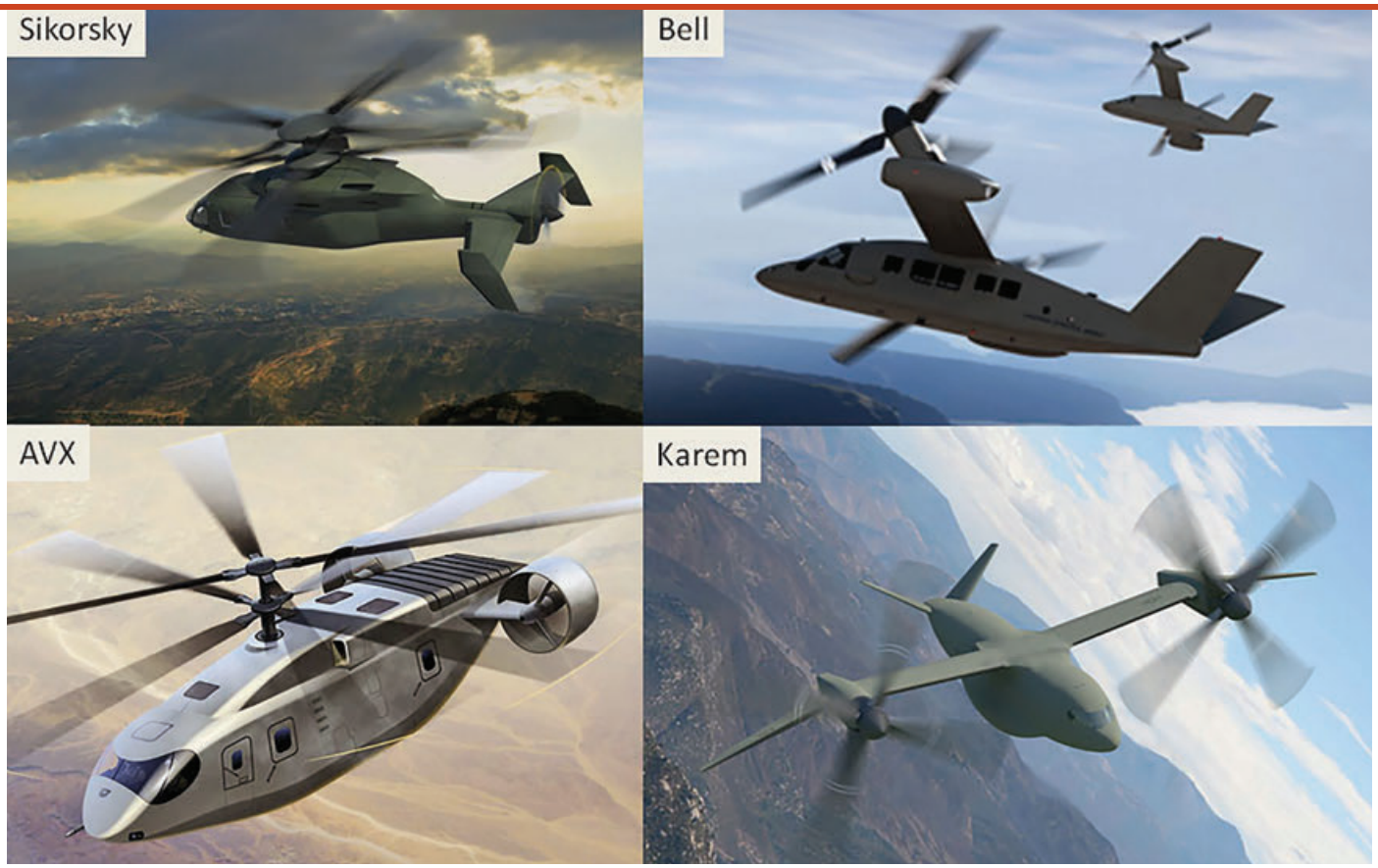
The part that's becoming very difficult for the industry is that, during the Cold War, you had a very large demand signal: "Beat the Soviet Union." That allowed industry to self-organize around that grand strategic goal. As long as you were working to solve those kinds of problems, you were pointing in the right direction. That became extremely muddied at the end of the Cold War, where we lost that demand signal, and that was about the last time we had, I would argue, an innovation challenge that was so clearly defined at a grand strategic level.

And then the wars in Iraq and Afghanistan came along, and that, at least, provided some guidance, or some demand signals, and you saw people step up to the plate with innovations to solve the war's problems—everything from MRAPs [mine-resistant, ambush-protected vehicles] to different kinds of sensors or counter-IED [improvised explosive device] gear or UAVs [unmanned aerial vehicles]. People knew where to innovate because they had a clear capability demand signal.

Now, we're back in this mode where industry has lost the demand signal—which priorities are important versus which ones are not. Is it to solve the high-end threat? Is it to solve the issues related to regional threats? Or is it still the terrorism challenge?

Army AL&T: You talked about mature technologies, and one of the things that comes to mind is enabling technologies. Tim Berners-Lee developed HTML and had really no idea where it would go, but knew that it could go somewhere. How important is that sort of thing—having those enabling technologies—to innovation?

Chao: Oh, it's critical. That's why throughout history innovation has not occurred in a linear fashion. There are bursts of activity. There's a fundamental, underlying, enabling technology that gets discovered—electricity, the internal combustion engine or the microprocessor—that drives follow-on innovation. The modern world is still experiencing the aftereffects of the invention of the microprocessor and integrated circuit. We've been living in an era that's been generally tied to Moore's Law: processing power doubling every two years. And now it's combined with the revolution in telecommunications, enabling the sets of technologies that wire the world together, providing the infrastructure for the Internet revolution—which then permits collaboration at a scale and level that's never existed before, triggering social and business model revolutions.



COMPETING TO INNOVATE
Chao argues for more, smaller programs to incentivize industry to stay invested in innovation. Of the four industry teams that submitted designs for tilt-rotor aircraft for a demonstration of a new vertical-lift platform, Sikorsky Aircraft Corp. and Bell Helicopter were selected in October 2014 to design, fabricate and conduct flight performance demonstrations for future vertical-lift capabilities in FY17. (Courtesy illustrations)

So, where, once upon a time, somebody could invent something two continents away—and it would take time for that to proliferate—what occurs today is spreading in near-real time.

We have Moore's Law that's been clicking away, making processing power stronger and stronger, and storage is becoming cheaper and cheaper. It's enabling all kinds of capabilities that we've always held out there as promising. Modeling and simulation [M&S], for example: People for a long time held out the promise and premise of what M&S can do. It's only now, because we finally have the processing power to do the things we've dreamed of, that it's finally coming into what people have been promising for 20 years in terms of capabilities.

Same thing with expert systems, AI [artificial intelligence]—whatever sets of terms you want to use around autonomy and more intelligent machines—we're finally able to do some of the things that people were dreaming about 10, 15 years ago. Our autonomous vehicles and robots are getting better and better. We're experimenting with self-driving cars, and it's getting harder to distinguish between human and automated responses in call centers. In a few more Moore's Law cycles, we'll be able to put as many circuits on a computer chip as there are neurons in the brain (86 to 100 billion). That will be in our lifetime. Then who knows what machines will be able to do?

Army AL&T: You were talking earlier about process innovations. Things like continuous process improvement and Lean Six Sigma seem to have the power to move very large bureaucracies that by nature don't want to move. Is it possible for the Army to make that a lot more pervasive part of the culture, even if you can't have a flat military organization with very little hierarchy?

Chao: You hit on this topic with that one, right word, which is "culture." In many cases, part of process innovation becomes a major culture issue. Historically you

don't get that kind of change in culture without a crisis of one form or another that forces fundamental relooks at how you organize, how you do things. That crisis for a military can be the beginning of conflict, and now all of your theory about how things should work goes out the window. You're facing a true adversary and you've got to rethink how you do things. In some ways, I would argue, the Army has been forced to get a little bit flatter because we've been fighting a very flat, nonhierarchical adversary, one who certainly has a very different organizational structure. In some cases we've had to match that. We've learned lots of lessons on how to do the "light fight" in the last decade.

Coming out of a war, we have a different set of challenges—budgetary ones that will once again force a look at how we're structured and how efficient the institution is, and how you function and maintain capability with far less budget and yet not much relief in terms of what's expected of the Army from a capability standpoint. So those kinds of [things] usually drive the search for efficiencies or create the imperative for business model innovation.

There's another element at play that relates to the topic of enabling technologies. The better you can measure the performance of an organization and the better you can analyze and understand the process of how your organization works, the more efficiently you can run it. It's the equivalent of medieval architecture versus Renaissance architecture—as mathematics and the understanding of physics got better, you could reduce the tolerances and you didn't have to build in as much margin because you could better analyze the structure. I think corporate America has been going through the same phenomenon. Operations research theory and tools have improved and we can better understand how it [corporate America] functions. So, therefore, you can more efficiently organize today than you could 20, 50, 100 years ago.

There is a limit, though, to how we design an organization that lives at the edges of tolerances and extremes of efficiency. Part of the inherent tension in any military organization is that you actually want to build in larger margins of error than in the commercial world because you face more extreme potential results in the case of failure or just bad luck. The consequences of burning through that margin are far more significant than in the commercial world—people die, battles are lost, countries fall.

So I would argue [that] it's a falsehood to claim that you'd ever want a military organization to be as efficient as a commercial organization. The consequences of failure are so large that a certain amount of inefficiency should be accepted to create redundancy and "strategic reserves." This is where the real subtleties come into play: If we want parts of our military organization to have inherent reserves, margin for error, inherent inefficiency relative to the optimum, then, in a tighter budget environment you would want—perhaps I should say *need*—all the noncritical functions to be extremely efficient to afford the cushion you want on the pointier end of the spear.

Army AL&T: People like Elon Musk, of Tesla and SpaceX, and others talk about how failure is not only an option but a must because if things aren't failing, you are not innovating enough. Government is a different story. No one wants to fail the taxpayer.

Chao: Well, that goes back again to a cultural issue. That wasn't always the case, and the tolerance for failure is something that we have lost, I would argue, over the course of the 1980s, 1990s, 2000s.

I think the willingness to tolerate risk has returned somewhat. The conflicts of the 2000s and 2010s created an imperative to take some level of increased risk. There's a good historical case study to prove that as an institution, we need to accept a higher level of risk if we want innovation. For example, look at the Poseidon missile program and you will see old video footage of the test missiles coming up out of the ocean, spinning out of control and exploding. We tolerated those failures then. But, to your point, today, probably within 24 hours you'd have Congress all over you because those same videos would be on CNN a thousand times a day, and that creates that pressure not to have those types of mistakes. And yet it is exactly those kinds of mistakes that drive understanding and knowledge and innovation, frankly. And so the fear of failure that has crept into the system, into the culture, over the last 30 years—I believe—is a really dangerous thing. And this institutional fear of failure can only be beaten back, I would argue, by leadership and the willingness to protect those who take risks and fail, and celebrate [those risks] as opposed to knocking them [the people] down.

We certainly have institutions that have that fearlessness about failure, in places like DARPA [the Defense Advanced Research Projects Agency] or the NASA of the Apollo era, historically. So, that tells me that it's not genetically impossible for the Pentagon, that it's something cultural that's crept in.

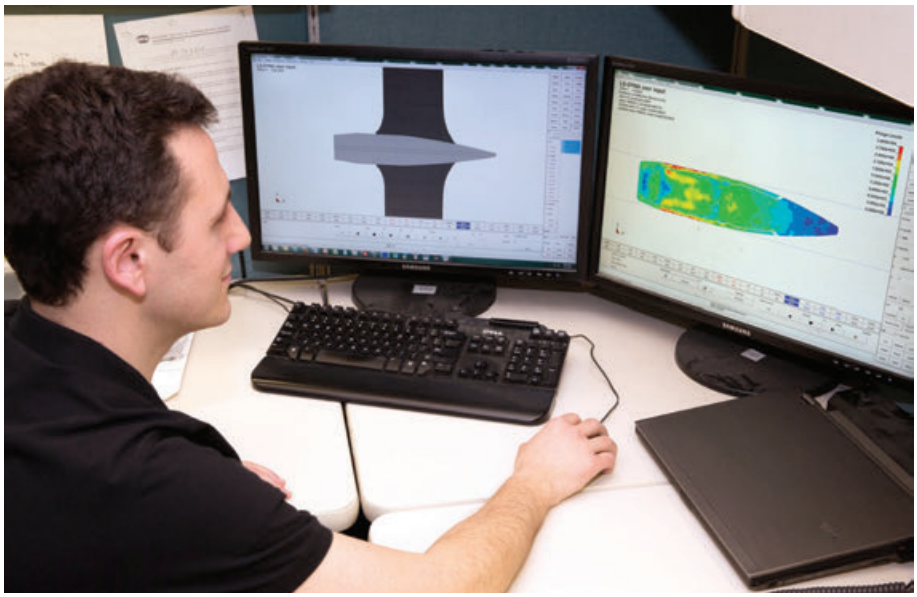
In a combat situation, the unwillingness to accept failure and a high level of caution can often cause strategic failure, failure on a grand scale. In peacetime

environments, you don't have something that creates a cost for being too cautious. And so, the system falls into, frankly, a bureaucratic stupor. I hate to use a controversial phrase.

Army AL&T: That's a controversial phrase, bureaucratic stupor?

Chao: Yeah, where people check boxes and, because there's no other way to distinguish between who is performing really well versus not, you pick away at every little failure as a way to differentiate between people.

It's such a fundamental point. If you want innovation, you need to accept failure because you are asking the organization to push its boundaries. Which raises another point: You don't necessarily want your entire organization to be focused on innovation—and to be clear, I'm talking about the extreme version of innovation centered on looking for major disruptive technology. Right? You only need a certain portion of your organization living on the edge, seeking extreme disruptive innovation. There are some parts of the organization that you frankly don't want innovation in. I don't want somebody experimenting around well-proven processes for managing the safety of a nuclear weapons stockpile, for example. It works, stick to the plan. Don't go goofy. It goes back to the [earlier] topic: Recognize that there are different kinds of innovation and tailor different parts of the organization to focus on them.



IT STARTS WITH A SPARK
Michael Cataldi, a mechanical engineer and modeling and simulation analyst with the U.S. Army Armament Research, Development and Engineering Center, uses modeling to evaluate small-caliber munitions. We live in an era defined by Moore's Law, Chao argues. As microprocessors get faster and faster, and storage gets cheaper and cheaper, it enables promising capabilities such as M&S, which in turn enables engineers to zero in on the strongest designs without churning through multiple prototypes. (Photo by Todd Mozes, U.S. Army Garrison Picatinny Arsenal, NJ)

Army AL&T: When you look at something like Better Buying Power, some of which seems to be more back-to-basics than revolutionary, do you think that it's striking the right balance between technological and process innovation?

Chao: Acquisition reform is one of these perpetual activities. After having studied acquisition reform for a long time and participating in a lot of the acquisition reform studies and efforts over the last 20 years, I think what you end up observing is that—the knee-jerk reaction to date has often been, "Let's rearrange the boxes or create czars or change the rules," when, in the end, getting back to the basics is where you should want to be. What I find encouraging about the latest round of acquisition reform discussions, and what Better Buying Power 1, 2 and 3 are beginning to embed, is the topic of incentives.

It doesn't matter what rules you set, it doesn't matter how many boxes you change. If you set the incentives the wrong way, then you're not going to get behavior change. This is why the topic that we just covered, willingness to take risk, is one of those elements that is disincentivized in the system.

If I'm a program manager in a company, and I take risks and I fail for legitimate reasons, not incompetence, and I'm punished for it—I lose my job, I lose my program, I lose funding, what kind of behavior change do you think that's going to trigger throughout the entire organization? Or if a company spends its own money inventing a product and the government grabs its intellectual property or insists on having [that] intellectual property so it can subsequently do open bidding on the manufacturing to crush the margins down, what do you the reaction is going to be the next time

If you want innovation, you need to accept failure because you are asking the organization to push its boundaries.

around that they're being asked to put money forward to invent something on their own?

So, ironically enough, acquisition reform is relatively simple if you get back to the basics, and I'm encouraged that [Undersecretary of Defense for Acquisition, Technology and Logistics] Frank Kendall, and many in the senior leadership in the Pentagon and the services, and certainly others like [Rep.] Mac Thornberry [R, TX] understand this. Congressman Thornberry's acquisition reform efforts, I think, have begun to zoom in on this topic of making sure that the incentives are set right.

Army AL&T: Speaking of incentives, the Joint Light Tactical Vehicle program had three companies that were competing, and each built its own competitive prototype. And then it was a winner-take-all decision. Certainly those companies are getting paid for their work, but after scaling up, two companies weren't going to win. They're going to lose jobs. Should it be winner-take-all?

Chao: This is one of the huge tension issues that's worth a deep look. We're doing these big, joint programs to have large enough scale in the programs to entice people to pursue them, invest bid-and-proposal dollars, and undertake independent research and development, again, because they have sufficient scale to justify the investment required. On the other hand, it's creating these winner-take-all situations in which—to your point—once you lose it, then we shouldn't be surprised that one of those losers ends up exiting the business entirely because, well, now there's nothing to go for until the next decade. For a midsize firm, it may cause them to exit that particular line of work or sell. For a larger, multibillion-dollar prime, it may cause them to exit that segment—or, if they see long-term potential, then hunker down.

The size of the budget will determine the health of programs. But it's the number of points of competition that will determine the health of an industry. So, when you go to one Joint Strike Fighter, you shouldn't be surprised that you'll lose a whole bunch of people that were competing in the manned fighter business, and now sit there and say, "Well, there's nothing to compete for [over] the next decade."

So, that is a deep issue in terms of future acquisition strategies and how you want to be building much broader acquisition strategies because you have those two tensions—create programs big enough to attract investment, but not so large that once they are decided you lose an industry. Some of the acquisition reform efforts address this and say, "Maybe we should have more X programs or other things so that when someone loses one of the big ones, they don't drop out; they'll have other things to hold them in."

I would argue if you want a broad, healthier industry, you want to have lots of smaller programs rather than huge ones. This goes back again to where you need to be sophisticated in your acquisition strategies. If it's an older, more mature technology, and you think it's going to be the last of something, then maybe you don't mind that you're collapsing the industrial base to a monopoly. But if it's an area where there's a lot of innovation, then you probably don't want to be creating these big, mega-programs because you don't want to be encouraging early exits by competitors, have them just give up because they don't see another entry point.

Army AL&T: In terms of a big program and you have a product that's supposed to last for decades, should there be some kind of mechanism where there's some competitive hound snapping at the incumbent's heels so they don't get complacent because they're locked in for decades?

Chao: Part of that depends on the broader technology cycles inside that industry. If the technology is not evolving that rapidly, or evolving at a 10-year or 20-year pace, then it's probably OK to lock in a vendor for that period of time. If you're seeing, however, as in parts of the commercial world, a technological evolution cycle of three years, then a decade or more without competition is probably too long. So, the acquisition strategy and the industrial-base policy strategy should not be divorced from an understanding of the technology development cycles. This is a sophisticated game, and one-size-fits-all policies will inevitably fail.

For example, one reform concept today is [that] we should make everything follow a spiral development program process. Spiral development, where you see how much you can get in a fixed time frame and then field it and move on to the next spiral, is very good for IT programs or other places where the technology is moving relatively quickly. It's not necessarily correct for other programs where

the technology is moving slower or needs a longer time to mature.

Army AL&T: Steve Jobs said, "You've got to start with the customer experience and work backward to the technology. You can't start with the technology and try to figure out where you're going to try to sell it." With Soldiers as the customer, have we got the equation right?

Chao: That is a key point. In the end, the Soldiers are the customer. They are the user. And the disconnect between the customer and the buyers was one of those topics the acquisition reform efforts were trying to fix in the '90s because they were beginning to drift apart. And then the war brought everybody back together. It dragged the "system" kicking and screaming into the current age because the [Soldiers] were, in frustration, becoming their own requirements generators and acquirers and going to REI to buy the gear on their own. I often made a point in the beginning of those war years: "Go take a picture of that Soldier's gear, lay it all out on the floor, and draw a box around how much they were issued versus how much they were going to REI or some other store and buying." [That] signaled that the acquisitions system had to catch up. And it did. We got multiple rapid-equipping types of mechanisms to change that.

As we get out of the war, [it's] imperative that we don't lose all of those hard lessons we learned. I think you're seeing a growing sense that we do need to involve the users—whether it's through the various mechanisms that the Army has established to get their input or through the COCOMs [combatant commands]—in terms of generating the requirements and needs. All of this calls for a better dialogue and interface between Soldier and developer. Systems just developed by the acquisition system, unhooked from users, unhooked from reality, will create a problem. On the flip side, users also don't often know exactly what they want, either. Right? If you just follow the polls or the surveys, you will also be wrong. At times there's interpretation—Jobs said start with the user experience, not necessarily the user. I'm sure a poll of the customer asking, "What do you want?" would never have come up with the iPod. It's that creative tension between the two methods that usually generates the best results.

Having as much interaction as possible between the user, the buying community that's trying to get things to you, the industry and the technological creators—that's key. The growth of the use of IPTs [integrated product teams] is all a reaction, I think, to this fundamental truth that if you try to build a product in a disconnected fashion, you have a higher chance of failure.

Army AL&T: Engineers solve problems, but they also tend to focus on features over benefits. So the Soldier, the customer, might become secondary to the benefit because the engineers are so focused on solving feature problems.

Chao: This is related to the question we just discussed. Jobs said solve the user experience. The same could be said: Solve the Soldier's problems. The best innovation comes from thinking about the problem as a whole—not by thinking about the technology or the feature. The benefit is derived from the fact that you are solving a real problem. I heard a story from a small startup company in the defense sector, founded by an ex-military person. His company was creating handheld devices to pull down fused intelligence data. He created the company because he was frustrated by what he had in the field—they were getting these big, clunky devices that had very nice touch screens developed by, I'm sure, very smart engineers. What they didn't know or forgot or ignored, was that the Soldier was usually wearing gloves when operating these devices. Nice feature; useless in the field. Knowledge of the user experience allowed his firm to develop a better product.

Another example is the evolution of stealth. We didn't start [out to] invent stealth out of whole cloth and without context because somebody said "I want to be invisible." They were trying to solve a problem: "How do I penetrate an ever-better-developing Soviet air defense system?" It was costing a fortune to brute-force our way through it with electronic warfare and better-performing aircraft. We were starting to climb the steep part of the cost versus capability curve. And it was in trying to solve a problem that stealth came about—a very innovative answer that wasn't an even-stronger electronic warfare box or ever-faster or higher aircraft, but a completely different way to solve an old problem. Wartime situations serve up your problems in a very stark and fast fashion.

The harder times are in peacetime situations where you've got to think through more, "What are the problems I'm trying to solve?" And that's why we're entering a period where the imperative has gone way up for leadership to send those demand signals and those priorities—"These are the problems that are really important to me as an institution that I would like to try to solve"—and then let the creative geniuses of the industry and everyone else try to solve it.

It goes wrong when you either muddy up what your priorities are or when you're too prescriptive: "I want you to solve my problem by having you develop a better

'black box.' " Really? Are you sure? How do you know that's the best solution? What problem are you really trying to solve? Because maybe I've got a fundamentally different way than just a better black box.

Army AL&T: You said something almost 10 years ago about the shift from "what to buy" to "how to buy." In your mind, what's the difference?

Chao: I think a lot of the acquisition reform efforts of the last 30 years, which were the reactions to some of the procurement scandals of the '80s and '90s, overly focused the Acquisition Corps on how it was buying—placing all these layers of oversight and double-checking and rules and checking boxes every step of the way. The focus was on process reform: "Am I buying the things that I'm buying well?" as opposed to the strategic question of "Are we buying the right things?"

It doesn't mean that you need to go willy-nilly and throw all the rules created over the last 30 years out. Some of those rules were put in place for a reason, but the original rationale may have gone away or the fix may be worse than the problem. The pendulum has swung really hard, I think, and probably overshot it, from the perspective of having the entire Acquisition Corps zoomed in on process—the "how" versus the strategic question of "what."

Army AL&T: If you were king of acquisition and you could change or "reform" any aspect of acquisition as it exists today, what would you change?

Chao: I'd zoom in on the incentives structure we have for industry and for program managers and PEOs [program executive offices]. I think it's so fundamental.

STEADY, AIM, FIRE
As computer processing power catches up to the stuff of sci-fi dreams, very new solutions to old problems emerge. Researchers at the U.S. Army Research Laboratory (ARL) are investigating the use of robotic exoskeletons to help Soldiers shoot accurately amid battlefield chaos. High-speed motion-sensing OptiTrack cameras monitor the exoskeleton's effect on simulated shooting. (Photo by Doug LaFon, ARL)

Today, we still have incentive structures that are misaligned. And, certainly, a lot of those misalignments are cultural. For example, if you have a well-performing program, usually what happens is that you don't get rewarded for it. Your money gets taken away—if you're under budget, you're going to have your money taken away and given to an underperforming program. That's not a good incentive for delivering good performance. Our overall profit philosophy is off. We still have a system that would rather pay $100 and 5 percent margins for something rather than $80 and 20 percent margins. That creates very perverse incentives.

King for a day? I'd spend a lot of brainpower and resources identifying those issues and trying to come up with offsets or fixes to those incentive structures. To be extreme and make a point, I can say it really has nothing to do with the rules or the FAR [Federal Acquisition Regulation]—which is actually pretty flexible at its heart; it has nothing to do with organizations and boxes and people and all that. It's behavior that we've just sort of embedded in the system—which parts of the rules we've decided to emphasize.

Army AL&T: We're talking culture again?

Chao: Yeah, we are, which is what makes this so hard. I have no illusions about how difficult these things are, because in the end, you're talking about culture. And culture is very, very difficult to change.

SPOTLIGHT:

MS. JENNIFER MURPHY

Rapid response, solid payoff

MS. JENNIFER MURPHY

COMMAND/ORGANIZATION:
U.S. Army Contracting Command – Redstone Arsenal (ACC-RSA)

TITLE:
Contracting officer, ACC-Redstone, Aviation Maintenance Directorate, Rucker/Logistic Support Facility Division

DAWIA CERTIFICATIONS:
Level III in contracting

YEARS OF SERVICE IN WORKFORCE: 11

EDUCATION:
M.S. in management with a concentration in acquisition and contract management, Florida Institute of Technology; B.S. in business administration with a major in management and a minor in procurement, Athens State University

AWARDS:
ACC-RSA Team of the Quarter Award for participation in the Acquisition Instruction Council

By her own admission, Jennifer Murphy's career started off slowly. But, roughly two years ago, it moved into a higher gear as she began working with a rapid-response contract for the U.S. Army Contracting Command at Redstone Arsenal (ACC-RSA) that's helping to get materiel to the warfighter in less time and at a lower cost.

Murphy got her start through the Student Career Experience Program (SCEP), and her first assignment was the PATRIOT Spares Office at ACC-RSA. "To start with, I did simple contract modifications, but as time went on, I was given more complex work," she explained. "I was fortunate to have a great trainer in Valerie Ritchey, who had the time and patience to teach me all about contract specialist work. I'm really grateful that I had a unique opportunity to learn process the way I did."

She's currently a contracting officer (KO) on a multiple-award indefinite-delivery indefinite-quantity (IDIQ) contract, a vehicle chosen in part as a result of the Better Buying Power emphasis on promoting competition. "The contract enhances competition, promotes small business and saves the government money by creating competitive actions on task orders that would otherwise be sole source," said Murphy.

One of the biggest challenges she faces with this streamlined approach is the condensed acquisition cycle. "Historically, contracting professionals have been asked to make up for lost time as the result of delays elsewhere in the cycle. In my current role, we have even less time to conduct our analysis," she explained. "It's challenging to do my due diligence as a KO and still keep the customer happy by meeting timelines."

"It's challenging to do my due diligence as a KO and still keep the customer happy by meeting timelines."

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

As a KO for the Aviation Maintenance Division supporting the Logistics Support Facility (LSF) Management Agency, I perform rapid-response contracting in support of all Army aviation systems and platforms, including Black Hawk, Apache, Chinook, Air Warrior, unmanned aerial systems, nonstandard rotary wing, armed scout attack, fixed-wing and aviation survivability equipment. In addition to supporting Army aviation, I support all other U.S. government agencies that operate Army-derivative aircraft—the Air Force, Navy, Coast Guard, Departments of State and Homeland Security and multiple foreign military sales (FMS) customers.

The contract actions that I prepare in support of these systems are through the issuance of individual delivery orders under a multiple-award IDIQ contract with an operational ceiling of $1.5 billion. Each delivery order is a streamlined competition between the two base contract award winners. I have awarded more than 20 new delivery orders since the contract's initiation 26 months ago and have performed hundreds of modifications. The office's fundamental premise is to support the program management office's cost, schedule and performance requirements. Our efforts greatly reduce cost because the two contractors on our IDIQ contract are small businesses.

To date, we have demonstrated greater than 30 percent cost-avoidance by using this contract, which equates to an annual savings of around $100 million (based on an annual business base of $250 million). Our streamlined contracting approach means that from requirement-identification to delivery-order award is much more rapid and greatly supports the warfighter by getting required materiel to the field as fast as possible.

How did you become part of the Army Acquisition Workforce, and why?

I began working for the Army in November 2004 as a GS-3 through SCEP. I felt SCEP was a great opportunity to explore the government job experience as well as the contracting profession, and I liked that it gave me the ability to gain on-the-job training for my future job while still pursing my bachelor's degree full-time.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

I see three different points of importance so far in my career with the workforce. First, SCEP introduced me to the government job experience and sparked my interest in the contracting profession. Additionally, during the two years I was part of the internship program, I was able to move to multiple different offices within ACC-RSA and was introduced to numerous programs and several different types of contracting environments. That experience gave me a general knowledge of how the different ACC-RSA offices operate and the vital role each one plays in supporting the warfighter. Finally, I think my promotion to KO is the most recent milestone in my career: it's an important responsibility that will continue to prepare me for even more advancement within the workforce.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

Many people have helped me in my career but I believe one person who has strongly influenced my path is Emily Crittenden, a KO and team lead for the Black Hawk multiyear program at ACC-RSA. I met Emily during my intern program and realized quickly that she was a very intelligent woman with a great attitude and sweet spirit. Since then, she and I have been great friends and colleagues and rely on each other during challenging circumstances.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

One of my greatest satisfactions as a workforce member is being exposed to multiple customers in support of the LSF contract. My communications with different aviation groups, outside organizations like FMS customers and the Navy and Air Force have given me a breadth and depth of understanding as to how the workforce supports the warfighter.

What advice would you give to someone who wants to get where you are today?

I would advise a future contracting officer to become extremely familiar with the Federal Acquisition Regulation and other government regulations. I would also suggest they have a great attitude and the ability to multitask.

—MS. SUSAN L. FOLLETT

PARTNERING TO PROTOTYPE

Soldiers and civilians participate in the armed unmanned ground vehicle demonstration at Fort Benning, GA, in 2013. AEWE brings together prototype developers and government and industry players to preview and test prototypes of new capabilities, some of which will go into formal testing and development and end up in the hands of Soldiers. (Photo by Patrick A. Albright, Maneuver Center of Excellence Public Affairs Office)

PROTOTYPING THE FUTURE

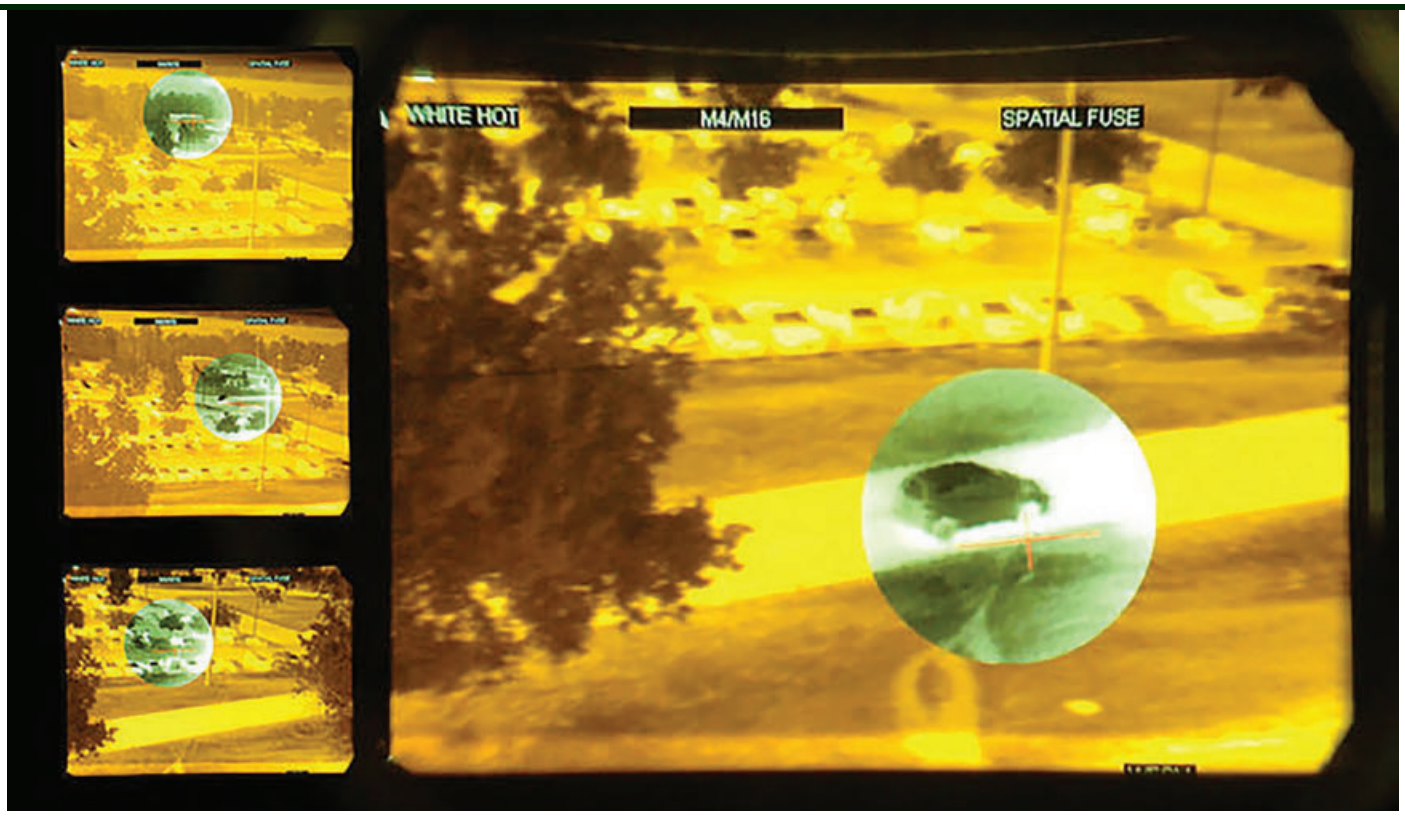
Better Buying Power emphasizes the value of prototyping capabilities to prove them out, and the annual TRADOC-sponsored Army Expeditionary Warrior Experiment is a model for the kind of venue that industry, organic developers and Soldiers need to come together to put capabilities through their paces and find the best solutions for the Soldier.

by COL F. Wayne Brewster II

Rarely is an idea perfect the first time it is assessed. New technologies, training strategies and force redesign concepts need to be evaluated and improved. That's why experimentation with prototypes is a critical tool for modernization and innovation for the Army.

The Army Operating Concept's vision for Force 2025 and Beyond says the Army's approach to modernization must be one that "synchronizes processes and products from concepts to capabilities to implement change." Force 2025 and Beyond efforts produce recommendations that help Army leaders direct modernization and force-development efforts to prevent conflict and shape future security environments.

Force 2025 Maneuvers is the learning effort that provides the means to evaluate and validate expeditionary capabilities for the brigade combat team, retain overmatch and set conditions for fundamental changes to the Army beyond 2025. To accomplish objectives set by Force 2025 Maneuvers, the Army is conducting a series of war games, exercises, experiments and evaluations to determine Army force design and organization as well as integrated doctrine, organization, training, materiel, leadership and education, personnel and facilities solutions to enable the force to meet its mission in 2025 and



REAPING THE REWARDS OF PROTOTYPES

A view through the FWS-I sight, which is based on Night Reaper technology that debuted as a prototype at the AEWE in 2009. It was renamed the FWS-I after prototyping and formal testing, and is the smallest, lightest thermal sight the Army has ever fielded. (Photo courtesy of PEO Soldier)

beyond. The U.S. Army Training and Doctrine Command (TRADOC) has direct oversight for the implementation and management of Force 2025 Maneuvers efforts.

TRADOC uses prototype experimentations under the Force 2025 Maneuvers effort in a balanced mix of laboratory and operational environments combined with Soldier feedback. Prototype experimentation is essential to modernization because it allows leaders to make investment decisions that are better informed and in compliance with DOD directives.

The 2015 DOD implementing guidance for Better Buying Power (BBP) 3.0 recommends increasing prototype experimentation to explore novel operational concepts, supporting key elements of the industrial base and hedging against threat developments. The BBP guidance affirms that prototype experimentation reduces lead time to develop and field new capabilities.

EXPERIMENTING AND TESTING

Experimentation can identify shortcomings as well as desired capabilities; both are useful. Determining what not to pursue can be as helpful to capability and materiel developers as early successes. The annual Army Expeditionary Warrior Experiment, or AEWE, is a TRADOC-sponsored experimentation venue that brings government and industry together to solve Army problems in a joint, inter-organizational and multinational environment. TRADOC centers of excellence partner at AEWE and collaborate on learning objectives focused on the Soldier and small-unit level. Feedback gathered early in the development of a technology from experiments like AEWE can better inform industry's internal research and development investments.

Experimentation augments mandatory testing, with a different nature and purpose. Although they share some aspects, such as involving Soldiers and an operational setting, prototype experiments differ from formal tests in several ways.

Whereas tests are typically mandated by law, policy or regulation, prototype experiments are a less formal tool that can provide decision-makers early insights before the program enters formal testing. Testing is critical to validate actual performance against established criteria. However, prior to formal tests, experimentation in a low-risk environment allows us to identify what today's science may be able to accomplish in the future without the

fear of failure. One such example of is Program Executive Officer (PEO) for Soldier's Family of Weapon Sights - Individual (FWS-I) program.

When PEO Soldier began exploring an advanced night-vision sight, a prototype technology named the Night Reaper caught the attention of capability developers in 2009 during the AEWE at Fort Benning, GA. The Night Reaper prototype demonstrated the capability of a weapon-mounted thermal sight integrated with a helmet-mounted image intensifier. While there were some typical issues with the prototype, such as weight and power use, the capability the Night Reaper demonstrated was instrumental in shaping the requirement for the FWS-I.

PEO Soldier, the U.S. Army Communication-Electronics Research, Development and Engineering Center's Night Vision Lab and capability developers at the U.S. Army Maneuver Center of Excellence used the Soldier feedback gathered at AEWE to improve the capability in the lab and later ran a series of user tests to validate the sight's requirements. Today, the FWS-I is the smallest, lightest thermal sight the Army has ever developed. Seeing the capability demonstrated by prototype technologies often helps us understand the art of the possible and the reality of existing science.

Experimentation serves a role in all Force 2025 time horizons. Some government and industry materiel solutions require little development and can influence the Army in the near term. At the same time, the Army must look further into the future and examine what may be possible for far-term capabilities that are not "shovel ready" now. Experimentation provides the Army an opportunity to modify portfolios and guide industry's internal research and development initiatives. It can assist in cost-benefit decisions and reduce risk for acquisition program milestone decisions.

A COLLABORATIVE EFFORT

Another example of the value of experimentation to enhance innovative modernization is the ongoing exploration of how robotics can enhance the capabilities of warfighters and small units through manned-unmanned teaming (MUM-T). Robotics shows promise in several areas, including increased flexibility and freedom of maneuver, lethality, situational awareness and resupply, while reducing Soldiers' exposure to threats. Experimentation on MUM-T includes collaboration from a variety of stakeholders, including government science and technology partners, capability developers, doctrine writers and industry.

The Marine Warfighting Lab, the U.S. Army Research, Development and Engineering Command labs and TRADOC battle labs encourage collaboration and nonattribution learning environments where there is no such thing as "failure." In this type of atmosphere, a "test, fix, test" methodology is used to solve problems. Learning that something does not work is just as important as discovering something that does.

CONCLUSION

In the future, the Army must seize opportunities to modernize with efficiency, agility and accuracy in order to demonstrate stewardship of valuable resources, proactively innovate and deliver those capabilities needed to maintain overmatch. Prototype experimentation provides a means for leaders to make timely, informed decisions before committing time, money and manpower to programs.

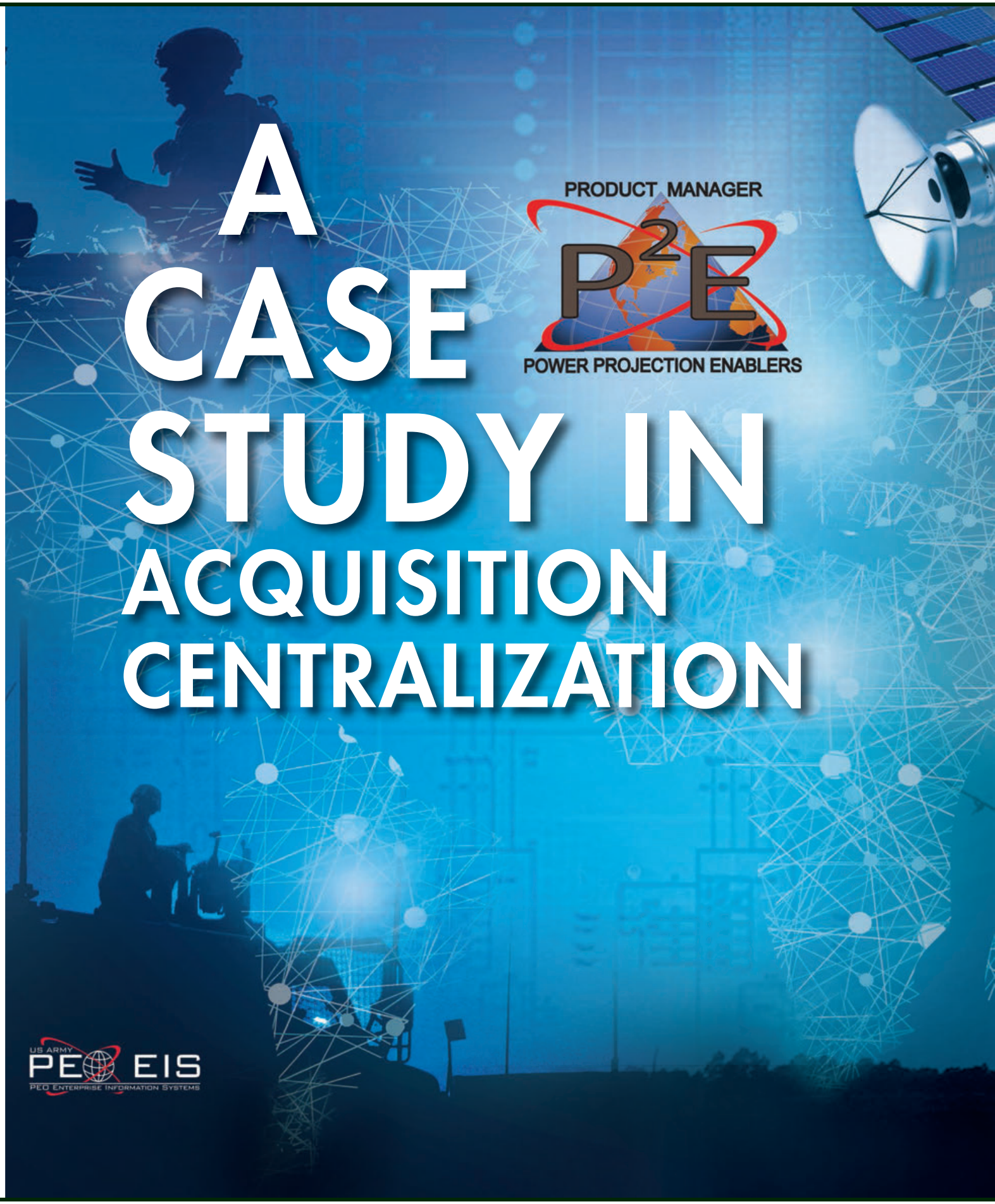
The Army must maximize its modernization investments by using prototype experimentation to yield innovative outcomes and accelerate the development of our desired capabilities. Experimentation is true discovery learning that pushes the boundaries of what is possible today and shows us the promise of tomorrow.

For more information, go to ***http://www.benning.army.mil/mcoe/cdid/AEWE/*** *or follow Army Expeditionary Warrior Experiments on Facebook.*

COL F. WAYNE BREWSTER II is director of the U.S. Army Maneuver Battle Lab, Fort Benning, GA. He holds an M.A. in military history from Louisiana State University, an M.A. in strategic studies from the U.S. Army War College and a B.S. from the U.S. Military Academy at West Point.

THE PROMISE OF SCIENCE

A Soldier prepares to launch a prototype Soldier-borne sensor during AEWE 2015 at Fort Benning, GA. Experimenting with prototypes saves time and money, and offers more flexibility to explore the possibilities of technology. (Photo by Angie DePuydt, Maneuver Battle Lab)



A CASE STUDY IN ACQUISITION CENTRALIZATION

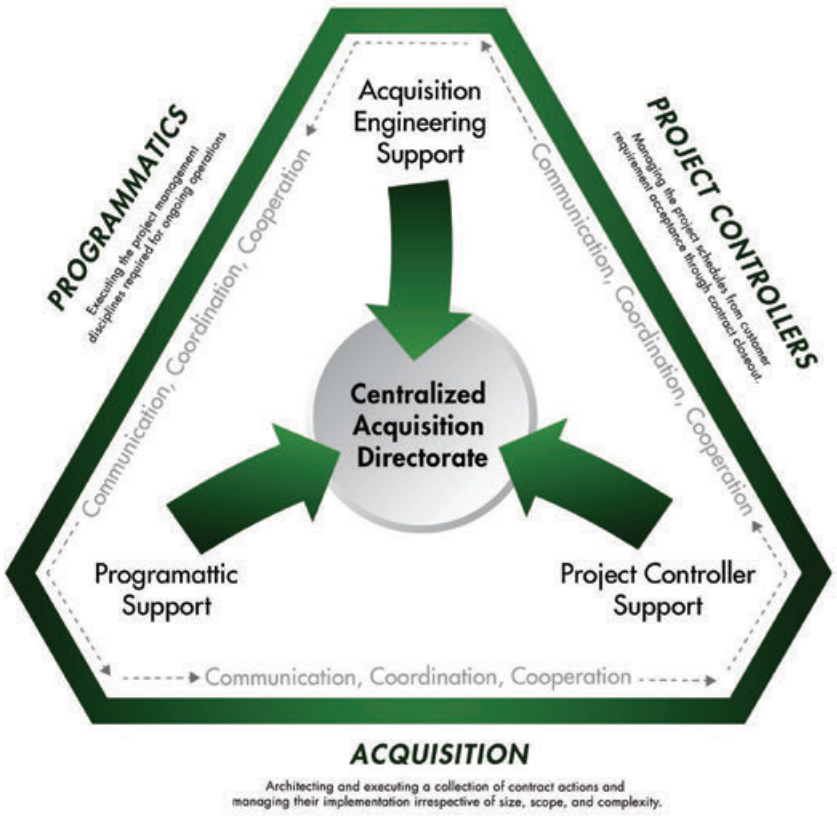
PM P2E supports a globally connected Army—and the "global" part can be a real challenge, as requests for IT acquisition support flow in from around the world, including many urgent requests from Soldiers in theater. To respond, PM P2E had to revamp to meet the demand, and an organization that had used a traditional, decentralized approach to developing requirements created a one-stop shop for acquisition, which yields better buying power efficiencies and alignment with JIE objectives.

by Mr. James "Chris" Christopher Woodis

Product Manager Power Projection Enablers (PM P2E) is one of the Army's top-tier information technology (IT) product offices. It acquires and implements enterprise IT capabilities for a globally connected Army, providing the full spectrum of network and information services so Soldiers, commands and supporting organizations can access, process and act upon information anytime, anywhere. P2E carries out this mission in support of globally deployed forces in the Central, European, Africa and Pacific Commands. Its materiel development portfolio is a critical part of the DA's initiative to transform its enterprise network into a cohesive force-multiplier by enabling DOD's Joint Information Environment (JIE) vision: a global network that will allow warfighters to work jointly and collaboratively in a secure information-sharing environment.

To effectively manage a global portfolio of emerging, complex requirements, P2E leadership had to change the way it managed business. It needed a leaner, more agile approach to the acquisition process. Having team personnel spread across the globe led to constant duplication of efforts, longer development queue times for artifacts—performance work statements, pricing matrices, quality assurance surveillance plans, requests-for-information documentation, work breakdown structures, independent government cost estimates and the like—fragmented working relationships and confusion at the ground level where requirements were being elicited and documented.

Faced with these challenges, PM P2E leadership recognized the need for a standardized team of IT acquisition experts at their headquarters to establish a one-stop



To effectively manage a global portfolio of emerging, complex requirements, P2E leadership had to change the way it managed business. It needed a leaner, more agile approach to the acquisition process.

CENTRALIZING FOR SAVINGS

P2E serves Army customers around the globe. Efficient, cost-effective acquisition was challenging in a decentralized environment, so P2E reorganized, creating a new, centralized Acquisition Directorate to reduce duplication and maintain institutional knowledge about global IT acquisition. (Photo courtesy PM P2E Pacific Directorate)

shop for all acquisition-focused efforts. Having the team in a single time zone would reduce artifact development times, decrease delays, reduce cycle times and increase predictability of contract award outcomes—enabling better communication and quicker decision-making for each acquisition. PM P2E would then have a skilled onsite workforce for real-time solution development where cross-functional teams share resources, information and lessons learned across procurements—irrespective of size, scope and complexity. This team became the P2E Acquisition Directorate.

Since its inception in 2013, the PM P2E Acquisition Directorate has moved forward on all fronts. It is now the official liaison to contracting centers, working in a straight line with contracting officers and specialists where, before, contact with the contracting centers came from multiple sources and information was not always communicated across the entire team. PM P2E is efficiently incorporating continuous process improvement and building customizable acquisition toolkits to facilitate quicker contract awards, and introducing significant cost savings by reducing the need for frequent and expensive travel to the Pacific, Europe, Africa and southwest Asia, creating operational efficiencies and increasing leadership support of standardizing network architectures across the Army enterprise.

In this capacity, and aligned to Better Buying Power (BBP), the directorate can now provide streamlined "cradle to grave" support across theaters from pre-award activities such as scope definition, acquisition artifact development, market research, funding coordination and industry proposal evaluation, to post-award performance monitoring and project closeout activities. These offerings have produced high-quality throughput in developing acquisitions and have allowed the directorate to target affordability and control cost growth while incentivizing productivity and innovation to improve the tradecraft across the portfolio.

Centralizing the directorate has enabled team members to work in partnership, following DOD guidance, to ensure acquisition documentation-streamlining stays on path with BBP—thus meeting the Army's expectations to actively and aggressively look at ways to achieve affordable programs, control costs throughout the product life cycle, incentivize

productivity and innovation in industry and government, eliminate unproductive processes and bureaucracy, promote effective competition, improve tradecraft in the acquisition of services and improve professionalism of the total acquisition workforce. Executing these activities from a single, centralized location has enhanced and accelerated acquisition cycle times, echoing BBP through process integrity in streamlining PM P2E's acquisition documentation.

The Acquisition Directorate comprises a cross-functional workforce of personnel ranging from IT acquisition subject matter experts and senior project controllers to expert project management and technical oversight teams—effectively representing the backbone of PM P2E's project execution. Their mission is to provide a central point of integration and synchronization for all PM P2E acquisition activities. This sea change in centralization has increased efficiencies and allowed for agile, elastic support that maintains consistent quality and deliverable throughput despite increasing demand, urgency of requirements and high theater operational tempo across multiple time zones.

CONCLUSION

PM P2E is now able to provide better communications and acquisition transparency—critical to senior Army decision-makers in the face of fiscal austerity—implementing accelerated acquisition processes and streamlining contracting instrument options to better serve its theater customer base. Ultimately, the PM P2E Product Office is now more flexible, responsive and able to make more informed contracting strategy decisions.

To date, standing up the PM P2E Acquisition Directorate has resulted in measurable improvements in process performance,

COLLABORATIVE COMMUNICATION

U.S. Soldiers assigned to the 1st Battalion, 41st Field Artillery Regiment, 1st Armored Brigade Combat Team, 3rd Infantry Division discuss mission objectives May 24, while working in a tactical operations center during multinational exercise Combined Resolve IV at the U.S. Army's Joint Multinational Readiness Center in Hohenfels, Germany. Part of PM P2E's mission is to provide Soldiers with the full spectrum of network access anytime, anywhere. (Photo by SPC Brian Chaney)

CONNECTING KOREA

Equipment for the Yongsan Relocation Plan is stored at U.S. Army Garrison-Humphreys. To support the plan, which consolidates U.S. forces in Korea at two installations for a less-intrusive presence, PM P2E is executing an $828 million command, control, communications, computers and intelligence (C4I) project including a new communications center, migration of 65 C4I systems and roughly 20,000 miles of conduit and cable. All of that requires a lot of contracts. The new P2E Acquisition Directorate has streamlined its processes to acquire such capabilities more effectively and efficiently. (Photo courtesy PM P2E Pacific Directorate)

LIFESAVING CONNECTIVITY ON-THE-GO

Platoon Leader 2LT Crockett Colbert establishes radio contact with other American forces before advancing toward a mock enemy position during Exercise Combined Resolve III, held in November 2014 in Grafenwoehr, Germany. PM P2E's ability to get equipment where it's needed when it's needed is critical. (Photo by SGT William A. Parsons, 214th Mobile Public Affairs Detachment)

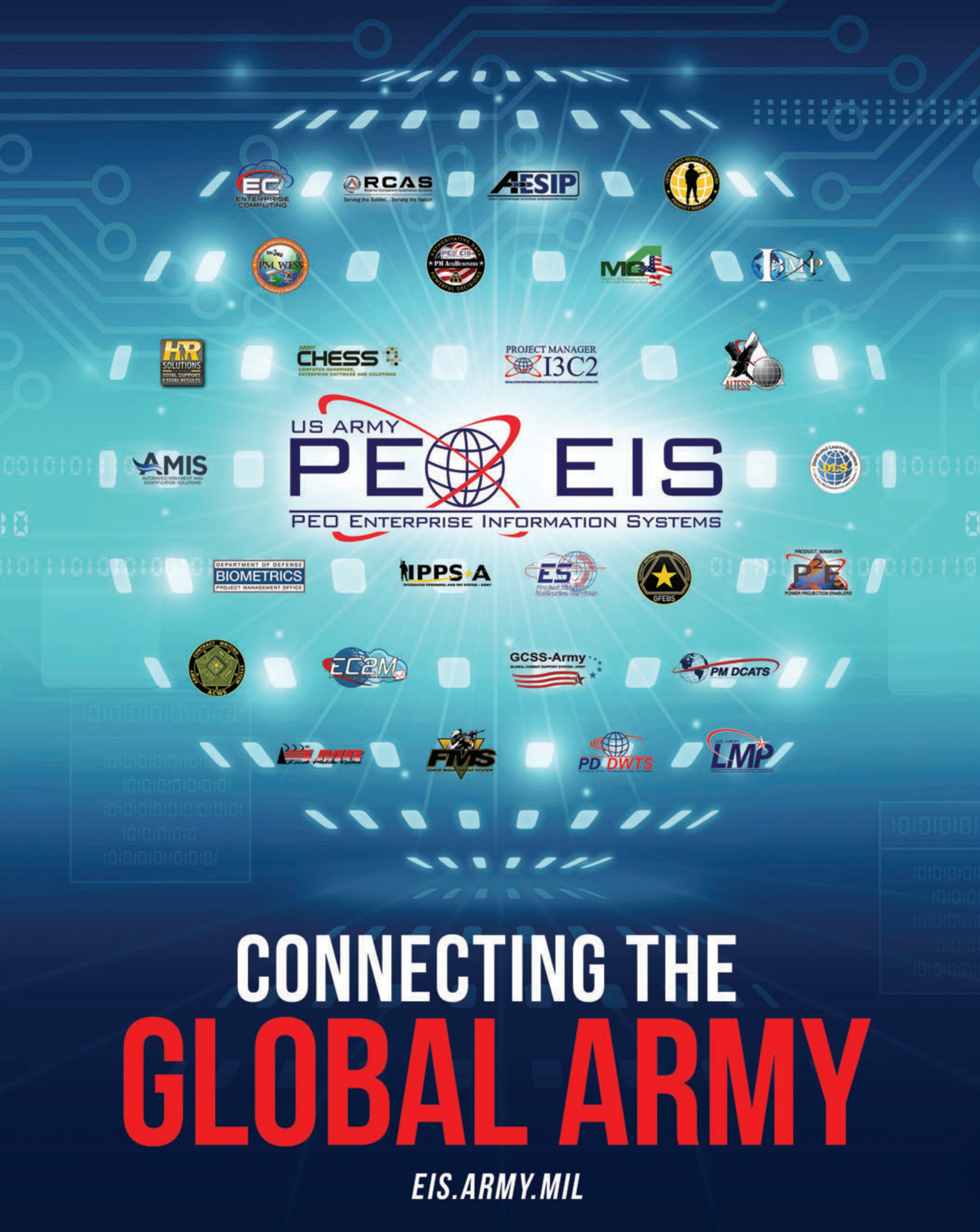
full accountability for theater IT requirements and the institutionalization of agile concepts and methodologies. Through those processes and the development of customizable acquisition engineering toolkits, the Acquisition Directorate has shown measurable improvements in process performance, scaling down artifact development cycle times, in some cases in excess of three months per requirement; thus, enabling rapid speed to market contracting solutions that are delivered on-time to meet the mission needs. The P2E mantra is to continue to develop a culture of continuous improvement with a laser-focused execution of the P2E mission.

For more information on standing up a centralized Acquisition Directorate for your organization, contact Mr. Jorge Caballero, PM P2E, acting director of acquisitions, at 703-806-4846 or ***jorge.l.caballero4.civ@mail.mil****.*

MR. JAMES "CHRIS" CHRISTOPHER WOODIS, senior consultant, is the program manager for Octo Consulting Group, supporting P2E, Project Manager Installation Information Infrastructure – Communications and Capabilities (PM I3C2), Program Executive Office Enterprise Information Systems (PEO EIS). He is a Certified Federal Contracting Manager, (Scaled Agile Framework Agilist) and holds an MBA and a B.S. in business management from the University of Phoenix, AZ. He has more than 15 years of acquisition engineering expertise in applying practical, agile, tailored approaches to acquisition engineering, IT strategic planning, enterprise architecture and portfolio management.

CONTRIBUTORS:

Mr. Michael A. Snyder *provides contracting support to PM P2E for Octo Consulting Group;* ***Mr. Jorge L. Caballero Jr.*** *is acting director for acquisitions for PM P2E, PM I3C2, PEO EIS.*



CONNECTING THE GLOBAL ARMY

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BUILDING CONSENSUS

A well-executed FMS can build partner-nation capability and strengthen U.S. partnerships around the world. (SOURCE: U.S. Army Acquisition Support Center and DASA(DE&C))

FOREIGN MILITARY SALES

Foreign military sales (FMS) are a different breed of defense program, existing at the nexus of foreign policy, international security, statecraft and international relations. Receipt of defense-related materiel from the United States can significantly elevate the ability of a partner or allied nation to defend itself, secure its borders, protect its citizenry or defeat an enemy.

In short, the FMS program is a fundamental and powerful tool of U.S. foreign policy. Authorized by the Arms Export Control Act of 1976, FMS allows the U.S. military to sell defense articles and services to foreign countries via a government-to-government sales agreement when the president finds that doing so will strengthen national security. FMS is also an important tool of security cooperation, aligning strategic priorities established by the White House, DOD or interagency organizations with the partner nations' security and stability objectives. From a program management perspective, ensuring that FMS is a part of strategic planning can also assist in keeping the U.S. industrial base operational. In addition, it helps the United States retain the continuity of a knowledgeable workforce and reduce the burden on U.S. taxpayers of restarting cold production lines.

A variety of approaches and funding options support U.S. goals that involve the transfer of U.S. military property. Transfers occur within the framework of sales or donations, and funding might come from the customer nation's treasury or from U.S. resources, directly or indirectly.

This special FMS section explores the impact that FMS can have on a country, and examines the nuts and bolts of how the FMS program works from the perspective of those who make FMS cases happen.

A fascinating example of how an FMS case can affect the security of a nation is in the first article in this section, "Aiding Colombia's Counterinsurgency Fight." Colombia, long home to a seemingly intractable insurgency that contributed to the nation's reputation for violence and the production of illicit drugs, has now become a vastly more peaceful place, and a lot of that can be attributed to FMS.

The FMS process is hardly perfect. The layers of oversight, the difficult calls on what to sell to whom and when, can be cumbersome. Yet FMS provides significant positives for the military and for the nation, helping get rid of surpluses, obviating the need to destroy or mothball expensive equipment and keeping the industrial base warm. For the program executive offices (PEOs) and the project manager (PM) shops, each FMS case almost always brings surprises, according to an article on lessons learned in selling night vision devices. That's because those offices don't make the sales themselves—they are closely involved as the providers of materiel, but their primary mission is to support the Soldier. As the article on night vision devices makes clear, FMS is a team sport.

—Army AL&T, PEO Soldier, PM Soldier Sensors and Lasers and DASA(DE&C) staffs

SPOTLIGHT:

MS. VERONICA A. "NITA" LOPEZ-JEWELL

Getting the details right

MS. VERONICA A. "NITA" LOPEZ-JEWELL

COMMAND/ORGANIZATION:
Matrixed to Assistant Program Executive Office for Strategic Planning and Operations, Program Executive Office for Missiles and Space

TITLE:
Foreign disclosure officer

YEARS OF SERVICE IN WORKFORCE: 9

EDUCATION:
MBA, Texas A&M University-Texarkana; B.S. in computer information systems, Hawai'i Pacific University

AWARDS:
Commander's Award for Civilian Service; achievement awards

I was a single parent of three kids, and getting my degree took a long time, but it was definitely worth it.

As the world gets smaller, the work of people like Veronica Lopez-Jewell becomes increasingly more important. Lopez-Jewell is a foreign disclosure officer (FDO) in the Program Executive Office for Missiles and Space (PEO MS), tasked with approving the release of military information to foreign government representatives, ensuring that recommendations for foreign visit requests are processed in a timely manner and managing the foreign liaison officers certified to PEO MS.

"Today's Army is, increasingly, more globally diverse," said Lopez-Jewell. "It is important to the Army to share information with our partner nations, as it allows for successful completion of joint missions."

The government-to-government release of classified military information is accomplished through delegation-of-disclosure authority letters (DDLs), which outline classification levels, categories, scope and limitations on information that may be disclosed to foreign recipients. DDLs are part of the foreign disclosure process, which happens before, during and after the execution of a foreign military sales (FMS) case, and are required for international agreements, military personnel exchange programs and cooperative research and development agreements.

Requests for information might be related to FMS but could also occur before an FMS case or as follow-ons to that process, Lopez-Jewell explained. For example, she said, a country might buy the Patriot missile system through an FMS agreement, but a software update to that system might be classified. An FMS customer wouldn't automatically receive that update; the customer would have to request that information and an FDO would review the request. When a request comes in, Lopez-Jewell works with a subject-matter expert to obtain a review and an opinion of the request and researches databases on her own to make the determination of whether to approve it.

It's a role that requires attention to detail. "There are legal ramifications for this job, so the incumbent must ensure that every i is dotted and t is crossed," she said.

That attention to detail, along with a little persistence, helped Lopez-Jewell get her start in acquisition. Several years ago, while earning her undergraduate degree, she found out about the U.S. Army Materiel Command's (AMC) Fellows Program. She applied but never got a response. She applied again, "and this time I bugged and bugged the program recruiter." Two phone interviews later, she was officially an AMC fellow.

Although she has been in Army acquisition since 2006, she has a 30-year career in federal service, following in the footsteps of her father, who served in the Army. That legacy will continue: She's the mom of triplets, two of whom are U.S. Marines.

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

I coordinate between Headquarters, DA G-2 [the Office of the Deputy Chief of Staff for Intelligence] and the PEO in ensuring that foreign visit requests are approved. I also authorize the disclosure of classified military information to foreign governments.

NO DETAIL TOO SMALL
The security and legal ramifications of Lopez-Jewell's role as an approver of what information foreign governments can access about U.S. military capabilities calls for great attention to detail. She consults with subject-matter experts and conducts her own research to determine whether to approve or deny a foreign government's request for information. (Photo by Chris Geisel, PEO MS)

How did you become part of the Army Acquisition Workforce, and why?

I was first introduced to the acquisition workforce when I was accepted into the AMC Fellows Program. The program required a grade-point average of 3.5 or higher to apply, and I used that as a goal while still working on my undergraduate degree. The ability to have a career, not just a job, and the target grade of GS-13 were attractive features of the program. My first position as a fellow was with PEO Aviation, supporting the Army Aviation and Missile Life Cycle Management Command G-2.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

The most important points in my acquisition career were the decision to get my college degree and my acceptance into the AMC Fellows Program. Before I went back to college, I was working as a GS-5 on Kwajalein Island. I knew that I was just as smart and capable as the GS-13s I worked with—the only difference was that they had college degrees and I didn't. At the time, I was a single parent of three kids, and getting my degree took a long time, but it was definitely worth it.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

BG Thomas Harvey [who retired in 2012 after serving as deputy commanding general of the U.S. Army Sustainment Command] encouraged me to pursue my college degree. I have not been a mentor per se; however, I strive to help others become better in their respective fields by always listening when needed and providing advice when necessary.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

Supporting the warfighter provides the greatest satisfaction in my career.

What advice would you give to someone who wants to get where you are today?

Keep striving to be the best at what you do. Don't be afraid to ask for help. Go to college and get your degrees.

—MS. SUSAN L. FOLLETT

SPOTLIGHT:

MR. THOMAS LAFONTAINE

Developing a global career

MR. THOMAS LAFONTAINE

COMMAND/ORGANIZATION:
Close Combat Weapon Systems Project Office, Program Executive Office for Missiles and Space

TITLE:
International program specialist

DAWIA CERTIFICATIONS:
Level III in program management; Level II in logistics

YEARS OF SERVICE IN WORKFORCE: 13

EDUCATION:
M.S. in program management, Naval Postgraduate School; B.S. in logistics management, Park University

AWARDS:
Exceptional Performance Award (7); Legion of Merit; Meritorious Service Medal (3 Oak Leaf Clusters)

Through the course of 24 years in the Army and a dozen years in Army acquisition, Tom LaFontaine has seen a lot of this world: Thailand, Oman, Germany, Norway, Belgium, Taiwan and Luxembourg, to name just a few places. And in his estimation, the Middle East is where you'll find "the nicest people anywhere. The respect and kindness of the people there is second to none."

LaFontaine has had a hand in foreign military sales (FMS) since 2002, working on the Avenger and Sentinel systems while on active duty in the Army. In his estimation, executing the FMS mission requires three things: proficiency in program management, a strong understanding of logistics and sensitivity to international relations.

Decoding business customs poses a big challenge in his work. "In a lot of countries, no 'business' gets done during the first 15 or 30 minutes of a meeting—in some cases, as long as an hour. That time is devoted to getting to know everyone, which is a big departure from how our meetings are structured," he noted. "We also work hard to break down language barriers and understand the customs of the countries we're working with."

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

I work in the International Programs Directorate (IPD) of the Close Combat Weapon Systems (CCWS) Project Office within Program Executive Office Missiles and Space. The IPD provides support through FMS efforts that influence regional stability and deter potential adversaries of the United States and its allies. International programs and the foreign sales of CCWS weapon systems allow the Army to maintain the industrial base.

Because of the reduction in the total DOD acquisition budgets, FMS are more important than ever to ensure that defense contractors can continue to produce the weapon systems and provide spare parts through economies of scale. A goal of FMS is to ensure that our allies have the weapons they need to defend their borders and allow our allies to fight using fewer U.S. Soldiers. Each time an ally can defend itself or deter aggression in their region, our Army benefits.

How did you become part of the Army Acquisition Workforce, and why?

While I was in the Army, I was assigned to a program office as a logistics support officer. During this assignment, I began my career in acquisition.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

I worked the Egypt Avenger/Sentinel FMS cases in the early 2000s for [the Project Office for] Cruise Missile Defense Systems (CMDS). I had the opportunity to be part of an FMS program from case acceptance through all procurement actions, culminating in being the fielding team lead in Egypt. During this program, I was able to gain a depth of understanding in FMS programs, which has been the cornerstone of my career. The knowledge I gained from this experience has propelled me to want to continue working on international programs by assisting our allies and supporting our warfighters.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

COL Richard DeFatta, who was the CMDS program manager when I began my career in acquisition, has been the most important mentor in my career. Through his guidance, I learned that acquisition should be about a supporting the Soldier each and every day. "Make your decisions based on what is best for the Soldier" is something he impressed upon me each time I sought out his advice. I have had a few opportunities to mentor younger acquisition personnel, and have used those opportunities to pass on the guidance I received early on in my career. If you are working for and making decisions based on what is best for our Soldiers, you are on track and doing what you should.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

It's difficult to see the results of one's efforts in a program office because it takes so many brilliant personnel to execute programs. While working FMS, I have been able to see programs from their inception through to delivery, which brings a great feeling of accomplishment.

What advice would you give to someone who wants to get where you are today?

If supporting Army Soldiers is something you strive to do, being part of the AL&T Workforce is a rewarding career path. Procuring and sustaining the best weapons we can provide is vital to ensuring that the men and women of the Army succeed no matter the battle or battle zone. Your efforts in the AL&T Workforce ensure our Soldiers go into battle with a qualitative military edge over our enemies and terrorists.

—MS. SUSAN L. FOLLETT

SEEING THE BIG PICTURE

Soldiers with 2nd Battalion, 44th Air Defense Artillery, 101st Airborne Division (Air Assault) Sustainment Brigade (101st SB) fire the Avenger air defense system mounted M3P .50 caliber machine gun during an Avenger ground gunnery range Aug. 19 at Fort Campbell, KY. LaFontaine was involved in Avenger and Sentinel FMS cases with Egypt in the early 2000s, from case acceptance through procurement actions and fielding. (Photo by SPC Joseph Green, 101st SB Public Affairs)

AVIATION SUPPORT
South Carolina Army National Guard (ARNG) Soldiers work with Colombian military members in Bogota, Colombia, to demonstrate preparing a UH-60 Black Hawk to load onto a cargo aircraft. A team of three subject-matter experts visited Colombia in April 2014 in support of the State Partnership Program, sharing experience and technical ideas. (Photo courtesy of South Carolina ARNG)

Aiding Colombia's Counterinsurgency Fight

In the last 15 years, Colombia has transitioned from a state that could not govern much of its territory or tamp down a long insurgency, to a vastly more stable and peaceful nation with a much healthier economy, thanks to a 'Marshall Plan' that provided a world-class rotary-wing capability. The initiative provides an excellent case study in how FMS and associated services, training and collaboration can aid a partner nation in reasserting and maintaining its legitimacy, and the security its people need.

by MAJ Mario Zaltzman and Mr. Charles Meixner

In 1999, against a background of persistent armed conflict with insurgents who used illicit crops to fund their activities, the president of Colombia, Andrés Pastrana, looked to other countries for help. Pastrana had first argued that developed countries should help Colombia implement some sort of "Marshall Plan," during a speech at Bogota's Tequendama Hotel in June 1998, nearly a week after the first round of that year's presidential elections. Such a plan would permit investments in social development in order to offer peasants alternatives to the growing of illicit crops.

The U.S. military responded, among others, with a capability that would prove essential to stabilizing Colombia—a foreign military sale (FMS) of helicopters, including UH-60 Black Hawks. A capability gap analysis executed by the Colombian military and U.S. Southern Command resulted in a plan to endow Colombia with a fully developed rotary-wing capability starting in 1999. The capability, called the Plan Colombia Helicopter Package (PCHP), included training institutions, a logistics pipeline and an initial order of helicopters that included 13 Black Hawks. The planners tailored the

SHARING INFORMATION
COL James Barkley, left, commander of the 59th Aviation Troop Command and the South Carolina Army National Guard (ARNG) state aviation officer, explains the electronic technical manual system for the UH-60 Black Hawk to a delegation of Colombian Air Force experts during their State Partnership Program visit to McEntire Joint National Guard Base, SC, in February 19. (Air National Guard photo by SMSgt Edward Snyder, 169th Fighter Wing)

PCHP specifically to Colombia's requirements and future modernization plans and strategy, and based its scope on the maturity of the country's armed forces, the existing infrastructure and the anticipated availability of Colombian pilots and maintenance personnel.

The PCHP was fully implemented by 2003. By the end of 2004, in the context of a new counterinsurgency strategy, the plan facilitated the achievement of asymmetric dominance by the Colombian military over an escalating insurgency by the Revolutionary Armed Forces of Colombia (FARC). The Colombian government's capacity to govern, exercise force within the rule of law, consolidate internal sovereignty and establish control over sovereign territory grew consistently stronger from 1994 to the present. Specifically, the government was able to return government services to all but 10 percent of the country's municipalities over which it had lost control because of the unabated insurgency.

Colombia's remarkable progress over a frustrating insurgency is, in part, a case study of success in the U.S. Army's FMS program as part of a greater, multilayered recipe of progressive and incremental reforms, a transformed counterinsurgency strategy, investments, taxes to pay for additional troops and materiel, capability developments, acquisitions, visions and, most importantly, the Colombian people's desire to succeed over the span of multiple presidencies.

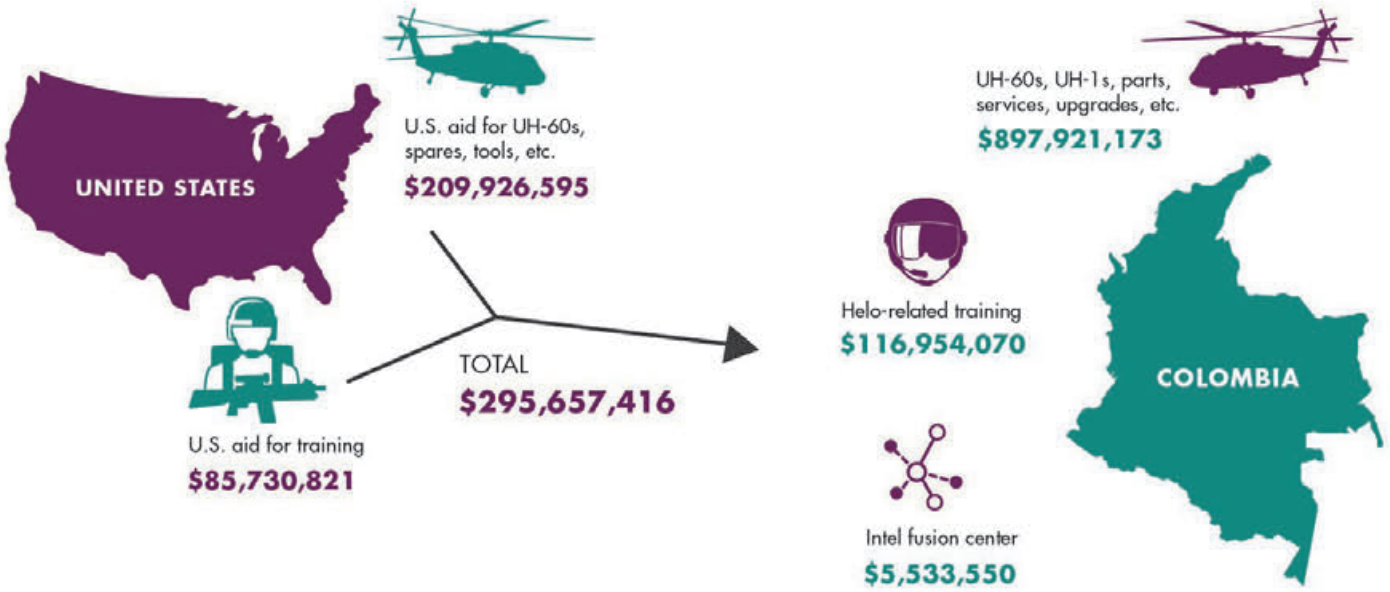
CALCULATING FMS PAYBACK

Examining the return on investment for the aid provided by the United States and the use of military assets procured by Colombia calls for a detailed look at the PCHP in the context of the political and security landscape over that period. How were these gains traceable specifically to the PCHP as distinct from Colombia's other counterinsurgent capabilities, including the baseline helicopter capability that it had as of 1997?

In fact, the success could be traced exclusively to the full augmentation of the PCHP capability: De-escalation of the insurgency started and then produced major gains only when the Colombian military achieved asymmetric dominance over the insurgents. The PCHP gave the Colombian military a sustained, world-class capability to reach any point in its country, regardless of the terrain, within an hour, on a massive scale, and then to sustain operations at that point for an unlimited period of time.

Through 2002, without the modernized counterinsurgency capabilities enabled by the fully implemented and resourced PCHP, the insurgency continued to escalate unabated, to the point that Colombia lost control of more than 50 percent of its municipalities. Once the transformed and resourced counterinsurgency strategy came online beginning in 2002, but still absent the full force of the PCHP, Colombia halted the escalation but was not able to make any substantial gains in bringing the lost municipalities back under its control.

The government had the legacy counterinsurgency rotary aviation capability from 1998 to 2004, but that alone failed to make any decisive difference on the battlefield; between 1998 and 2003, the Colombian Armed Forces had many victories over the insurgents, only to lose the gains achieved once the military left the area, often remote and rugged terrain not easily traversed. It was only in 2004, with the addition of a fully developed rotary-aviation capability in the form of the PCHP, that the Colombian military achieved asymmetric dominance—the



BY THE NUMBERS
This graphic shows the scope and dollar value of the FMS and the Colombian government's own contributions to the Colombian military's overall effort from 1992 to the present. Colombia also bought machine guns, ammunition, protective gear, night vision devices, armored patrol vehicles and other equipment and provided additional training. (SOURCE: Security Cooperation Information Portal)

ability to move rapidly and at will anywhere in the country—over the insurgents. Once this occurred, the military was able not only to re-establish government control of an area, but also to hold the territory it had gained.

DECISIVE ACTION

Between 2003 and 2007, the Colombian military stood up nine mobile brigades comprising counterinsurgency battalions and combat support and services companies prepared to move quickly to any part of the country by whatever means available, bringing the total to 17. These brigades had a full-time, guerrilla search-and-destroy mission. Concurrently, the Colombian military on its own conducted Plan Patriota to break the FARC's strategic initiative. The first phase of the plan, beginning in 2003, was Libertad Uno, which broke the guerrilla ring around Bogota. It lasted four months and involved 11,000 troops, including a portion from the 17 mobile brigades.

These troops broke up into platoon-sized formations and occupied the whole area around the city, supported by an enduring logistics pipeline. The victory was overwhelming, with more than 400 guerrillas captured or killed and many others deserting. The role of helicopters during this operation, representing a shift in tactics, was to sustain the dispersed formations, provide limited air support, conduct medical evacuation (MEDEVAC), create fear (through noise and visibility) in the minds of the FARC and instill confidence in the minds of the soldiers.

The second phase of the operation, Libertad Dos, involved attacking the strategic base area of the FARC using a new task force known as Joint Task Force Omega, which included several of the mobile brigades; the full capability of the Colombian Army Aviation Brigade, for the first time in the context of the counterinsurgency strategy; and riverine units from the Colombian Navy. The Colombian military considered Libertad Dos to be a huge success, with all of the core FARC base areas disrupted during the three-year period of 2003-06; the FARC dispersed to jungle areas.

The rotary-wing assets provided a decisive advantage in Libertad Dos in terms of transportation, supply line sustainment, MEDEVAC and close air support. Using a similar approach, the Colombian military forces conducted offensive operations with decisive rotary-aviation support throughout the country, dispersing the FARC and other irregular armed groups to more and more remote terrain. This dispersion resulted in 4,500 FARC deserters by 2005.

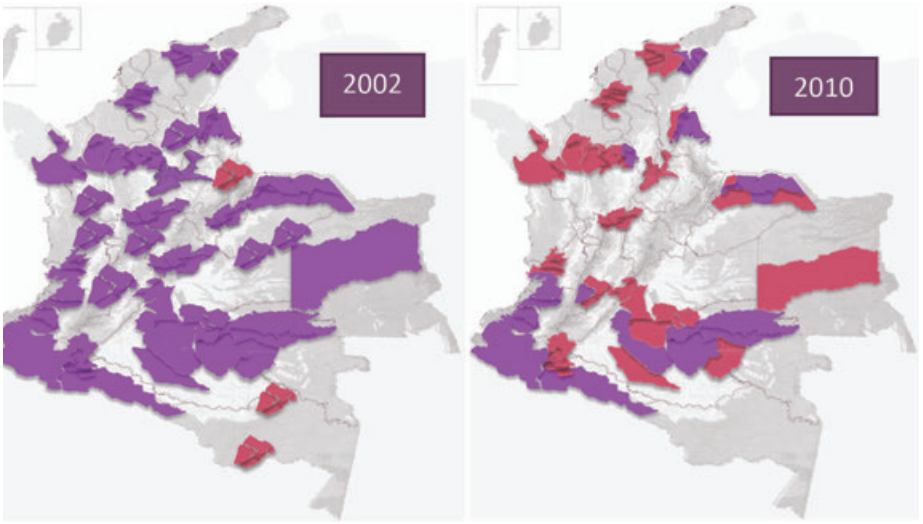
To support these successes, the Colombian Army acquired an additional 29 UH-60L Black Hawks and 13 Russian MI-17s between 2007 and 2009. Additionally, the national logistics pipeline

and maintenance capability for all of the helicopters matured through the employment of DynCorp International Inc. and the training of Colombian military mechanics and maintainers. This meant that, beginning in 2003, when a helicopter went down anywhere in the country, it could be extracted and repaired in most cases within the borders of Colombia by Colombians. Before the PCHP, when a helicopter went down, it stayed down.

U.S. and Colombian military forces collaborated to establish a Colombian intelligence capability that was fully integrated with the overall security and antinarcotics strategy of Plan Colombia and supported offensive operations against FARC. When word was received on high-value FARC or other irregular army key operatives, the intelligence would be fed to the Combined Air Operations Center. Concurrently, an aircraft with a precision guided missile would be sent to hit the target and a special forces team would be dispatched on a UH-60L helicopter from the Army Aviation Brigade.

Once the missile hit, helicopters delivered special forces troops with members of the National Police to clean up the impacted area and secure enemy combatants as well as any materials that might provide intelligence information. Using this approach, from 2007 to 2011, more than 80 high-value targets were taken out, including members of the "secretariat" that runs the entire organization. The successful operations to take out these individuals acted as a marketing tool, capturing the enthusiasm and support of the Colombian people and shifting momentum from FARC to the Colombian government.

The additional rotary-wing and intelligence assets provided through U.S. assistance had intangible benefits as well. One of the major stumbling blocks to success against FARC was that the Colombian military was casualty-averse, in that it lacked consistent, reliable means of rapid extraction or support during counterinsurgency operations. This capability gap made troops hesitant to remain in remote areas after an offensive. The full capability of the PCHP-augmented Army Aviation Brigade was effectively employed at arguably the exact time it was needed in the context of the counterinsurgency strategy, at the beginning of 2004.



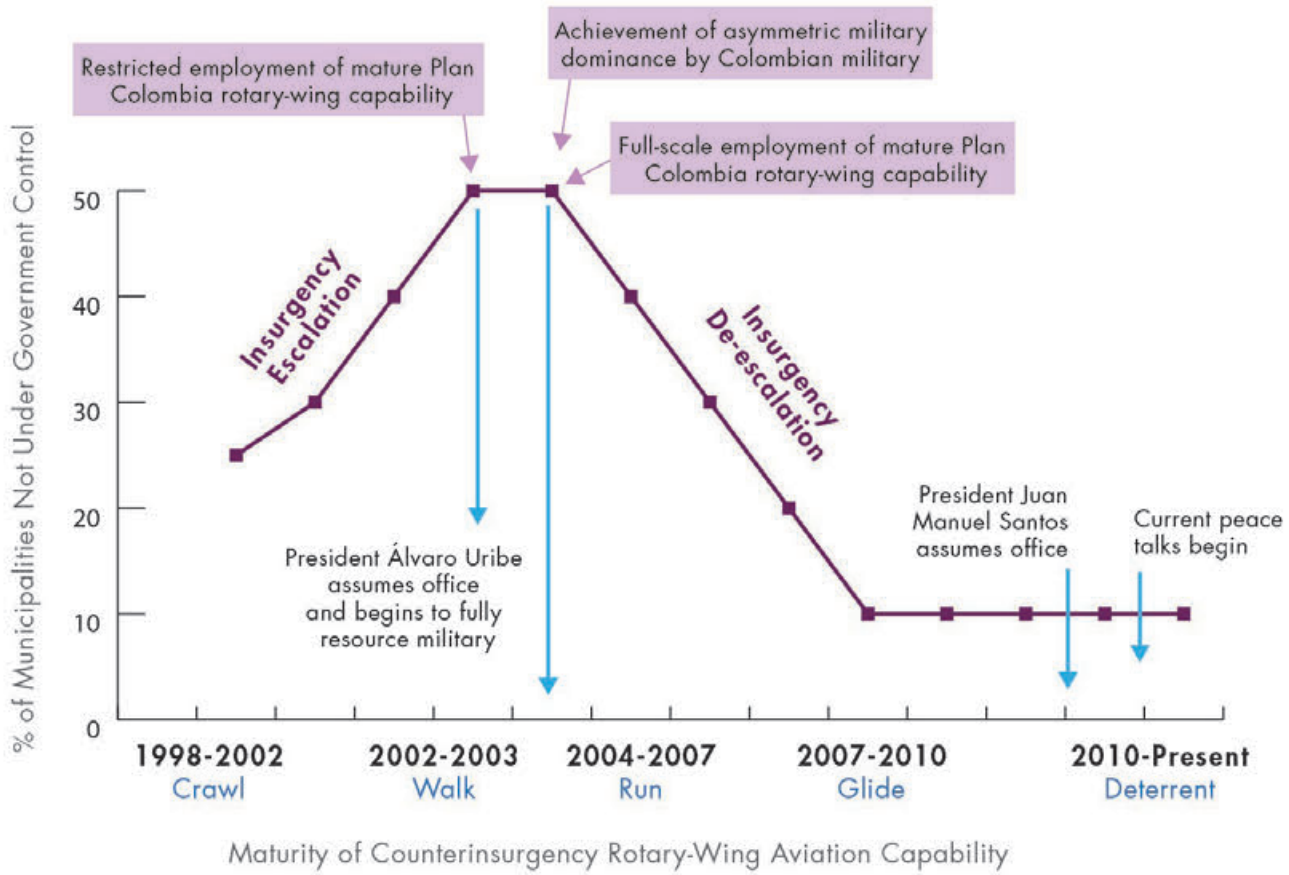
INSURGENCY WANES
The maps represent levels of insurgent activity in Colombia in 2002 and 2010. The red areas represent moderate insurgent activity, while the purple areas represent high levels of activity. (Images courtesy of DASA(DE&C))

In addition to an offensive capability, the PCHP gave the military on-demand defensive capabilities of air support, MEDEVAC and extraction from any point in Colombia within an hour. A national logistics pipeline and a world-class training pipeline were also in place so that the military could fully employ the rotary-wing capabilities. With the composite of these capabilities in place, the newly transformed counterinsurgent military could now mass and overwhelm the insurgents in any location of the country, no matter how remote, with an hour's notice. The insurgents lost the advantage of being able to dominate remote and challenging terrain.

CONCLUSION

The decisive capability provided by the PCHP was not the only ingredient in facilitating these Colombian successes, but it was an essential component. Without the use of PCHP to achieve asymmetric military dominance starting in 2004, the Colombians would have had a very difficult time advancing with their operations to secure villages, highways and mobility corridors, let alone taking on the insurgents in remote regions of the country.

Today, the enduring and decisive capability that the PCHP has provided to the Colombians, in combination with multisource, actionable intelligence, has resulted in an asymmetrically dominant deterrent capability whereby the insurgents have no sanctuary as individuals or units. This enhanced deterrence has



CAPABILITY DEVELOPMENT
As the different phases of the PCHP were deployed, the number of municipalities not under government control, represented by the brown line, declined. (SOURCE: Security Cooperation Information Portal)

kept the insurgents off balance and given them an incentive to make a peace deal with the Colombian government and retire with their lives and riches intact.

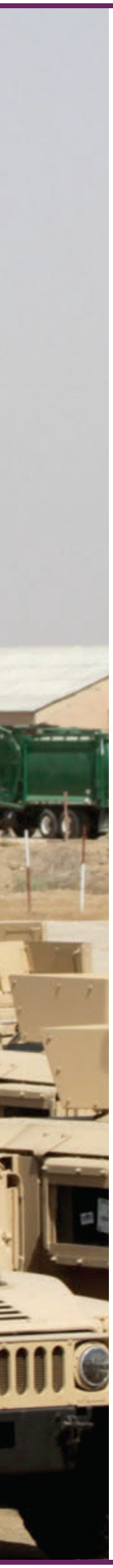
Success is not just a matter of simply providing a capability. Other ingredients were required, including an effective strategy and the will to win. Nevertheless, this case demonstrates that FMS, when provided in a full-package approach in combination with deliberate planning, can be a decisive tool for partner nations to meet the security needs of their people.

This article is adapted from "The Role of the Plan Colombia Helicopter Package in Strengthening the Legitimacy of the Colombian Government," the author's master's thesis defense presented to the Fletcher School at Tufts University. For more information or to obtain a copy of the thesis defense, contact MAJ Zaltzman at ***mario.e.zaltzman.mil@mail.mil****.*

MAJ MARIO ZALTZMAN serves as an assistant product manager supporting the Program Manager for Joint Operational Medicine Information Systems in the Program Executive Office for Enterprise Information Systems. He holds an M.A. in international affairs from the Global Master of Arts Program at Tufts University's Fletcher School and a B.S. in biochemistry from Duquesne University. He is Level III certified in program management and Level II certified in international affairs, and is a member of the Army Acquisition Corps.

MR. CHARLES MEIXNER was until recently a security assistance specialist in the Policy, Strategy and Resources Directorate of the Deputy Assistant Secretary of the Army for Defense Exports and Cooperation (DASA(DE&C)). A retired Navy officer with an engineering background, Meixner has 25 years' experience in international affairs and security cooperation with the Air Force and the Army. He holds an M.S. in information systems from Strayer University and a B.S. in industrial studies from Moorhead State University.

ADVISE, ASSIST AND EQUIP
Iraqi security forces receive a shipment of more than 70 up-armored High Mobility Multipurpose Wheeled Vehicles at Camp Taji, Iraq, in June, part of 150 Humvees acquired through FMS to assist in the fight against the self-described Islamic State. The 310th Advise and Assist Team, 13th Sustainment Command (Expeditionary) and the 1st Sustainment Command (Theater) supervised receipt of the vehicles in support of Operation Inherent Resolve. In addition to helping partner nations with their own security, such sales obviate the need for expensive mothballing or storage of unneeded equipment. (Photo by CPT A. Sean Taylor, 310th Expeditionary Sustainment Command)



DIVEST AND PROSPER

USASAC streamlines the Excess Defense Articles process, speeding up sales of excess materiel and cutting down on expensive mothballing to save millions, reduce excess inventory and keep the organic industrial base warm by offering not just materiel but an array of services.

by Mr. Tommy L. Lancaster (COL, USA, Ret.)

The U.S. Army Security Assistance Command (USASAC) role in the divestiture of the military's equipment through the Excess Defense Articles (EDA) program continues to grow, with EDA divestiture activity reaching $2.5 billion this year.

USASAC, headquartered at Redstone Arsenal, AL, develops and manages all foreign military sales (FMS) and security assistance programs for the Army. Security assistance provides defense articles, military training, sustainment and other defense-related services by grant, loan, credit or cash sales in support of national security policies and objectives. Currently, the command is managing 5,000 FMS accounts, spread out over more than 145 countries and valued at $160 billion.

Lemuel Williams, chief of USASAC's Mission Support Division, G-3, attributes the substantial savings to a complete overhaul of the EDA business model. As the team lead for EDA operations, Williams has seen the number of FMS cases spike from a few cases five years ago to an average of nearly 100 per year.

"Historically, our EDA divestiture process was very reactive," said Williams. The DA, he continued, "would start this lengthy, cumbersome process, and 12 to 14 months after the process started is when USASAC would get visibility of equipment that might become available. That gave us a very short window to act, 60 to 90 days."

MOUNTING COSTS

Williams explained that, with the old, linear process, when equipment was declared excess—a decision made at the DA level—it would be transported to a depot where it would be stored for years or, in some cases, decades. The bill for transporting thousands of pieces of expensive equipment across country, along with storage

The EDA process comes with USASAC's "total package approach," which includes not only the equipment, but also refurbishment, training, facilities, spare parts, publications, maintenance, logistics support and other services to ensure that a capability performs appropriately.

fees, was staggering. For example, the cost of storing one armored personnel carrier is $350 per year; multiply that by tens of thousands, and the result is a significant cost for the Army.

Add to that the cost of making the equipment storage-ready—draining fluids and removing hazardous materials—which can range from a few thousand dollars per unit to tens of thousands of dollars per unit. Ultimately, a DA decision to demilitarize, or tear down the equipment, can tack on another several million dollars, said Williams. "And that's just in one instance, not the hundreds of cases that would accrue over the years."

Two years ago, the Iraqi Army obtained 1,026 EDA-declared M113A2 armored personnel carriers through USASAC's FMS program. These M113A2s collected dust for nearly two decades at a West Coast depot before the Anniston Army Depot in Alabama refurbished them at the Iraqi Army's request. Williams said this type of case also accomplishes the USASAC mission of building partner capacity, supporting combatant command engagement strategies and strengthening U.S. global partnerships.

"This was a win-win situation for both the Iraqis and the U.S. because, in the Iraqis' case, they went from a nonexistent armored capability in 2010 to plans for six divisions," said now-retired COL Sammie Hargrove, then USASAC's U.S. Central Command regional operations director, in a 2013 interview. "For the U.S., we divested ourselves of 1,026 M113s. Demilitarizing that many vehicles can be cost-prohibitive." The estimated U.S. cost avoidance was $31 million.

Williams noted that one of the biggest complaints about the old EDA process was that it was slow and cumbersome. "Once Army equipment was declared excess, we'd get notice from the DA G-4. Then we'd have to get permission from the State Department to survey the equipment out to foreign countries. Then, we'd survey it out to maybe 60 or 70 countries, based on which countries the State Department tells us are eligible," said Williams. "You can see that this process burns up a lot of time."

Talks begin in earnest once partner nations express interest in the equipment. USASAC personnel and partner nations negotiate price, availability, refurbishment, training, parts packages and many other factors. Finally, a partner nation is selected and a letter of acceptance is issued.

PUTTING PEN TO PAPER
Then-Secretary of Defense Chuck Hagel and Qatari Minister of State for Defense Affairs Hamad bin Ali al Attiyah sign letters of offer and acceptance for Apache helicopters and Patriot and Javelin missile systems at the Pentagon on July 14, 2014. Thanks to the revamp of the EDA business model, the number of FMS cases like this one has increased dramatically, as has the dollar value. (DOD Photo by PO2 Sean Hurt)

THE NEW MODEL

According to Williams, USASAC approached the DA G-3/4/8 and asked to be involved at the start of the process. As a result of that request, MG Mark McDonald, USASAC's commander, and

STAKING A CLAIM
A Moroccan Army representative makes a notation about the condition of a High Mobility Multipurpose Wheeled Vehicle he is inspecting. By divesting itself of excess defense articles, the U.S. Army can save storage and demilitarization costs while supporting the OIB. (Photo by Rick Bumgardner, USASAC)

Robert Moore, deputy to the commanding general, are now voting members on the General Officer Steering Group, chaired by the G-4. "So as soon as Army G-4 starts talking about changing the force structure, we're present. If the Army decides to do away with a division, which will likely result in a significant number of EDAs, we can start working requirements," said Williams.

This new proactive role means USASAC has an eye on the proposed list of EDAs and can engage potential customers immediately, versus sitting back and waiting for millions of dollars of equipment to be transported and stored in warehouses and depots across the United States until DOD decides what to do with it.

"We're going to take it right out of unit hands, and we're going to put it in customer hands, and the customer starts paying the bill," said Williams, "whereas before, the U.S. government assumed all costs—at taxpayer expense—and risks until the customer signed for it. Once it is signed off a unit's books, under the new process, it will be available for pickup the next day. Then, a joint vehicle inspection is conducted with the customer, who will sign for it on the spot, and away it goes on a truck."

JUST IN TIME

This facelift to USASAC's EDA operations, dubbed the "just in time" approach, has triggered an avalanche of opportunity. The number of cases has spiked from approximately three active cases out of eight working cases annually, to 85 active cases out of more than 200 working cases annually.

Under the new model, Williams' EDA team takes an unprecedented degree of initiative, preemptively reaching out to meet customer needs while saving millions in storage and demilitarization costs. But taxpayer savings aren't the only advantage. The EDA process comes with USASAC's "total package approach," which includes not only the equipment, but also refurbishment, training, facilities, spare parts, publications, maintenance, logistics support and other services to ensure that a capability performs appropriately.

"So, we've just generated probably a few thousand man-hours of work, refurbishing equipment at the depot, and now that's keeping U.S. citizens employed and contributing to the Army's organic industrial base [OIB]," said Williams. "Then, in order to refurbish the equipment, we have to buy parts for it, [which is] also contributing to U.S. industry."

The Army's OIB consists of depots, arsenals and ammunition plants, all of which are a critical component in U.S. military and joint force readiness. The OIB provides services for refurbishment, modernization, and repair and return to customer countries. In the case of maintenance on EDA, the U.S. Army Materiel Command (AMC) Security Assistance Management Directorate works with the OIB to help determine the best options for bringing the materiel to the standards required by the customer.

As crucial as the OIB is to the U.S. economy and military readiness, the American military's transition from combat to sustainment has led to a sharp decline in work at OIB facilities. Because the

FIELD OF GOLD
Joint visual inspection allows representatives from other countries the opportunity to inspect equipment prior to accepting it through the EDA program. USASAC informs countries interested in EDA of the refurbishment capabilities offered by the Army's OIB that can be obtained through the FMS process. (Photo by Rick Bumgardner, USASAC)

CHECKING UNDER THE HOOD
Moroccan Army representatives test the engine of a High Mobility Multipurpose Wheeled Vehicle to determine what may need to be repaired if they acquire the vehicle through the Army's EDA program. (Photo by Rick Bumgardner, USASAC)

survivability of the OIB is a priority for national security, AMC is investing in industry partnerships to sustain it while USASAC's EDA sales contribute greatly to the effort. Last year, USASAC's FMS of excess articles netted the OIB more than $100 million in revenue.

CONCLUSION

The new EDA business model should become policy by FY17, said Williams, before the active Army's drawdown in size from 490,000 to 450,000 by Oct. 1, 2017. "At one point, we had only been moving equipment that had been stored in warehouses for years or EDA from previously announced cuts, not the materiel that will be coming out of active units," he said. What was once a tidal wave of potential EDA can now be described as an impending tsunami.

"There are a lot of moving pieces, but the just-in-time model has been extremely successful so far," he said. "With minimal staffing and expanding mission, we have managed to take an antiquated, cost-prohibitive process and, based on guidance and intent from the chief of staff of the Army, turned it into a parallel, proactive, cost-efficient process. With the support of our command and Big Army, we'll continue this success into the future."

*For more information, visit **www.usasac.army.mil** or contact the USASAC public affairs office at 256-450-5727.*

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LEADING THE ARMY SECURITY COOPERATION ENTERPRISE

The Deputy Assistant Secretary of the Army for Defense Exports and Cooperation (DASA(DE&C)) leads the Army security cooperation enterprise and links the world to Army innovation through foreign military sales, technology transfer and licensing to strengthen mutual defense capabilities.

DASA(DE&C) links the world to Army innovation by:

- Providing tools to allies and partners to safeguard our global community.
- Closing technology gaps through shared research and innovation.
- Fostering cohesion and unified effort, continuous improvement and service to our customers.
- Strengthening trust of our foreign, industry and institutional partners.

U.S.ARMY

Deputy Assistant Secretary of the Army
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IN DEFENSE OF IRAQ

Mine-Resistant Ambush-Protected (MRAP) vehicles sold to the Iraqi army through the Army's FMS and Excess Defense Articles programs are used to help defeat and deter threats to the region from the Islamic State group. In December 2013, USASAC, in collaboration with its partners in the security assistance enterprise, completed an expedited FMS case in 90 days for delivery of 250 MRAPs to Iraq, in response to that country's urgent requests. The delivery took place in December 2014. (Photos courtesy of USASAC Public Affairs)

The Requirements QUESTION

The Army security assistance community has a handful of tools to help partner nations navigate the FMS process by effectively defining requirements and eliminating capability shortfalls.

by Mr. Charles Meixner

A key question in the Army's approach to requirements is how to achieve solutions without over-specifying. The ultimate goal is to make trades that reflect available resources, balancing costs and benefits. Partner nations, however, may not take the same approach to determining requirements, which can complicate foreign military sales (FMS). Some nations establish requirements using processes very similar to those the United States uses—transparent and easily understood—but others have buying habits based on a process that is opaque, by comparison.

Thus partner nations may enter into FMS without the clearly defined requirements to which the Army is accustomed. This can lead to a lot of message traffic back and forth that ultimately delays delivery of the requested item. It may also lead to an FMS offer that does not satisfy the partner nation's needs, resulting in the loss of a sale or extensive rework of the offer.

LAYING THE GROUNDWORK

The FMS process begins when a partner nation submits a formal request to DOD. This letter of request (LOR) usually takes the form of a letter, a message, an email or even a verbal discussion. If the request is verbal, a memorandum for record will document the conversation and outline the required information. For a request received during a meeting or conference, the meeting minutes will specify the action requested and will be signed by the appropriate representative of the purchasing nation. LORs can request the purchase of articles or services, resulting in a letter of offer and acceptance (LOA); the lease of military property; or simply the price and availability (P&A) of a specific item. Cost and schedule are determined with the assistance of the program executive office (PEO) or the life-cycle management command for the military item being requested.

THE HOWITZERS ARE HERE
An M109-A5 howitzer is off-loaded to a trailer at the port in Punta Arenas, Chile, in December 2014. The self-propelled howitzer was one of 12 purchased by the Chilean army through USASAC's FMS program.

Although no specific format is required for an LOR, it should identify the desired defense articles and/or services in sufficient detail to enable the implementing agency to determine the item's availability and releasability and to prepare an accurate cost estimate. Implementing organizations for the Army include the U.S. Army Security Assistance Command (USASAC), the U.S. Army Corps of Engineers, the U.S. Army Medical Materiel Agency and the Security Assistance Training Field Activity of the U.S. Army Training and Doctrine Command.

An LOR may request P&A of the goods and services the customer is interested in purchasing. P&A is a rough order-of-magnitude estimate of projected cost and availability. It is intended for planning purposes only, not for the customer to use in budgeting. DOD takes pains to emphasize that this number is only an estimate. The final cost of the sale will appear in the LOA and may differ from the initial P&A estimate. Before any offer is made that would introduce a new capability to a country, it must first be cleared through the Deputy Assistant Secretary of the Army for Defense Exports and Cooperation (DASA(DE&C)), to ensure that the planned sale has addressed all releasability issues and to avoid giving the partner nation a false impression.

The LOA is the actual contract between DOD and the customer for the sale; it represents a bona fide offer by the U.S. government to sell the items described therein. The LOA becomes an agreement when the customer signs it and provides the initial deposit payment specified in the LOA. While P&A and LOA data are both estimates, an LOA reflects the customer's specific requirements and contains the most precise data available when the document is prepared. Regardless of the price listed on the LOA, the customer is liable for the full cost of any article or service provided pursuant to the LOA. That means that when the United States and the partner nation eventually iron out incomplete or poorly defined requirements, the partner nation will pay for any cost increases.

LOAs include an offer expiration date and are typically valid for 60 days from the date of issuance. The customer must sign the LOA and make the initial deposit within those 60 days, or the LOA is automatically canceled. If this happens, the customer has to request a new LOA, and the price may change as a result of production schedules, availability of raw materials or other manufacturing variables. The customer may also request an extension within the 60 days to prevent the LOA from expiring.

LENDING A HAND

If the partner nation has not fully developed a requirement, the LOR may contain insufficient information for the receiving organization. If requested or agreed to by the partner nation, the implementing agency may put together a survey team of experts to help the nation define requirements more fully. USASAC and the PEOs have done this frequently at the request of the partner nation, in coordination with the senior defense official at the country's U.S. embassy.

For example, the Office of the Program Manager-Saudi Arabian National Guard (SANG), PEO Aviation and USASAC representatives recently assisted the SANG. Representatives gathered at a meeting in early April to discuss procurements as part of the U.S. Army's effort to help the Kingdom of Saudi Arabia's Ministry of the National Guard modernize its aviation force. The modernization encompasses training, equipment, maintenance, supply, procurement, management, organization, health care and facilities. The Kingdom of Saudi Arabia is conducting combat operations within its region, and the Guard must be prepared to answer any call and accomplish assigned missions. The goal was to synchronize actions across the aviation enterprise to ensure that the partner modernizes its aviation force as efficiently as possible.

ENHANCING JOINT OPERATIONS
The Army delivered this CH-47D Chinook helicopter and two others to the Royal Moroccan Air Force in August as part of an FMS case between the United States and the Kingdom of Morocco. Providing these helicopters will improve interoperability between the U.S. and Moroccan militaries.

In another possible approach, DOD's Defense Security Cooperation Agency (DSCA) may, at the behest of the combatant commander, form an Expeditionary Requirements Generation Team (ERGT) and send it into the country to help determine capability shortfalls and write the necessary LORs.

In one of the most recent examples, DSCA deployed an ERGT in March 2011 to Bulgaria, consisting of 13 personnel from nine different organizations. The core team members included the DSCA team chief, a regional/desk officer from the Office of the Under Secretary of Defense for Policy, desk officers from the U.S. Department of State and DASA(DE&C) and personnel from the component command and the country team. A good mix of technical and operational experts from the military departments accompanied the core team. The Bulgaria ERGT conducted capability planning that successfully produced LORs addressing mutually agreed-upon objectives, resulting in signed LOAs.

Survey teams from the military departments normally go into the country to assess the full requirements of a system sale, while an ERGT will help a partner nation turn a capability shortfall into a defined requirement. With either of these methods, the purpose is to come to an understanding of the requirements and avoid delays in making an offer.

Another method to ensure a proper exchange of information and sufficient understanding by all parties is the Transparency Project now being tested by the Army and DSCA. This initiative establishes documentation and a series of meetings to take place during the LOR and LOA development phase. The goal is to minimize potential misunderstanding, conduct informal exchanges of information and flesh out requirements to avoid problems and costly corrections during program execution. If the test program proves successful, this process is likely to become a standard for major system sales, "major" being military equipment on the Department of State's U.S. Munitions List that has a nonrecurring research and development cost of more than $50 million or a total production cost of more than $200 million.

DSCA and the services conceived and developed the Transparency Project in 2014. The first test case, run by the Army and DSCA, started in January, using the United Kingdom's Apache LOR. The pre-LOA phase was completed in July and resulted in an LOA provided to the country for signature. The post-LOA phase will begin after the country signs the LOA and will continue until the sale goes on contract, up to two years after signature. DSCA is anticipating the U.K.'s critique of the pre-LOA phase, which it will present to the services. At that point, there may be some revisions to

REFURBISH AND REUSE
A disassembled M88A1 recovery vehicle is painted at Anniston Army Depot, AL, where 10 vehicles are being refurbished to their original condition before shipment to the Jordanian Armed Forces. Work on this particular FMS case, signed in 2013, began in 2014, with 12 vehicles shipped to Jordan in as-is condition and an additional 10 refurbished. The final vehicle was delivered in April.

the process, and one of the other services may initiate another test case.

CONCLUSION

Partner nations rely on the FMS process to provide immediate solutions to their needs for defense capabilities. Experience has shown us that the best FMS solutions involve a full package of equipment, training, maintenance, spare parts, organizational readiness and continuing logistic support. Well-defined requirements are essential to provide these military capabilities successfully; partner nations who know what they need and what it will cost them can make purchases that will serve the intended purpose, and will obtain the best product at the lowest cost.

For those using the FMS system, the importance of a well-written and comprehensive LOR cannot be overstated. The Army security assistance community stands ready to help partner nations determine capability shortfalls and define requirements using survey teams, ERGTs and, possibly in the future, transparency projects.

FMS and the entire security assistance enterprise fill a necessary function for countries without a mature acquisition organization to obtain products and services that will meet their national security needs. However, partner nation defense organizations may also be looking for avenues to initiate or enhance relationships with key manufacturers and vendors outside of FMS. While this is appropriate and may cost less, lower costs may be the result of incomplete training, maintenance, organizational readiness or continued support guarantees. For this reason, DSCA and the services are continually trying to improve the FMS process to reduce costs and shorten timelines.

One challenge facing the FMS enterprise is sequestration, which imposed restrictions on DOD's budget and reduced the effectiveness of FMS program offices. Limitations on staff, travel, purchases and contracting hindered the FMS mission and created challenges that minimized the benefits of the FMS process to partner nations. The FMS enterprise was hampered in its ability to provide total package benefits and oversight of the original equipment manufacturers (OEMs) and vendors for the partner nation, even though the partner nation was paying the bill for such services. Efforts are being made to uncouple FMS-funded activities from those paid for by U.S. taxpayers, so as to minimize this type of disruption in the future.

Delays in establishing or amending an FMS case often can hurt the OEM's bottom line by forcing it to adjust delivery timelines in response to contracting delays. With the downsizing of the U.S. military and the decrease in defense spending, manufacturers such as Lockheed Martin Corp., Boeing Co., Raytheon Co., United Technologies Corp. and others are significantly increasing their direct marketing to foreign buyers. In the future, larger, platform-level systems are likely to be acquired by partner nations through direct commercial sales as well as through FMS cases.

For more information, see the Letter of Request Guide at ***https://www.dsca.mil/2014-foreign-customer-guide/appendix-1-letter-request-lor-guide*** *and the Security Assistance Management Manual (Chapter 5) at* ***http://www.samm.dsca.mil/chapter/chapter-5****; or contact Floyd Baker, DASA(DE&C), at 703-545-4715 or* ***homer.f.baker.civ@mail.mil****.*

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LESSONS LEARNED IN FMS

FMS is a complex 'team sport' with a lot of players, and a vital means to help partner nations reach their security goals, as well as to help keep the U.S. Army's industrial base warm and support program management goals and the principles of better buying power. PM SSL's efforts in sales to many different countries have yielded useful insights in overcoming challenges.

by COL Michael E. Sloane and Mr. Charles Meixner

Foreign military sales (FMS) are a team sport. Success requires a great deal of coordination and contributions from the Army acquisition enterprise and other Army-specific agencies that participate in the FMS process with partner nations, including the U.S. Army Security Assistance Command (USASAC), the U.S. Army Corps of Engineers, the U.S. Army Training and Doctrine Command and the U.S. Department of State, among others. FMS cases require the support of life-cycle management commands; research, development and engineering commands; and program executive offices (PEOs).

One of the primary reasons that FMS is a team sport, and a vigorous one at that, is that the process is far from elegant; it is complex and multifaceted, sometimes presenting questions with no easy answers. In some instances, the decision to sell U.S. military equipment is relatively straightforward, such as with close allies like many nations in Europe. With other nations, the decision-making process may have considerably more layers and nuances.

As the Project Manager for Soldier Sensors and Lasers (PM SSL) has learned, program management offices must be heavily involved. Contributing organizations work together to plan, program, budget and execute FMS cases with the same high degree of attention to detail and efficiency as other DOD procurement activities.

THERE WILL BE SURPRISES

Essentially, every request that PM SSL, assigned to PEO Soldier, gets for an FMS case is a surprise, but the surprises are ones that PM SSL has come to expect over 12 years of involvement in FMS. PM SSL has garnered considerable experience and gathered lessons learned in various aspects of FMS, including advance planning and detailed discussion, data disclosure, contracting approaches and follow-on supply issues.

All orders for FMS products come through USASAC, which works with the Office of the Deputy Assistant Secretary for Defense Exports and Cooperation (DASA(DE&C)). The DASA(DE&C), in concert with other organizations such as the

WORLDWIDE CAPABILITY
Slovenian Pvt. Ales Simenko looks through a night vision device during training at Hohenfels Training Area, Germany, in September 2014. The training was part of Exercise Saber Junction 2014, in which participants from the United States, NATO allies and European security partners conducted unified land operations combining offensive, defensive and stability operations. NVGs are a mainstay of FMS for PEO Soldier. (U.S. Army photo by SGT Christina M. Dion, 319th Mobile Public Affairs Detachment)

Department of State, decides what the Army can sell and to whom. Then, the DASA(DE&C) works within the network of stakeholders to put together the sale, while the program management office works to integrate FMS efforts into its planning.

PM SSL's first responsibility is to equip U.S. Soldiers with sensors, lasers and precision targeting devices to dominate the battlefield through improved lethality, mobility, situational awareness and survivability in all operational environments. PEO Soldier and the DASA(DE&C) work hard to get the FMS customer the best possible equipment, given current export regulations and limitations on advanced technology approved by DOD. PM SSL works with industry partners and relies on the Night Vision and Electronic Sensors Directorate (NVESD) of the U.S. Army Communications-Electronics Research, Development and Engineering Center to develop and improve advanced electro-optical, night vision and sensor devices. Thus the Army can be ready to respond when necessary to supply needed items at the right time to U.S. Soldiers and partner nations.

The mission of supporting national FMS goals is work that PM SSL does while it is performing its core mission. As of August 2015, PM SSL was supporting more than 35 FMS cases. These efforts involve the sale of more than 11,000 night vision goggles (NVGs) and image intensifiers, valued at more than $10 million, to 17 different countries.

LESSONS LEARNED

PM SSL's FMS efforts have yielded several useful insights for overcoming challenges to capitalizing on FMS opportunities while protecting the flow of equipment to U.S. Soldiers. Among the most important lessons learned is the necessity for program managers to understand early on the factors involved in supporting FMS goals. For instance, given that PM SSL cannot predict when an FMS case might arise nor what it might look like except in the most general terms, it's important to coordinate up front with industry to be prepared with measures that can mitigate risks to program cost, schedule, sustainment and quality assurance in supporting U.S. Soldiers. Successful program managers understand that FMS success resides largely with the

strength of the professionals within their office, coupled with strong, continuous relationships with other U.S. government organizations supporting FMS cases.

Accurate forecasting and coordination of potential and emerging FMS requirements can dramatically improve the chances for FMS success by allowing all stakeholders to plan and budget for sufficient financial and human resources. Advance planning and detailed discussions between the United States and a purchasing country also play a key role in the ultimate success or failure of an arms transfer program. The importance of conducting these activities before consummating a sale increases proportionately with the complexity and sensitivity of the system involved. Before finalizing selection decisions, country requirements should be well-defined and the ability by DOD and a contractor to satisfy those needs clearly understood. Thus, a purchasing country can make a fully informed decision and the United States will be able to validate that the country's requirements are being fully met. (See "The Requirements Question" on Page 150.)

A potentially problematic aspect of FMS is data disclosure. What technical data will or will not be released, and at what cost, should be clearly defined up front, not in the middle of the FMS case. The purchasing country may firmly believe that pertinent sections of the contract ensure the transfer of technical data needed to properly absorb and independently maintain the product being sold to them, whereas the documents do not, in fact, guarantee that degree of support. This can become the topic of high-level discussions and recriminations, making data disclosure a potentially worrisome issue. Many such concerns can be avoided in advance of the sale, however, with a thorough examination of the disclosure policy affecting the product technology.

Another area of potential misunderstanding is that, after delivery of a product or weapon system, many countries that possess the requisite skills and supporting logistics infrastructure find it advantageous to procure follow-on supply directly from U.S. contractors. However, the purchase of a major weapon system with all necessary support elements takes a degree of program management experience and system integration expertise that the purchasing country may not possess. That depends on several factors, including the sophistication and sensitivity of the weapon system, the system's

SUPPORTING DJIBOUTI
Members of the Djiboutian army receive instruction on NVGs from Soldiers of the U.S. Army's 3rd Squadron, 124th Cavalry Regiment in Arta, Djibouti, in March 2012. The instruction was in support of an FMS case supporting border security force training. (Photo by TSgt Daniel St. Pierre, 4th Combat Camera Squadron)

By keeping industrial production lines open and sustaining critical manufacturing skills through FMS, the United States can preserve a knowledgeable workforce and reduce the cost to taxpayers of having to restart cold production lines later in response to an increase in demand.

Accurate forecasting and coordination of potential and emerging FMS requirements can dramatically improve the chances for FMS success by allowing all stakeholders to plan and budget for sufficient financial and human resources.

maturity and configuration stability and the degree to which the U.S. government owns the system's components.

SUCCESSFUL STRATEGIES

PM SSL has developed the following specific approaches to help bring FMS cases to completion:

1. Control cost with consolidated procurements and quantity price points. Providing cost-effective contracts to FMS customers using the PM's base contracts can be complex. Equipping requirements for U.S. forces are most often authorized far in advance of FMS requests. Adding to the complexity, FMS quantities can be less certain than equipping projections for DOD, which tends to lead to requirements for separate delivery orders. PM SSL has successfully combined several limited-quantity procurements from various requirements into single-vendor delivery orders to secure NVGs for coalition partners at affordable costs. Additionally, the PM establishes contractual volume-based price points to achieve cost advantages for the increased quantities associated with consolidated orders. This supports the Better Buying Power (BBP) 3.0 focus on promoting effective competition.

2. Support FMS schedule requirements using the Special Defense Acquisition Fund (SDAF). Another focus area for the program management office is production lead time. It's often not enough to simply wait for a cost-effective order quantity, as this may not align with FMS delivery requirements. One way to address this potential issue is to use the Defense Security Cooperation Agency's SDAF, which provides a way to finance the acquisition of defense articles in anticipation of their sale and transfer, resulting in quicker responses to FMS requests. SDAF is a revolving fund used to purchase and store high-demand items that typically have a long production lead time. Ultimately, FMS case money is used to pay for the items, which keeps the SDAF functioning. In other words, SDAF money enables the procurement of systems in advance of FMS requests. This proactive step supports the BBP 3.0 focus on incentivizing productivity in industry and government.

3. Capitalize on FMS opportunities to preserve critical industrial capabilities. During recent global conflicts, the U.S. military's NVGs have proven themselves as combat multipliers; therefore, demand has increased significantly from the United States and foreign nations. After years of peak production, however, U.S. military demand for new NVGs has begun to slow with the scaling down of operations in Southwest Asia and the resulting reduction in requirements. By keeping industrial production lines open and sustaining critical manufacturing skills through FMS, the United States can preserve a knowledgeable workforce and reduce the cost to taxpayers of having to restart cold production lines later in response to an increase in demand. This also supports BBP 3.0's focus on incentivizing productivity in industry and government.

4. Plan for FMS after U.S. production, manufacturing and quality assurance are complete. FMS procurements are to receive the same high level of quality control that U.S. products receive, and program managers must conduct FMS product verification procedures using the same production testing as for equipment fielded to U.S. forces. However, FMS requirements may arise after production for U.S. equipping is complete, which can present significant challenges of production and quality testing. For products likely to become FMS items of interest, program managers should assess, plan and prepare as best as possible to preserve or restart manufacturing capabilities and quality testing.

   This process may be complicated by potential design changes made in line with export controls on system capabilities, and program managers should remain alert for such changes. Keeping other U.S. government shareholders informed as production and test capacity and their related resources change is vital to ensure that expectations are consistent with current and forecast capabilities. This forward-looking approach supports the BBP 3.0 focus on improving tradecraft in acquisition services.

CONCLUSION

From a program manager's perspective, succeeding at FMS takes an enterprise of the right people and skills, a flexible

FOSTERING COOPERATION
SPC Rumaldo Hinojosa, right, of 3rd Squadron, 124th Cavalry Regiment, and a soldier of the Djiboutian Army conduct training on the AN/PVS-7 NVG provided by PM SSL through FMS, in Arta, Djibouti, in March 2012. (Photo by TSgt Daniel St. Pierre, 4th Combat Camera Squadron)

industry, proper oversight and strict cost management. Program management offices with long-term vision identify risks early to ensure that partner nations receive U.S.-developed technology and equipment at an affordable cost, on schedule and within performance and quality assurance guidelines.

In its FMS endeavors, PM SSL achieved success by combining limited-quantity procurements to establish better price points based on larger total unit quantities, in addition to using a variety of funding streams, which together can result in more rapid responses to FMS requests. Additionally, PM SSL has maintained productive relationships with U.S. government agencies, teaming on FMS cases for their products and with their industrial base partners.

Peacetime military engagement has become a key component of U.S. defense strategy to shape the international environment in ways that will favor U.S. interests. FMS achieves several important U.S. goals by creating and reinforcing international partnerships and building strong and capable allies to meet the global challenges of an uncertain and complex security environment.

For more information, go to the PEO Soldier websites ***www.peosoldier.army.mil*** *and* ***http://www.peosoldier.army.mil/portfolio/#1****; DASA(DE&C)'s website,* ***http://asc.army.mil/web/tag/dasa-dec/****; USASAC's website,* ***http://www.army.mil/info/organization/usasac/****; and DSCA's website,* ***http://www.dsca.mil/****.*

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FMS SUCCESS
PFC Nathaniel Pounds, a cannon crew member assigned to Field Artillery Squadron, 2nd Cavalry Regiment, loads ammunition into an M777A2 Howitzer weapon system during an artillery demonstration, where they fired an XM1156 PGK for the first time in the regiment's history at Grafenwoehr Training Area, Germany, July 24. The compatibility of the kit makes it an attractive FMS product for partner nations. (U.S. Army photo by SGT William A. Tanner, 2nd Cavalry Regiment)

Four Steps to Successful FMS

Selling military equipment to allied nations has many benefits—boosting our allies' capabilities and thereby strengthening U.S. posture; facilitating military cooperation—but it's a sensitive process that requires careful planning. PM CAS shares its four-step process to successfully handling FMS.

by Mr. Peter Burke and Mr. Ted Hom

Foreign military sales (FMS) require a tremendous amount of planning, preparation and sensitivity to the customer's culture, values and needs. But most of all, they require solid communication among all stakeholders.

It is easy to identify these tenets, but to execute them is certainly a challenge. The challenge is worth it, though, because FMS build strategic relations, and result in an improved U.S. defense posture, partner nation security and interoperability with nations. FMS also saves the Army money, because buying a larger order with partner nations leads to a lower per-unit price.

In today's environment, with increasing hot spots in the Middle East and Western Europe, rumblings in the Pacific Rim and limited military resources, FMS are becoming a more important mechanism to train, equip and operate with our allies.

STEP ONE: BUILD A GOOD PRODUCT

The Precision Guidance Kit (PGK) is a good case study of what it takes to create a successful FMS case. The PGK is a GPS device with fuzing functions, and uses GPS and control surfaces to guide 155 mm projectiles to the programmed target grid with a high degree of accuracy, reducing collateral damage and enabling quicker success. It is an Acquisition Category (ACAT) Level II effort, achieving urgent materiel release in March 2013 and anticipated to secure type classification-standard/full materiel release (TC-STD/FMR) in the first quarter of FY16. The kit meets international standards for safety and compatibility, and is attractive for FMS because it turns a conventional stockpile of 155 mm projectiles into near-precision munitions.

INTERNATIONAL EFFORT
Representatives from Picatinny Arsenal, JMC, Germany, the Kingdom of Sweden and Denmark after a successful demonstration of the XM1156 PGK in the German Panzer Howitzer 2000 at YPG. (Photo courtesy of YPG Public Affairs)

It's capable of mitigating the shortcomings of current area engagement munitions by enabling the maneuver commander to engage critical targets, including fleeting and "short dwell" targets, with increased accuracy and effectiveness. Without the high performance and high degree of compatibility, few nations would want to buy the PGK.

STEP TWO: BUILD RELATIONSHIPS

Solid performance of equipment is just the first threshold to enable the interplay of different stakeholders to go forth with a possible FMS case. The Office of the Project Manager for Combat Ammunition Systems (OPM CAS) is a proactive player in the early stages of the FMS case development.

Within the PGK program, OPM CAS developed solid working relations with many partners before embarking on the sale. These partners included United States Security Assistance Command (USASAC), Redstone Arsenal, AL; Joint Munitions Command (JMC), Rock Island, IL; Department of the Army-Defense Export Cooperation (DASA(DE&C)), Washington, DC; different Offices of Defense Cooperation (ODCs); U.S. embassies worldwide; Program Executive Office Ammunition (PEO Ammunition), Picatinny Arsenal, NJ; and Army Test and Evaluation Command's facility at Yuma Proving Ground (YPG), AZ.

The success of the PGK depends on its interfaces with the projectile, weapon, fire-control system and GPS constellation. In other words, a potential customer cannot simply procure the item off the shelf. The PM office, as the center of this indirect-fire ecosystem, is responsible for evaluating how the PGK will work on a candidate weapon system, which may be significantly different from what it was qualified on in the United States. Recognizing this early in the strategic planning for FMS, PM CAS took action to build up an in-house capability to quickly evaluate foreign systems' compatibility with PGK in order to have a realistic scope of work in hand during discussions with candidate buyers.

The coordination of different stakeholders, with strong communication brokered by the PM, is also critical in paving the way to develop and execute an FMS case. Constant follow-up and status updates help keep the case flowing.

STEP THREE: KNOW THE BENEFITS

Besides the obvious benefits of interoperability and strengthening ties with our allies, FMS act as a strategic enabler to benefit the Army and the warfighter.

The PGK production contract was structured to realize a benefit from the economies of scale from higher volume production: The contract defined lower prices based on higher quantities ordered in a given period. As FMS orders come in,

ON TARGET
PGK is a GPS with fuzing functions that uses control surfaces to guide 155 mm projectiles to a programmed target grid with a high degree of accuracy, reducing collateral damage. (Photo courtesy of YPG Public Affairs)

PGK PRESENTATION
Co-author Peter Burke shows the PGK separated from a 155 mm artillery projectile during media day at Picatinny Arsenal, May 4. Events such as this provide a venue to promote the device. (Photo by David Vergun, Defense Media Activity)

partner nation funding is added to the U.S. Army's order, resulting in a lower average unit cost, enabling all to benefit with higher quantities for the same amount of funding.

STEP FOUR: HAVE A PLAN OF ENGAGEMENT

With these benefits in mind, OPM CAS developed a plan of engagement that has enabled successful foreign sales of the PGK. PM CAS briefs at international conferences, meetings or visits at Picatinny Arsenal, NJ, where PM CAS is located, presenting unclassified information regarding PGK, and often capturing the interest of the allied party because of the kits' high performance and potential to greatly improve their indirect fire capabilities. The allied party typically has a national course-correction fuze requirement (adding a precision capability within the fuze module to improve conventional ammunition precision) and sees that PGK could possibly fulfill their needs.

The allied nation will typically then request a follow-up unclassified PGK briefing in their country so more military and technical experts can evaluate the program. Briefings are typically presented by PM CAS at the U.S. embassy in the host nation, coordinated with the ODC of the host country, USASAC, DASA(DE&C) and PEO Ammunition.

Upon successful briefing and discussions, OPM CAS invites the interested nation to witness a PGK lot acceptance test at YPG. The week spent at Yuma with the country representatives, getting to learn more about PGK and building a strong relationship based on trust, is invaluable. This is the spirit of international cooperation and coalition building.

Just because the FMS case is signed does not mean that the work is over. Once an FMS case has been signed, its execution (conduct new equipment training, publish technical manuals, produce, ship and deliver defense articles) still requires care and diligence. The JMC case managers and the host-nation acceptance teams must work closely to ensure the defense articles and training materials are delivered and documented as promised. FMS program management reviews are critical to make sure all defense articles and services are identified and scheduled for delivery.

Allies have decided to partner with the United States on PGK based on this plan of engagement, with its strong communication framework. Furthermore, this framework has resulted in a 13 percent decrease in PGK production unit cost in FY15. This plan of engagement has also been applied successfully in other programs, such as the 155 mm Excalibur, a GPS-guided 155 mm artillery round and an ACAT Level I program that has been sold to Sweden, Canada and Australia, and can be used across other programs.

CONCLUSION

FMS case development and execution is a detail-oriented endeavor in meeting allied customer needs. Communication is the cornerstone of all the facets of FMS, including relationship building, interplay of national and international stakeholders, proactive follow-up, a solid plan of engagement and—of utmost importance—the highly reliable performance of equipment to be sold. All of these efforts result in our allies being able to fight shoulder to shoulder with us, using common equipment in present and future conflicts, and the economy of scale results in lower prices for the Army.

For more information, contact the author at ***peter.j.burke.civ@mail.mil*** *or 973-724-2110.*

MR. PETER BURKE is the deputy project manager for PM CAS at Picatinny Arsenal. He is a graduate of the Harvard Business School (General Management Program), and holds an MBA from the Florida Institute of Technology and a B.S. in industrial engineering from the New Jersey Institute of Technology. He is Level III certified in program management and in systems planning, research, development and engineering (SPRDE) and is a member of the Army Acquisition Corps (AAC).

MR. TED HOM is the director of international programs for PEO Ammunition's PM for Combat Ammunition Systems at Picatinny Arsenal. He holds an M.S. in national resource strategy from National Defense University, an MBA from Monmouth University, a graduate certificate in international relations for business from Boston University Brussels and a B.S. in chemical engineering from the State University of New York at Buffalo. He is Level III certified in program management and in SPRDE and is a member of the AAC.

COMMENTARY

FROM THE DIRECTOR,
ACQUISITION CAREER MANAGEMENT
LTG MICHAEL E. WILLIAMSON

The Professionals *Behind* Program Success

Army acquisition experts continually sharpen the decisive edge for Soldiers on the battlefield.

Often in the acquisition community and throughout the Army, and even in testimony on Capitol Hill, we talk about successful programs. These are the programs that are built on solid foundations with stable, realistic requirements and sound acquisition strategies. There is a tendency in these discussions to overlook the real reason behind the success—having the right people in the right place at the right time.

My focus for this column is on team members within the new Joint Light Tactical Vehicle (JLTV) program in the Program Executive Office (PEO) for Combat Support and Combat Service Support (CS&CSS) and the established HELLFIRE Missile System in the PEO for Missiles and Space (MS). Both are successful, award-winning programs. The JLTV team received the prestigious David Packard Excellence in Acquisition Award in 2013 for several innovative initiatives that enabled the award of three competitive prototyping contracts for JLTV's engineering and manufacturing development (EMD) phase. The HELLFIRE II team received the equally prestigious William J. Perry Award in 2013 for accomplishments that included meeting the vital needs of our warfighters through increased production rates and performance enhancements.

While there are hundreds of hardworking and dedicated team members associated with these programs, four acquisition professionals from JLTV and four from HELLFIRE were selected by their program leadership for a look at their credentials as well as their perspectives on program and career success.

It is abundantly clear that our Army acquisition professionals are our greatest asset. For the eight featured here, mentorship is as important as teamwork. Leadership is important. However, their tireless commitment and greatest satisfaction come from knowing that their work is vitally important to the success and well-being of our warfighters.

TEAM JLTV

JLTV is the next generation of light tactical vehicles, designed to provide the necessary leap in protection, payload and performance to meet the expeditionary needs of the Army and Marine Corps. Here, we learn about the leaders of three teams (Alpha, Bravo and Charlie) who managed the innovative EMD phase from August 2012 to November 2014. (The JLTV program office assigned a team to each of the three vendors chosen to develop a competitive prototype.)

We also learn about a test manager who provided data to support both a Milestone C decision and a low-rate initial production contract award. As team leads, these acquisition professionals were instrumental in monitoring contractor execution in terms of cost, schedule and performance; coordinating with contractor leadership and integrated product teams; coordinating with joint program leadership, staff and outside agencies; and providing subject-matter expertise for technical and programmatic objectives.

Scott M. Doudna, deputy product director, led the Alpha Team. He is an Army Acquisition Corps (AAC) member currently serving in a Critical Acquisition Position (CAP) with 18 years of experience and two Level III Defense Acquisition Workforce Improvement Act (DAWIA) certifications, in program management and engineering. Scott has an undergraduate degree in mechanical engineering from Kettering University and a graduate degree in technical management from Embry-Riddle Aeronautical University.

Scott said that what prepared him for his role with JLTV was simple: "Early in my career, I found someone whose career and life reflected where I wanted to be. I secured that individual as a mentor, and I deliberately and diligently followed the advice and recommendations of that mentor." He finds great satisfaction in being part of a successful program. "Everybody wants to be part of a winning team," he said, adding that it was very rewarding and satisfying to know that the team's effort will provide warfighters with equipment that will allow them to more efficiently, effectively and safely execute their missions. Their ability to execute these missions successfully directly correlate to the freedoms we enjoy on a daily basis, he said.

Scott recommends that members of the acquisition workforce actively manage their careers. Establish, in writing, three-, five- and 10-year goals. Discuss each career decision with your mentor and evaluate it against these goals. If the opportunity moves you closer to your defined goal, jump in with both feet and pursue it with reckless abandon. If not, pass on the opportunity and leave it for someone who will derive greater benefit. There will be failures along the way, but it is important to pick yourself up and carry on. Remember, failure is the partner to success, not the antithesis.

Donald J. "Don" Starkey is the deputy product director who led JLTV Team Bravo. He is also an AAC member currently serving in a CAP, with Level III DAWIA certifications in program management and engineering. He has an undergraduate degree in mechanical engineering from Lawrence Technological University and a graduate degree in management from Walsh University. Don has more than 29 years of civilian acquisition experience, joining the JLTV team as it was transitioning from a U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) research and development program, the Future Tactical Truck System.

Don said that when he was a young engineer, his new boss, Al Puzzuoli, then product manager for the M113 Family of Vehicles

Don believes that JLTV is a successful program because of the introduction of the "knowledge point" process. At key points in the program, the combat and materiel developers, along with other major stakeholders, would get together to assess how the program was progressing.

who later became the PEO for Ground Combat Systems and is now retired, made a lasting impression on him. Al was smart, Don said, and showed him how to see the big picture and to know what was critical and what just had to be good enough. He also was patient. If a crisis arose, Al made it a point not to overreact. He told Don to take some time, gather the facts and try to take emotion out of the equation in order to reach a logical conclusion. "Now that I am in a leadership role," Don said, "I try to impart this to the folks who look to me for mentorship."

Don believes that JLTV is a successful program because of the introduction of the "knowledge point" process. At key points in the program, the combat and materiel developers, along with other major stakeholders, would get together to assess how the program was progressing. This created an atmosphere of cooperation and gained buy-in if changes were necessary.

Christopher M. "Chris" Brouwer, deputy product director, led the Charlie Team. He is also an AAC member occupying a CAP, with Level III certifications in program management and engineering. With 18 years of acquisition experience, Chris has an undergraduate degree in computer engineering and computer science from Kettering University. He joined the JLTV team just as it was preparing to go into the technology development phase in January 2007.

TESTING DOWN UNDER
John L. "Woz" Wozniak, a JLTV test manager and deputy product manager, is shown in a 2009 photo in Queensland, Australia, where he was assessing the Australian government's testing capability. Wozniak said his greatest satisfaction from having a leadership role in the JLTV program was being able to see it from its inception clear through to the start of production. (Photo by Mike Malik, Joint Program Office JLTV)

JLTV TEAM LEADERSHIP
Joint Program Office (JPO) JLTV Deputy Product Directors Scott M. Doudna, left, Christopher M. "Chris" Brouwer and Donald J. "Don" Starkey collaborate. They led the Alpha, Charlie and Bravo teams, respectively, in managing the JLTV program's innovative EMD phase; each team worked with one of the three vendors chosen to develop a competitive prototype. (Photo by John A. Otwell, PEO CS&CSS Strategic Communications)

He said that people are the number one reason that JLTV is a successful program, and JLTV has a great team of people—competent, passionate and focused on the program's success. For Chris, competition has been the next biggest factor in that continued success. "Competition among our industry partners has enabled the program to do things it otherwise would not have been able to do and will ultimately result in fielding the best possible JLTV to our Soldiers and Marines," he said.

His great source of pride is having the opportunity to be a part of the JLTV program from the beginning. "I have been able to either directly author or have significant input into almost every aspect of the program to date," he said. "We have had many important challenges and opportunities along the way, and we have been able to do some rather creative things within the acquisition process." Of the many lessons learned that Chris has to share, "the biggest would be to not be afraid to be creative and think outside of the box," he said. "Just because things have been done a certain way for many years doesn't mean it is the only or best way to accomplish the mission."

A JLTV test manager, **John L. "Woz" Wozniak**, also serves as the deputy product manager. An AAC member in a CAP, he has two Level III DAWIA certifications, in program management and test and evaluation, along with an undergraduate degree in economics from the University of Michigan at Ann Arbor and a graduate degree in strategic studies from the U.S. Army War College. Woz has 13 years of civilian acquisition experience following retirement from a 20-year career in the U.S. Marine Corps, where he was a Heavy Vehicle Fleet project officer and a base motor transport officer.

"We can't forget the prime and subcontractors and their workforce, who work hard every day making these missiles. It is a total HELLFIRE team effort."

Of the many contributors to the JLTV program's success, Woz said, the most significant are the professionalism of those assigned to the program and the phenomenal teaming. While the stakeholders often had widely varying orientations, he said, everyone pulled together in the end. Significant players included TARDEC; the Combined Arms Support Command; U.S. Army Test and Evaluation Command; Marine Corps Combat Development Command and Deputy Commandant, Combat Development and Integration; Marine Corps Operational Test and Evaluation Activity; Office of the Secretary of Defense, specifically the Director, Operational Test & Evaluation; and the Deputy Assistant Secretary of Defense, Developmental Test & Evaluation, among others.

"My greatest satisfaction is being able to see a program from its inception all the way through to the front steps of the production phase, particularly since it's a program that will likely be a significant force provider for both the Army and Marine Corps for the next 40 to 50 years," he said, adding, "My only lesson is the value of perseverance. No program is without challenges. If everyone stays focused on the end goal, it's remarkable what can be accomplished, particularly when people aren't worried about who gets the credit."

TEAM HELLFIRE

The combat-proven HELLFIRE Missile System entered service in 1985 and has been used in every conflict since Operation Just Cause in Panama in 1989. The four team members featured here oversee program budgeting, contracting, product assurance and international sales. Today, the HELLFIRE II missile is the primary air-to-ground precision weapon for rotary-wing and unmanned aerial systems (UAS) for the entire armed forces, as well as 22 allied nations. The Romeo missile and the future Romeo Block 1 continue the long line of successful adaptations to the HELLFIRE family of missiles and ensure that warfighters continue to have the overmatch capability necessary for mission success.

Patrick V. Miller, the assistant product manager for business operations, is responsible for planning and executing the HELLFIRE budget, including Army, Navy, Air Force and foreign military sales (FMS) funding. He is an AAC member with a DAWIA Level III certification in program management who holds an MBA from Oklahoma City University and an undergraduate degree in business management from the University of Dayton. With five years of civilian acquisition experience, Patrick is a retired Army lieutenant colonel with more than two decades of service.

Patrick noted important points in his career that helped prepare him for his role with HELLFIRE. "The most important decision was to become a member of the Acquisition Corps when I was a captain," he said. "I've learned something in

KEEPING THE HELLFIRE ON TARGET
Patrick V. Miller, left, Sandra "Sandy" French and Steve Dumas are members of the HELLFIRE II team, which received a William J. Perry Award in 2013, recognizing their outstanding contributions to DOD precision strike systems. (Photo by Jennifer Weiger, PEO MS)

> *"Many individuals have had a hand in my development and in teaching me the way to handle matters in a professional manner. Proper attitude can carry one a long way."*

every position I've had, but being the deputy project director in the Threat Systems Management Office and serving as the assistant product manager in the Army Tactical Missiles and the Precision Fires Rockets and Missiles project offices have prepared me for my role here in the HELLFIRE Product Management Office." These prior positions provided challenges and the opportunity to learn to manage the cost, schedule and performance of a program, he said.

Patrick said the success of the HELLFIRE program is attributable to his colleagues and their desire to provide the best weapon systems to our Soldiers, sailors, airmen and Marines. "We can't forget the prime and subcontractors and their workforce, who work hard every day making these missiles. It is a total HELLFIRE team effort." His greatest satisfaction comes from knowing that the work he does has an impact. "We are making that difference in allowing our warfighters to reach out and engage the enemy from a distance. This ultimately saves lives," he said.

Sandra "Sandy" French is the lead HELLFIRE acquisition analyst responsible for planning, developing and managing multiple, complex hardware and service-related requirements involving a variety of contracts. This includes development of long- and short-term strategies for the HELLFIRE missile programs—such as engineering services, depot-related repair and reset and production—and all documentation associated with the contract requirement packages.

Sandy is an AAC member who has attained DAWIA Level III certification in contracting and Level I certification in program management. She has an undergraduate degree in technology management from Athens State University and a graduate degree in acquisition and contract management from the Florida Institute of Technology. With more than 23 years of acquisition experience, Sandy has spent 19 years with the HELLFIRE team. In addition, she served for three years in the U.S. Air Force Reserve.

Echoing her colleagues, Sandy said that mentoring early in her career from a civilian with more than 40 years of contracting experience helped prepare her for the leadership position she now holds. She also said that encouragement from the program office's business manager allowed her to complete her graduate degree, which has been instrumental to her success. Her advice to others is to find a mentor who is not only knowledgeable but also willing to encourage pursuing leadership training opportunities.

She said her greatest job satisfaction is knowing that she is supporting the men and women who serve in uniform, as well as their families. To the members of our armed forces, Sandy said, "HELLFIRE means reliance, success and precision." She attributes the program's success to the dedication and professionalism of the military, civilian and contractor personnel at all levels who support the HELLFIRE program.

Frank Bower is the international programs manager for the HELLFIRE Missile System, overseeing all FMS cases and requests. Retired after more than 20 years of service in the Marine Corps where he served as an aviation ordnance officer, he has worked with the HELLFIRE in one way or another since the late 1980s. With more than a decade of civilian experience in the Army Acquisition Workforce, Frank has attained two DAWIA Level III certifications—one in program management and another in life cycle logistics.

Like his team members, Frank finds his greatest job satisfaction in knowing that there are Soldiers and Marines on the battlefield who are being supported by HELLFIRE, enabling

a helicopter or UAS to engage the enemy and keep the crew out of harm's way. "As a retired Marine," he said, "I have active-duty friends who fly AH-1 Cobra/Viper helicopters, and it is their go-to weapon." He takes great pride in the fact that his son is also a Marine aviation ordnanceman who just checked into an AH-1W squadron and will be working with the HELLFIRE system.

His advice for a successful acquisition career is to always remember who you work for—in this case that Soldier or Marine on the battlefield who is counting on the close air support that HELLFIRE provides.

Because the HELLFIRE system is known throughout the world as effective, reliable and able to be used on multiple platforms, 22 countries currently are engaged in 62 HELLFIRE FMS cases with a total value of more than $1.3 billion. This security cooperation enhances our interoperability with coalition partners and provides a lower overall system cost for U.S. forces and our coalition partners.

Steve Dumas leads the product assurance team, as well as additional support personnel from multiple functional areas, charged with meeting the quality assurance mission requirements for the HELLFIRE Missile System, including launchers and support equipment. He is an AAC member who has attained DAWIA Level III certifications in production, quality and manufacturing and in engineering. With two undergraduate degrees, one in chemical engineering from Auburn University and another in electrical engineering from the University of Alabama in Huntsville, he also has a graduate degree in management from the Florida Institute of Technology. Steve has 31 years of acquisition experience, 27 of them in the HELLFIRE product management office.

Throughout his career, Steve said, he was given responsibilities and taught to take ownership of them, while being given the freedom to make mistakes and to learn from them. That prepared him for his current role. "Many individuals have had a hand in my development," he said, "and in teaching me the way to handle matters in a professional manner. Proper attitude can carry one a long way."

In Steve's opinion, the greatest factor in the HELLFIRE program's success lies in the teamwork approach to business. All issues are worked with "open book" communication. The relationship with the prime contractor, Lockheed Martin Corp., has been one of shared information and a "win-win" approach to resolving difficult problems, Steve said. There is great pride among both government and contractor personnel in fielding the most reliable munition possible for our Soldiers. This is the foundation of HELLFIRE's excellent reputation.

Steve said the warfighter at the end of the "trigger pull" is counting on him to do his job well. He derives job satisfaction from seeing the HELLFIRE system used so extensively on the battlefield and hearing testimonials, the success stories from our returning warfighters.

CONCLUSION

The defense acquisition process is highly complex and requires a professional acquisition workforce to ensure that programs are successful. Our AAC and the individual team members highlighted here underscore the importance of what we do for our warfighters every day.

There are nearly 37,000 members of the Army Acquisition Workforce, according to Career Acquisition Personnel and Position Management Information System (CAPPMIS) data as of July 31. (CAPPMIS is the central repository for all Army Acquisition Workforce data.) These men and women are the driving force behind our ability to provide our men and women in uniform with the best weapon systems and equipment on earth.

I encourage all of our team members to take a lesson from the acquisition professionals featured here and continue to seek opportunities to expand upon career and leader development goals. Identifying, growing and developing our acquisition professionals is vital to the continued success of Army acquisition programs.

It is abundantly clear that our Army acquisition professionals are our greatest asset. For the eight featured here, mentorship is as important as teamwork. Leadership is important.

PROBLEM SOLVERS
SGM Kenneth Agueda, then-sergeant major of the RDECOM G-3, talks with students June 17 during the five-day eCYBERMISSION National Judging and Educational Event at Hunt Valley, MD. The annual Web-based STEM competition, entering its 14th year, is for students in sixth through ninth grades. It challenges them to develop solutions to real-world challenges in their communities. Winning projects in 2015 included improving water purification as well as identifying and harnessing alternative energy sources. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

FROM THE COMMANDING GENERAL,
U.S. ARMY RESEARCH, DEVELOPMENT AND
ENGINEERING COMMAND
MG JOHN F. WHARTON

From STEM to EMPLOYMENT

Growing the next generation of Army scientists and engineers through an education and research continuum

The Army Operating Concept dictates that "future forces conduct operations consistent with the tenet of adaptability, anticipating dangers and opportunities and adjusting operations to seize, retain, and exploit the initiative." The Army is arguably the nation's foremost leadership training institution, and one of the roles of the research, development and acquisition communities is to develop leaders who can innovate and adapt on the science and technology fronts so that we can deliver the capabilities Army leaders need on the battlefield.

The U.S. Army Research, Development and Engineering Command (RDECOM), on behalf of the Army, is committed to growing the next generation of scientists and engineers to deliver the decisive overmatch the nation needs to win in a complex world. As a community, we must develop a national strategy to ensure America's future security through a robust continuum of science, technology, engineering and mathematics (STEM) education and research.

RDECOM has the mission to deliver this competitive advantage and the programs, investments and partnerships needed to drive the critical educational fundamentals. The command's 13,800 civilians and military constitute one-third of U.S. Army Materiel Command (AMC) manpower. Approximately 10,000 of our personnel are scientists and engineers. With that workforce, RDECOM executes 74 percent of the Army's

science and technology budget. We also have more than 1,000 agreements with industry and more than 1,500 with academia. These agreements, in a variety of forms, further the Army's specific goals in research and development (R&D), scientific investigation, innovation and education.

Furthermore, RDECOM already invests more than $100 million annually along a continuum that begins with our K-12 outreach efforts and extends through undergraduate scholarships to sponsored postdoctoral research. On behalf of the assistant secretary of the Army for acquisition, logistics and technology and AMC, RDECOM serves as the executive agent for STEM outreach and the Army Education Outreach Program, which reaches 42,000 students annually.

RDECOM is increasing its investment with historically black colleges and universities (HBCUs) and tribal colleges and universities, as well as institutions serving minorities such as the Hispanic community and Pacific Islanders. RDECOM has ongoing relationships with a number of HBCU institutions, funding an average of $43.5 million a year in R&D contracts, grants and cooperative agreements.

We are now designing a program to bring together and strengthen these programs. Our goals are far-reaching but can be stated simply: Gain visibility on all the programs we offer, manage and publicize these programs, and develop a strategy to connect the dots from program to program so the Army and those in the academic community who engage with us get the most out of our time, effort and money.

The Army's vision of winning in a complex world drives this effort. RDECOM's global presence through forward-element

LEADERSHIP FOCUS
MG John F. Wharton, RDECOM CG, discusses students' projects June 19 at the culmination of the eCYBERMISSION National Judging and Education Event. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

THE ARMY'S GAIN
Dr. Asha Hall, a materials science engineer with the U.S. Army Research Laboratory at APG, works on the Keithly four-point probe station measuring capacitance of a light and flexible multiferroic material in a crystalline charge transfer material. Hall is a DA civilian who represents the ultimate goal of RDECOM's STEM education and research continuum: to provide the Army with the R&D workforce it needs to win in a complex world. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

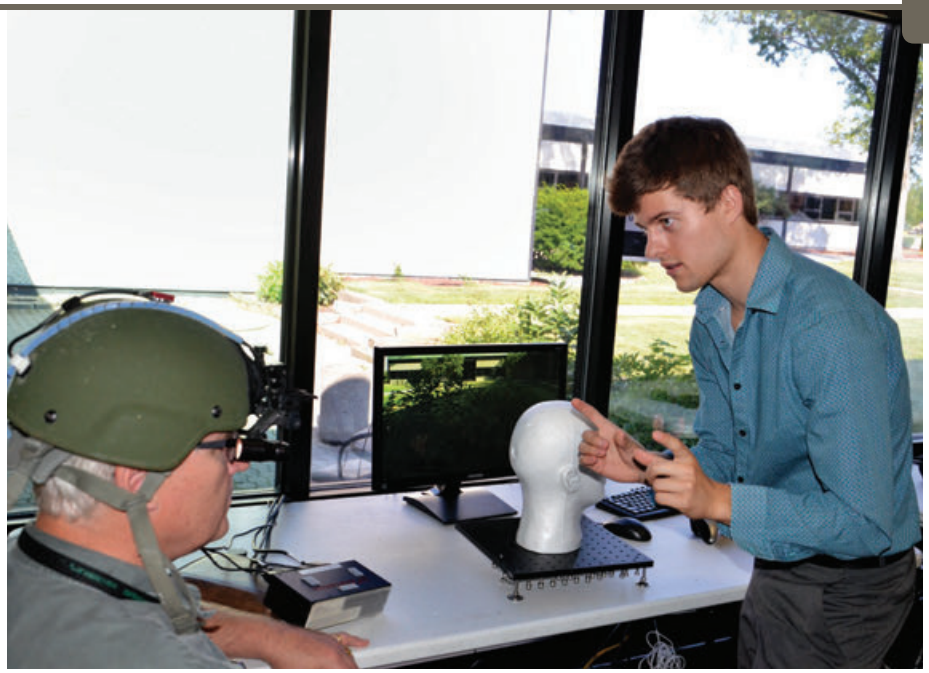
commands and international technology centers in locations such as Japan, Singapore, Argentina, Chile, the United Kingdom and France informs our understanding of the scientific and technological challenges we face. What we and others see is not promising.

REGAINING SUPERIORITY

Expanding global interest and investment in scientific knowledge have empowered potential adversaries that are threatening our superiority in key areas. According to the National Science Foundation (NSF), America's ratio of R&D to overall gross domestic product in 2011 was 2.8 percent, which ranked 10th in the world. The United States ranked eighth in R&D intensity in the data for 2007.

The NSF states that America's R&D intensity "has been gradually slipping in the world rank for this indicator in recent years." In contrast, China and South Korea exhibited the greatest percentage increases. The pace of growth from 2001 to 2011 in China's overall R&D remains high at 20.7 percent annually, according to NSF data. South Korea's R&D rate of growth averaged 10.9 percent annually over the same period.

Adapting Army training and leader development programs to efficiently support changing requirements will enhance scientific and technological innovation.



JOB, AND GROWTH, EXPERIENCE
Vincent Filary, an electrical engineering student from the University of Michigan and summer hire with the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC) Ground Vehicle Robotics team, demonstrates his project to a TARDEC employee Aug. 13 during the 2015 Summer Hire Expo. The expo culminates TARDEC's Summer Hire Program, through which it seeks high school graduates, undergraduate- and graduate-level college students who are interested in working on science and engineering programs such as the development of hybrid-electric vehicles, fuel-efficient energy modules and advanced robotics. (U.S. Army photo by Doug Halleaux, TARDEC Public Affairs)

In its study of trends in R&D spending, the Organisation for Economic Co-operation and Development (OECD), whose membership includes 34 countries, finds that while America remains the world's largest R&D investor, China's total R&D funding is expected to surpass that of the United States by about 2022 if the current rates of growth and investment continue. According to the OECD, China is projected to hit $600 billion in R&D spending by 2024, while the United States will stand at about $475 billion.

With respect to innovation in military science and technology, America's adversaries have attempted to dissect our R&D efforts during the past 14 years of war with the goal of harming our warfighters. For example, Iraqi insurgents developed improvised explosive devices (IEDs) to destroy America's High-Mobility Multipurpose Wheeled Vehicles. This led to the expedited development and fielding of the Mine-Resistant Ambush-Protected family of vehicles.

At the same time, countries around the world are investing significantly in military programs amid growing tensions and conflicts in Eastern Europe, the Middle East and the Pacific. In 2014, the Chinese government released its official defense spending of $131.57 billion, an increase of 12.2 percent from the previous year. On March 4 of this year, China announced that it would raise its defense budget by approximately 10 percent. The announcement marks China's

AN APPETITE FOR LEARNING
Jyuji D. Hewitt, executive deputy to the RDECOM commanding general, shows a student how to use a Meal, Ready to Eat June 17 during the eCYBERMISSION National Judging and Educational Event. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

fifth consecutive year with a double-digit percentage increase in official military spending figures.

THE PROGRESSION CONTINUES

U.S. Army leaders now face critical decisions about how to address the joint warfighter's anticipated needs for Force 2025 and beyond. In the R&D and acquisition communities, it is understood that the technological capabilities that will power Force 2025 are already about 85 percent designed and engineered. At RDECOM, we are compelled to look further into the deep future. We are committed to developing the next generation of scientists and engineers who will design and build the capabilities we field in 2040 and beyond.

Bringing visibility and coherence into our programs will also enable us to better influence our partners and thereby optimize our investment with the academic community. The Army must foresee vulnerabilities and develop unmatched capabilities as the academic disciplines and technology change. We must cultivate our relationships with universities to help them produce graduates who can meet that challenge. Ensuring diversity in the Army R&D workforce is inherent in the need to present our adversaries with multiple dilemmas. To that end, we will make proportional distribution among academic institutions a priority as we continue to engage institutions serving minorities.

We will match this effort with the development of leaders who are knowledgeable about crucial capabilities, because Army leaders are the competitive advantage that technology, advanced weaponry and other platforms cannot replace. Combining this with the technical expertise we are fostering through academic engagement, plus the products that an innovative workforce creates, will present our adversaries with multiple dilemmas. Successful leader development programs incorporate accountability, engagement and commitment; create agile and competent leaders; produce stronger organizations and teams; and increase expertise by reducing gaps. Adapting Army training and leader development programs to efficiently support changing requirements will enhance scientific and technological innovation.

This is particularly important in light of the aging workforce now in place. The largest portion of the RDECOM workforce falls within the range of 49 to 63 years old. Seventeen percent of the RDECOM workforce is eligible to retire. By 2025, 45 percent of the current workforce will be eligible for retirement. At three of our seven centers and laboratories—the Aviation and Missile Research, Development and Engineering Center, Army Research Laboratory and Edgewood Chemical Biological Center—less than 20 percent of the workforce is younger than 34.

CONCLUSION

The Army must be prepared for new threats that demand a workforce well-versed in rapidly emerging fields such as

Our goals are far-reaching but can be stated simply: Gain visibility on all the programs we offer, manage and publicize these programs, and develop a strategy to connect the dots from program to program.

CASTING A LIGHT ON SCIENCE
Suzanne Procell, a supervisory chemist with the U.S. Army Edgewood Chemical Biological Center, explains how to build a spectroscope to identify all the wavelengths of white light, to ninth-grade students attending the APG STEM Expo, Nov. 18, 2014. These students represent the rising generation of scientists and engineers that RDECOM is making a concerted effort to nurture, in part through events such as this one. (U.S. Army photo by Conrad Johnson, RDECOM Public Affairs)

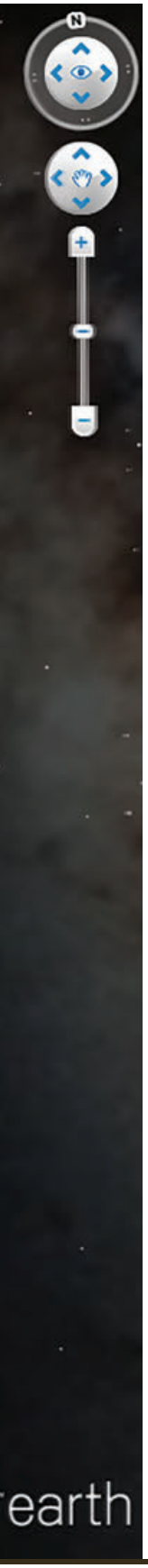
synthetic biology and cybersecurity, as well as the leadership qualities and experience necessary to eventually run the organizations they join. Young college graduates are a prime source for this agility and these necessary skill sets. Without a strategy to recruit, develop and retain bright professionals, the Army places Soldiers' technological advantage on the battlefield in jeopardy.

By providing a platform of awareness surrounding existing education programs and opportunities, we are bridging the gap for our next generation of scientists and engineers. (See the Army Educational Outreach Program website at **http://www.usaeop.com/**, for example.) We will continue to encourage our nation's youth to take advantage of opportunities in continuing education, but we will also light the path for future opportunities. Likewise, we will continue to develop the leaders that the Army community needs. It is deeds, not words, that will enable RDECOM's goals to take root.

As leaders, we are responsible for the current security of our nation, but we must be equally responsible for ensuring that there is a STEM pipeline to support future U.S. military technology requirements. Our community must drive the conversation on how we build relationships and develop a cohesive national strategy. Doing this ensures our ability to win decisively in the complex world of the future, as we have shown we can today.

MG JOHN F. WHARTON has been the commanding general (CG) of RDECOM, Aberdeen Proving Ground, MD, since September 2014. He leads more than 14,000 researchers, engineers and support personnel assigned to RDECOM, a major subordinate command of AMC. Previously he served as CG of the U.S. Army Sustainment Command and Rock Island Arsenal, IL, and as the senior commander for U.S. Army Garrison – Rock Island. He has also commanded at the company, battalion and theater-support-command levels and held Army and joint staff positions in logistics. He holds an M.A. in national security and strategic studies from the Naval War College and a B.S. from the United States Military Academy at West Point, and studied at the U.S. Army Command and General Staff College. He also completed the Quartermaster Officer Basic and Advanced courses and the Inspector General's Course.

(SOURCE: www.google.com/earth)



EARTH *by the* NUMBERS

PEO STRI takes a unique approach to tracking modeling and simulation requirements, using Google Earth to communicate visually what a synthetic terrain representation needs to show—clear, detailed requirements generated in a fraction of the time it takes to describe the same needs in a text document.

by Mr. Thomas Kehr and Mr. Trey Godwin

13RCR6547120522.
31.8124111° Latitude, -106.4213056° Longitude.
31°48'44.68"N, 106°25'16.70"W.
Fort Bliss, TX

Each of these entries describes relatively the same location in geographic coordinate space, but without a visual reference or map they can be difficult to decipher. Maps are indispensable tools that help humans understand, in a visual way, important facts about the surface of the Earth. Geographic coordinates and maps go hand in hand in establishing where we are and where we want to go.

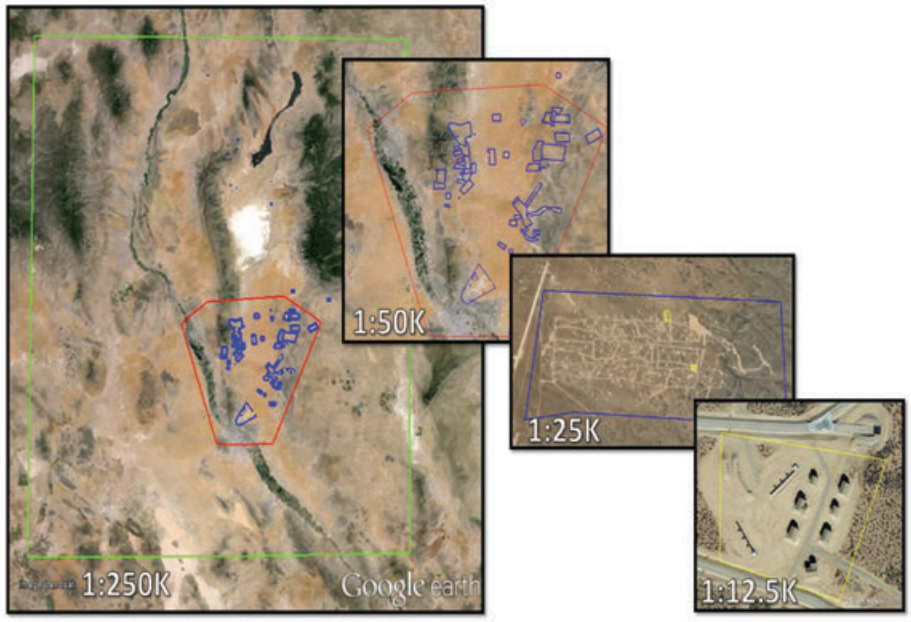
Advancements in computing have empowered the Army, through modeling and simulation software, to transform maps into synthetic terrain representations that are used in simulation systems and devices to enable virtual and constructive training. The development, testing and evaluation of synthetic terrain representations for modeling and simulation applications rely heavily on visual inspection by all stakeholders.

The representation of terrain for a given geographic area must be visually verified and validated to ensure that the synthetic terrain reflects the appropriate "look and feel" of the terrain and environment, while also meeting the requirements of a given capability manager. Unlike other weapon systems and training devices in which requirements can readily be interpreted through a text-based requirements document or system specification, synthetic-terrain representation requirements present a unique set of challenges for proper interpretation.

Recent improvements and widespread availability of consumer geographic and mapping software applications, such as Apple Maps and Google Maps, have revolutionized the once niche field of commercial mapping. The Synthetic Environment Core (SE Core) program, under the Program Executive Office for Simulation, Training and Instrumentation (PEO STRI), has implemented a solution to the above-mentioned requirements through one of these commercially available consumer mapping applications—Google Earth Pro. Google Earth Pro builds on the capabilities of Google Earth and the less robust Google Maps by adding advanced geographic analysis features such as improved geographical measurement calculations and the ability to import data from other geographic software applications.

Advancements in computing have empowered the Army, through modeling and simulation software, to transform maps into synthetic terrain representations that are used in simulation systems and devices to enable virtual and constructive training.

FIGURE 1



GETTING CLOSER
Graphical KML representation of four fidelity scales for the Fort Bliss, TX, terrain representation requirements, from least detailed to most detailed moving from left to right. Training areas are shown in more detail, ancillary areas of Fort Bliss in less. When the product in question is a map, it's much easier to communicate the requirements visually using map software rather than describing them in a text document. (SOURCE: Google Earth Pro)

REQUIREMENTS CHALLENGES

Traditionally, synthetic terrain representation requirements were compiled through a text-based database content requirements (DCR) document, which contained details such as geographic boundaries, terrain fidelity within a given extent, and geospecific 2-D and 3-D model features (such as those in Table 2 on Page 183). The SE Core team identified several challenges when using this text-based DCR, especially when sharing the document with multiple organizations and stakeholders. A text-based requirement describing a geographic location in a specific coordinate space can be sufficiently detailed, but without a corresponding visual representation, the description requires further geospatial analysis to fully comprehend.

Inversely, a requirement such as one stating that the contractor "shall develop a synthetic terrain representation of Fort Bliss" is overly vague and requires

TABLE 1

Scale	Description	Example of Features Represented	KML Color Code
1:250K	The 1:250,000 scale is the ancillary between higher-fidelity areas. This scale is not considered directly relevant to training.	Superhighways, primary roads, extremely large building structures and extremely large bodies of water.	Green
1:50K	The 1:50,000 scale is an area with notable landmarks and navigationally significant features. This is typically a city or built-up area surrounding a military facility or along a known route between military facilities or training areas. It can also be a corridor or path along a planned operational route as well.	Everything in the 1:250K scale, plus road interchanges, secondary roads, trails, large building structures and large bodies of water.	Red
1:25K	The 1:25,000 scale represents the primary areas of operation that are significant for training. This is intended to be military installations, training ranges, major maneuver areas, airfields or other designated areas of operations. In general, this scale will not extend to the boundaries of the government installation or training area.	Everything in the 1:50K scale, plus airfield lighting, airfield markings, all building structures and all bodies of water.	Blue
1:12.5K	The 1:12,500 scale is defined as the higher-resolution urban inset to accommodate dismounted training. In this scale, every observable feature will be represented in the synthetic terrain representation.	Everything in the 1:25K scale, plus building interiors, doors and windows.	Yellow

FEATURES TO SCALE
SE Core Terrain Representation Scale Specification Standard. (SOURCE: SE Core Scale Specification version 2.0)

extensive investigation to develop associated derived requirements. For example, which training ranges are required? Is there a requirement to develop areas outside of training areas? What is the required fidelity of the maneuver areas? By implementing a standard-terrain-fidelity-scale specification and a commercial geospatial-visualization tool, these challenges can be eliminated, while also promoting a collaborative process of requirements development.

TERRAIN SCALE SPECIFICATION

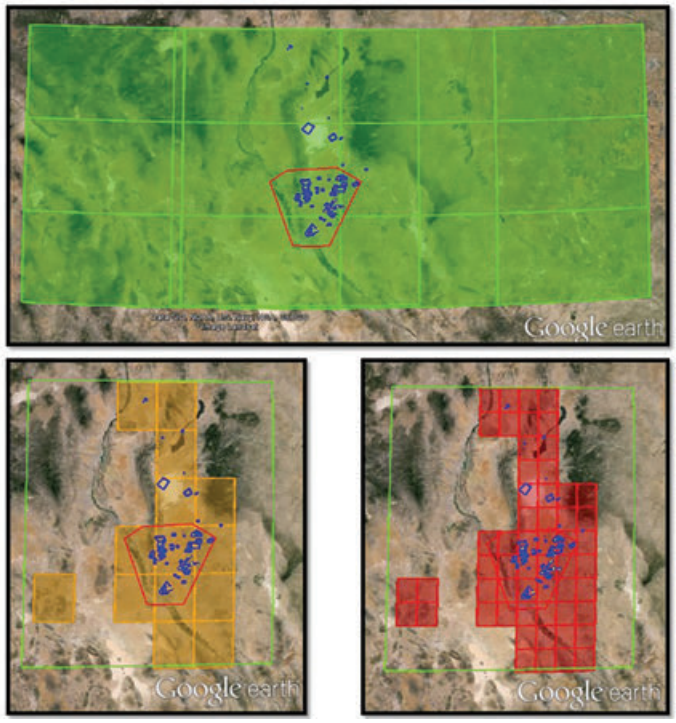
SE Core has implemented a terrain scale specification document that standardizes how geospatial terrain features will be collected and represented within a given synthetic terrain representation product. This scale specification closely follows the National Geospatial-Intelligence Agency standard map scales of the joint operations graphics (JOG) and topographic line map (TLM) series to promote a common vernacular when sharing requirements between stakeholders.

The accompanying scale-specification table provides a high-level description of each SE Core terrain scale and examples of represented features in each. See Table 1, and Figure 2 on Page 180.

GRAPHICAL DATABASE CONTENT

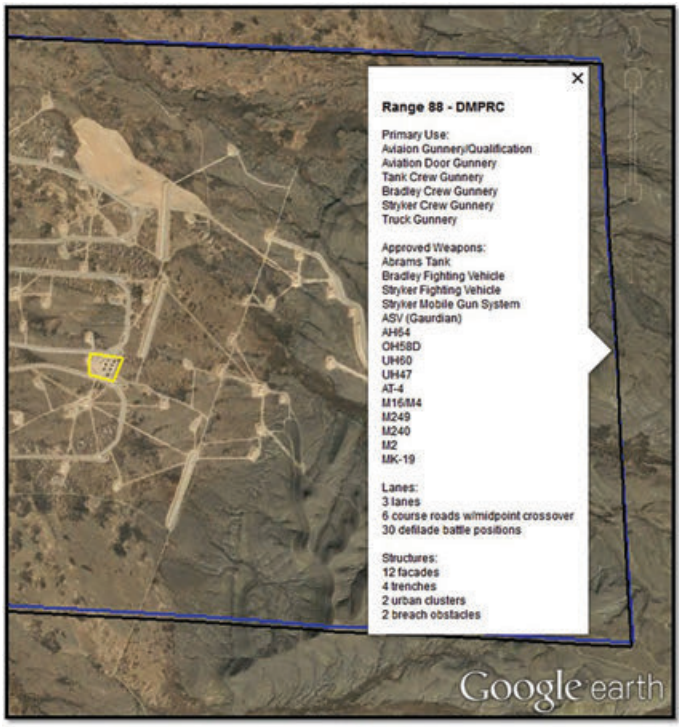
Using the terrain scale specification Google Earth Pro can be used to visually document the terrain requirements through the Open Geospatial Consortium Keyhole Markup Language (KML) standard. KML is an international standard that allows the creation of geolocated pinpoints and overlays. KML files can be created and shared easily through Google Earth Pro with a very shallow learning curve.

FIGURE 2



STANDARDS TO SCALE
SE Core created a scale specification table to standardize how features are captured on terrain representations. SE Core's common specifications rely on industry-standard graphics, so that those producing the requirements and those meeting them speak the same language. At top, a KML representation of joint operations graphics, with examples of topographic line map series (TLM-100, bottom left; TLM-50, bottom right), capture requirements for Fort Bliss terrain. (SOURCE: Google Earth Pro)

FIGURE 3



VISUAL AND VERBAL
Maps and text aren't mutually exclusive ways to capture requirements. Creators of terrain requirements can add comments to Google Earth Pro, embedded in an overlay file. Here, a metadata comment gives additional reference data on the DMPRC live-fire range at Fort Bliss. (SOURCE: Google Earth Pro)

The SE Core team, a synthetic terrain stakeholder, or the capability manager can generate a graphical DCR by referencing the KML color code associated with each scale specification standard. Figure 1 on Page 178 provides an example of this using the SE Core Fort Bliss terrain requirements. A box of approximately 300 km squared represents the 1:250K ancillary area of the terrain representation. The figure illustrates the 1:50K area comprising the primary Fort Bliss training reservation. A primary live-fire range, the Digital, Multi-purpose Range Complex (DMPRC), is captured as a 1:25K area, and the associated DMPRC air-to-ground integration villages are captured through the 1:12.5K fidelity area. Google Earth Pro's measurement functions also allow for accurate area and perimeter calculations for each overlay to aid in the collection of metrics and generating reports.

The Google Earth Pro KML file approach to a DCR also allows for the capture of other required terrain representation components that would otherwise be burdensome to represent in a textual format, such as aerial imagery requirements, elevation data requirements, associated raster map products and geospecific model locations. Additionally, the KML standard allows for the inclusion of embedded metadata in the overlay file, which can be used to add comment fields to the KML overlays that can easily be displayed through the Google Earth Pro interface. (See Figures 3 and 4.) These comments can add useful reference data on a particular training area or provide additional requirements commentary—for example, the required terrain export formats and files for a given geographic area. This data can be useful for the

SE Core has implemented a terrain scale specification document that standardizes how geospatial terrain features will be collected and represented within a given synthetic terrain representation product.

synthetic terrain developers as well as the test and evaluation personnel.

COLLABORATIVE REQUIREMENTS DEVELOPMENT

The wide availability and public familiarity with Google Earth and Google Maps, coupled with the open KML standard, enable collaborative requirements development among stakeholders. Upon receiving an initial requirement to generate a terrain representation for a given geographic area, they can use Google Earth Pro, in conjunction with other geospatial references, to visually inspect the area to identify additional areas of interest (AOI) and secondary terrain features for the initial DCR KML document.

This initial document can then easily be shared with the capability managers, end users and additional terrain stakeholders to provide feedback necessary to form the baseline requirements document. Because end users can review a visual representation of the requirements, they can easily identify missing AOIs or terrain features early, which results in less rework in the verification and validation phases of the terrain representation life cycle.

The underlying XML schema of KML allows this graphical DCR to be converted to a text format, with Microsoft Excel scripting, for use in generating test procedures or as a programmatic requirement.

Google Earth Pro also allows for the simultaneous display and storage of multiple KML DCR documents. (See Figure 5 on Page 182.) This feature can be useful as an interactive terrain catalog that allows users to visualize global coverage of where an organization has developed terrain.

CHALLENGES AND FUTURE WORK

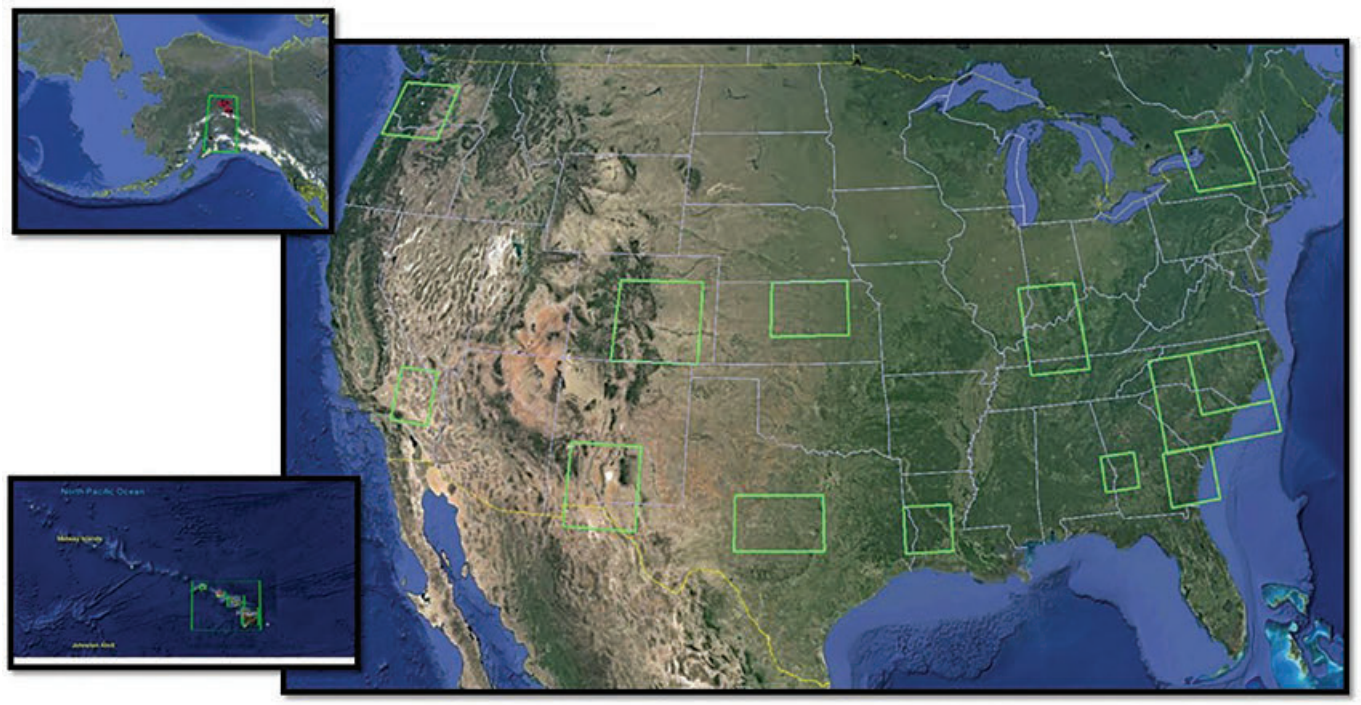
In our experience, Google Earth Pro can readily be obtained on federal computer systems given appropriate system administrator approval. Google Earth Pro is a cybersecurity-approved software item for which Google used to charge an annual license fee, but it is now freely available. The process of requirements tracking and development using KML files requires bidirectional collaboration through Google Earth or Google Earth Pro; therefore, if a stakeholder does not have access to Google Earth, the process can be stalled.

There is a workaround when one user does not have access to Google Earth. Someone with the software can

FIGURE 4

REQUIREMENTS IN HIGH RESOLUTION
Using map software to capture requirements for terrain representation enables the requirements generator to capture information that would otherwise be burdensome to define. For example, it would take a lot of text to describe the geospecific locations easily shown here in high resolution in the KML file. (SOURCE: Google Earth Pro)

FIGURE 5



CATALOGING COVERAGE
Google Earth users can store multiple KML documents, which has allowed SE Core to create a portfolio—easily accessible and ready for collaboration—of its current terrain coverage. (SOURCE: Google Earth Pro)

create a slide presentation or PDF containing screenshots of each scale and AOI included in the KML file. This can be time-consuming, but is still more efficient and user-friendly than a traditional text-based requirements document. The SE Core program is looking at methods to better automate the screen capture of KML overlays on Google Earth.

Unlike traditional word processing software, Google Earth Pro and KML files currently do not include any functions for tracking changes or edits. To view differences between two identical KML files, they must be laid onto each other and toggled on and off to visualize the changes. Other methods can also be used, such as temporarily swapping the color of an AOI overlay when sending it to the requirements management authority. Until Google provides a better mechanism for tracking changes, it is imperative that users apply a rigorous configuration management process to maintain KML-based requirements documents.

CONCLUSION

The SE Core program and its confederate simulation-system programs, such as the Aviation Combined Arms Tactical Trainer (AVCATT), the Close Combat Tactical Trainer and the Games for Training program, have met with great success using Google Earth Pro and KML files to visually track live, virtual, constructive and gaming terrain representation requirements. In conjunction with the U.S. Army Training and Doctrine Command's Program Office for Terrain at the National Simulation Center in Fort Leavenworth, KS, terrain representation requirements can be generated in a fraction of the time previously spent on a text-based solution. Moreover, the requirements are in a portable and graphical format for efficient feedback and collaboration by terrain and simulation stakeholders.

Unambiguous terrain requirements are a key feature of the graphical DCR process, and the union of visual indicators with a graphical geographic interface guarantees that all stakeholders have a common frame of reference, which reduces the time spent communicating and solidifying a given synthetic terrain requirement. This explicit requirements capability, coupled with rapid requirements generation

TABLE 2

Requirement ID	Requirement Text
Ft Bliss -85	The Ft Bliss database shall contain the 1:12.5, Range 87 CACTF [Combined Arms Collective Training Facility] extent defined by the following coordinates: [32.41513023671055, -106.0316295592038 32.40155697221756, -106.0299203449524 32.40361990271021, -106.0214026377009 32.4080648095095, -106.0218998418759 32.41432003910031, -106.0225876614814]
Ft Bliss -86	The Ft Bliss database shall contain the 1:12.5 Range 88 Urban Cluster extent defined by the following coordinates: [32.416042949181, -105.9554166535113 32.41623012259206, -105.95359385994 32.41812562641574, -105.9542359650387 32.41798748110522, -105.9557351496772]
Ft Bliss -87	The Ft Bliss database shall contain the 1:12.5 Range 66 Urban Cluster extent defined by the following coordinates: [32.29157041923858, -106.444884339355 32.29174690321553, -106.4435019306567 32.29261977028097, -106.4436809242268 32.29236765272218, -106.4450632163078]
Ft Bliss -88	The Ft Bliss database shall contain the 1:12.5, range 50 Urban Cluster extent defined by the following coordinates: [32.21885557772292, -106.5422421046779 32.21881862164134, -106.5414421770093 32.21927686037046, -106.5414092698276 32.21934587572412, -106.54229733582]
Ft Bliss -89	The Ft Bliss database shall contain the 1:12.5, Karmen' Shah MOUT extent defined by the following coordinates: [32.06176552177676, -106.1939879098336 32.05942561789409, -106.1955576957802 32.05593723272537, -106.1887644447425 32.05951644147655, -106.1871200197107]

WHERE TO TEST
This excerpt comes from terrain representation test procedures generated from the Fort Bliss KML DCR documents. (SOURCE: SE Core Fort Bliss Test Procedures)

and collaboration, results in higher-quality deliverables to better meet customer and end-user needs and expectations.

*For more information, go to the SE Core program website at **www.peostri.army.mil/PMConSim/SECore.jsp**; or contact the SE Core's Assistant Project Manager Frank Rhinesmith, at **frank.d.rhinesmith.civ@mail.mil** or SE Core Chief Engineer William Reese, at **william.c.reese16.civ@mail.mil**.*

MR. THOMAS KEHR is the government integration and test lead systems engineer for the SE Core program at PEO STRI and is responsible for overseeing the day-to-day testing and evaluation of SE Core terrain databases, as well as managing the overarching database test schedule in the live, virtual, constructive and gaming system environments. He holds bachelor's and master's degrees in electrical engineering and is pursuing his doctorate in modeling and simulation from the University of Central Florida. He is Level III certified in systems engineering, Level I certified in science and technology management and Level I certified in program management. He is a member of the Army Acquisition Corps.

MR. TREY GODWIN is a visual systems engineer for the SE Core program at PEO STRI. He is responsible for the execution of SE Core terrain database productions and is the advocate for aviation training programs, with an emphasis on the Longbow Crew Trainer and AVCATT. He holds a B.S. in geography and environmental science from Stetson University. Before joining the SE Core program, Mr. Godwin accumulated nearly 10 years of experience with industry partners developing terrain databases for virtual simulation systems.

SPOTLIGHT:
MS. ALLISON WALLACE

A 300 percent difference

MS. ALLISON WALLACE

COMMAND/ORGANIZATION:
Sentinel Product Office, Cruise Missile Defense Systems Project Office, Program Executive Office for Missiles and Space

TITLE:
Assistant product director

DAWIA CERTIFICATIONS:
Level III in systems engineering; Level II in program management

YEARS OF SERVICE IN WORKFORCE: 14

EDUCATION:
B.S. in chemical engineering, Auburn University

AWARDS:
Achievement Medal for Civilian Service; numerous Quality Step Increases, special act awards and performance awards

It's rare to find the words "weapon system" and "textile industry" in the same sentence, much less the same resume. But it's not so rare for Allison Wallace: A chemical engineering major in college, she spent two semesters in a co-op assignment with a textile manufacturer. Between her junior and senior years, she heard about an opening for a chemical engineering co-op with the U.S. Army Space and Missile Defense Command (SMDC) to support the development of a chemical high-energy laser weapon system, and decided to look into it. "Going from the textile field to the weapons field was a 100 percent difference—a 300 percent difference, actually," she said.

She enjoyed the work at SMDC as a co-op and went to work full-time after graduating in 2002 and has been working for the U.S. Army ever since. For the past three years, she has been the assistant product director (APD) for the Sentinel Product Office in the Cruise Missile Defense Systems (CMDS) Project Office at the Program Executive Office for Missiles and Space.

"One of the biggest challenges I face is communicating information in a clear and timely manner to organizations external to the CMDS Project Office—offices within HQDA, for example, or user representatives," said Wallace. "I work to address communication challenges by keeping the viewpoint of the target audience in mind and by providing information in the most concise manner possible."

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

I serve as the APD for the Sentinel Product Office with responsibility for providing the product director (PD) with information and advice to manage development, integration, testing, fielding and sustainment of Sentinel radar variants. The Sentinel fleet is fielded worldwide and provides the warfighter with the capability to detect, classify, identify and report cruise missile, unmanned aerial system, rotary-wing and fixed-wing threats.

SENTINELS IN ACTION
Part of the Army inventory since 1997, the Sentinel is deployed in support of active Army and National Guard air defense units, the Counter-Rocket, Artillery and Mortar System, the Army Integrated Air and Missile Defense System and homeland defense. As APD, Wallace helps make that happen. (Photo by Peter Baldwin and Laura Brezinski, CMDS Project Office)

How did you become part of the Army Acquisition Workforce, and why?

In the summer of 2001 I worked as a co-op for SMDC in support of a developmental counter-rocket, artillery and mortar system. After the attacks of 9/11, I decided to pursue a career supporting national defense as an Army civilian and accepted a job offer from SMDC for an entry-level engineering position in the spring of 2002.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

One of the most important points in my career was accepting a developmental assignment as the assistant product manager of the Surface-Launched Advanced Medium-Range Air-to-Air Missile Product Office in 2008. My experience during this assignment motivated me to transition from a specialized engineering position to a management position and paved the way for me to reach my current position as Sentinel APD.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I have been fortunate to receive guidance and support from Army civilian and military leaders. These include Dr. Rodney Robertson, who inspired me to accept my initial position with the U.S. Army; LTC Michael Tice (USA, Ret.), who selected me for my first assignment in program management; Michael Bieri, who supported me in pursuit of a position with the Aviation and Missile Research, Development and Engineering Center; Margaret Moulder, who presented me with opportunities to gain experience briefing and coordinating with Army senior leadership; Felicia Cook, who mentored me in establishing long-term career plans; Susan Noojin, who provided guidance in achieving personal and professional goals; and Troy Allen, Sentinel PD, who continues to provide me with challenging assignments and leadership to reach new objectives.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

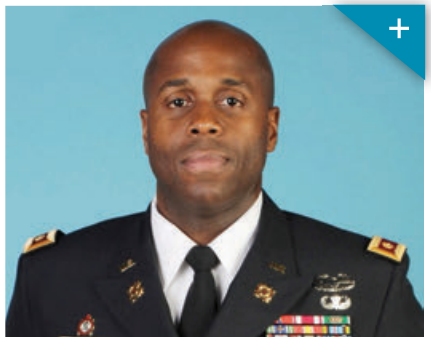
My greatest satisfaction is being able to contribute in some way to the national defense. It is rewarding to know that organizations I have supported have provided tools to Soldiers to help protect them and to help them accomplish their mission.

What advice would you give to someone who wants to get where you are today?

Set achievable goals, define small steps required to meet those goals and work to take each step. Remember that you can change course if you want to take your career or your life in a different direction. Seek advice and support from leaders around you who meet your definition of success.

—MS. SUSAN L. FOLLETT

DEDICATED TO THE MISSION
Wallace started her career as a co-op with U.S. Army Space and Missile Defense Command, and, after the attacks of September 11, 2001, decided to devote her career to the national defense. Fourteen years later, she's still with the Army, and still focused on missile defense.



SPOTLIGHT:

MAJ HAVARD WHILES

The man with the power

MAJ HARVARD WHILES

COMMAND/ORGANIZATION: Program Management Expeditionary Energy and Sustainment Systems, Program Executive Office Combat Support and Combat Service Suppor

TITLE: Assistant product manager, Product Manager Large Power Sources

DAWIA CERTIFICATIONS: Level II in program management

YEARS OF SERVICE IN WORKFORCE: 3

YEARS OF MILITARY SERVICE: 13

EDUCATION: M.S. in strategic intelligence, National Intelligence University; MBA, University of Phoenix; B.A. in administration of justice, Rutgers University

AWARDS: Bronze Star Medal (with two Oak Leaf Clusters (OLCs)); Meritorious Service Medal; Army Commendation Medal (with three OLCs); Army Achievement Medal; National Defense Service Medal; Armed Forces Expeditionary Medal; Presidential Unit Citation; Meritorious Unit Citation; Army Superior Unit Award; Army Service Medal; Overseas Service Ribbon; Parachutist's Badge; Global War on Terrorism Expeditionary Medal; Global War on Terrorism Service Medal; Combat Action Badge; Iraq Campaign Medal

"Uncommon and accidental" is how MAJ Havard Whiles describes his career path, which started with the decision to join the Virginia Army National Guard, after a one-year break following nine years of active-duty service, and ended with a post as assistant product manager (APM) for the Program Executive Office for Combat Support and Combat Service Support.

As APM for power generation, he's responsible for four systems in different phases of the acquisition cycle: the Advanced Medium Mobile Power System (AAMPS); the Deployable Power Generation and Distribution System (DPGDS) Prime Power Unit; and the Tactical Quiet Generator and its replacement, the Large Advanced Mobile Power System (LAMPS).

"The biggest challenge I face is communication, internally and externally," said Whiles, who works with teams at Joint Base Lewis-McChord, WA, Fort Bliss, TX, and Fort Belvoir, VA, several Army depots and stakeholders around the United States. He resolves the problem in part by walking to meet coworkers, regularly logging up to 10,000 steps a day.

Regardless of his destination, Whiles is mindful of his customer. "When I travel for new material in-briefs or fieldings, I make a point of interfacing with the warfighter, our number one stakeholder, to make sure I stay in sync with their requirements and they understand what we can do for them."

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

I'm responsible for four systems in various stages of the acquisition cycle. I serve as the AMMPS team lead for interactions with units during new material introductory briefs and total package fieldings. The AMMPS program is currently in production and deployment. We are fielding to all Army brigade combat teams (BCTs), and this has been a great opportunity for me to meet and talk to warfighters about their requirements.

DPGDS is a recapitalization effort of an existing system to modernize this capability in the Army and potentially the Air Force, and we're working with our contracting counterparts to advance this effort. The LAMPS program is approaching the end of the engineering, manufacturing and development (EMD) phase and we are currently testing the EMD articles.

A large part of my day-to-day tasks involves running our office, as an executive officer or operations officer for my product manager. I manage schedules, staff meetings, functional meetings, internal and external task tracking and long-range planning efforts not assigned to anyone else.

My role is important because I bring nine years of operational Army experience to the table. The acquisition professionals in our office work hard to deliver the best sustainable tactical electric power generation equipment to the warfighter. However, many of them don't have current Army operational experience to help guide the decision-making process. I use my experience with operational Army units to inform our engineers and logisticians about capabilities suitable to meet warfighter requirements.

How did you become part of the Army Acquisition Workforce, and why?

By accident. After nine years on active duty, I went to work in private industry. After 10 months with an information protection company in New Jersey, I was promoted to a position of greater responsibility in Northern Virginia, but I missed the Army. I joined the Virginia Army National Guard to be around Soldiers again and, after about one year, I began working for my unit full-time to backfill officers from the unit deployed to Afghanistan. This led to a position at the National Guard Bureau's (NGB) Requirements Materiel Division as a systems integrator, fielding heavy trucks to all states and territories. After four months, I was sent to the acquisition course in Huntsville, AL, and was assigned to Project Manager Expeditionary Energy and Sustainment Systems (PM E2S2) as an APM. I also transitioned to the active Guard Reserve force.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

My experience at NGB was definitely a turning point in my career. That role was my first nonoperational Army position and I quickly found myself working on logistics issues at the national level. In addition, I attended the force management course at Fort Belvoir and learned "how the Army ran"—how Congress distributes resources to the armed forces and how those resources turn into capabilities for the Army. In the operational Army at BCT and below, few people understand these processes, and they need our help to navigate them.

Another important point in my acquisition career is when I deployed to Afghanistan for several months, just two weeks after reporting to my program management office. This experience jump-started my program management education because I had the opportunity to provide capabilities to Soldiers in combat and solicit their feedback in real time.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I have had great mentors at different stages of my career. In the AL&T Workforce, BG Brian Cummings at PEO Soldier has been and continues to be a great mentor. He is a senior leader with a clear vision who genuinely cares about his subordinates' success and knows what they should do to achieve success. BG Cummings, then the PM E2S2 program manager, sent me to Afghanistan with essentially no experience because he knew it would set me up for success later in my AL&T career.

One of the most important things about mentoring to me is being able to provide information to a subordinate that I have learned through experience. Mentoring was easy as a seasoned combat veteran in the operational Army, and I hope to do more mentoring as I build on my AL&T Workforce experience.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

One of the most satisfying things is the work we do on behalf of the warfighter and the American people, unbeknownst to them. Soldiers are often unaware that their recommendations get our full attention when our fielding teams or logistics assistance representatives hear about some systemic issue with our products. We go to extraordinary efforts to analyze failing components, develop parts that are more reliable and slip them into the production line. These improvements appear seamless to the users but require enormous effort from our engineers, logisticians and technicians.

What advice would you give to someone who wants to get where you are today?

Dive into the workforce and learn as much as you can learn in the first year or two, and then endeavor to improve your organization. Be willing to attend as many meetings about your program as you can: Even meetings tangentially related to your program will provide valuable insights for you. Find out who your stakeholders are and meet them. Volunteer to travel to events where you can interact with warfighters in operational units. Talking with representatives of operational units will keep you informed about what the current and emerging requirements are.

Finally, seek mentors to take advantage of their experience. Talk to your engineers and technicians and ask them to explain the fundamental principles of your system. Knowing what your engineers know will increase your credibility with warfighters, your engineers and your peers.

—MS. SUSAN L. FOLLETT

SPOTLIGHT:

LTC LAMONT HALL

LTC LAMONT HALL

COMMAND/ORGANIZATION: Project Manager Warfighter Information Network-Tactical (WIN-T), assigned to Program Executive Office for Command, Control and Communications – Tactical

TITLE: Product Manager, WIN-T Increment 2

DAWIA CERTIFICATIONS: Level III in program management and a member of the Army Acquisition Corps

YEARS OF SERVICE IN WORKFORCE: 15

YEARS OF MILITARY SERVICE: 22

EDUCATION: M.S. in information management, University of Maryland; B.A. in business administration, Weber State University; graduate of the Command and General Staff College

AWARDS: Legion of Merit; Meritorious Service Medal (2 Oak Leaf Clusters (OLCs); Joint Service Commendation Medal (2 OLCs); Army Commendation Medal (3 OLCs); Joint Service Achievement Medal (2 OLCs); Army Achievement Medal (1 OLC); Joint Meritorious Unit Award; National Service Defense Medal; Armed Forces Expeditionary Medal; Global War on Terrorism Service Ribbon; Korean Defense Service Medal; Army Service Ribbon; Overseas Service Ribbon

Shifting focus

As the Warfighter Information Network-Tactical (WIN-T) program transitions into the production phase, WIN-T Increment 2 Product Manager LTC Lamont Hall faces a challenge: changing the focus from the agile, process-oriented model used for development and testing to a disciplined, sequential approach for the large-scale effort of fielding, training and maintaining the equipment in the field.

"Instead of focusing on a single brigade combat team's [BCT] development and testing, we're now fielding and training up to 10 BCTs per year and maintaining the current force of 14 fielded BCTs and three division headquarters," said Hall.

Hall noted that he'll use a three-pronged approach to address that challenge: continuous and focused command emphasis, organizational adjustments for the project manager and the prime contractor, and implementation of new reporting and monitoring processes for production activities.

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

I am responsible for the research, development, integration, testing and fielding of WIN-T Increment 2. I also manage all life-cycle aspects of the program to ensure that they are in compliance with the approved cost, schedule and performance baselines. As we transition into the production phase of the program, we are focused more than ever on fielding fully supportable systems and capabilities that meet reliability, availability and maintainability requirements.

After 22 years, the greatest satisfaction for me is still the privilege and honor of being a Soldier and the opportunity to work with, teach, train and mentor some of the great Soldiers and civilians we have in the Army and the AL&T Workforce.

KEEPING TROOPS CONNECTED
The Army demonstrated this mobile command post, part of Warfighter Information Network-Tactical (WIN-T) Increment 1, during Network Integration Evaluation 15.2, Fort Bliss, Texas in May. WIN-T Increment 2, now being fielded to BCTs, expands on-the-move capability to the company level. (Photo by Amy Walker, PEO C3T)

How did you become part of the Army Acquisition Workforce, and why?

After completing company command as a captain in South Korea, I started looking at my follow-on assignment options. One option was to compete for selection into the Army Acquisition Corps and apply for the Advanced Civil Schooling (ACS) program if I was accepted. The ACS program was an opportunity for me to complete a fully funded master's degree at an accredited civilian university. Getting a master's degree was one of my career and personal goals, so I jumped at the opportunity. Furthermore, the opportunity post-ACS to lead and manage materiel acquisition programs that develop and field critical equipment and systems to Army Soldiers was very appealing to me.

What do you see as the most important points in your career with the Army Acquisition Workforce, and why?

I see two very important points in the career of an Army acquisition officer. The first is the educational component of your career. The basic Army acquisition courses, combined with ACS opportunities and the Defense Acquisition University mandatory and elective courses, help develop the academic and programmatic skills required to manage and lead Army acquisition programs. The second point is the leadership assignment portions of your career. These include jobs like assistant product manager, DA systems coordinator and product manager—opportunities to put into practice the educational concepts and leadership skills learned throughout your entire Army career.

Can you name a particular mentor or mentors who helped you in your career? How did they help you? Have you been a mentor?

I was very fortunate to have two very good mentors as a junior officer who helped me immensely: CPT Dan Feemster and CPT Chris Fucci were my company commanders when I was a second and first lieutenant. They helped instill in me a sense of duty, honor, pride, selfless service and discipline in all that I did as a military officer, on and off duty. They taught me and demonstrated the value of putting people first, respect foremost and mission accomplishment always. These traits apply to combat arms branches as well as to the Acquisition Corps. I have been a mentor to several company-grade and field-grade military officers and recently to a DA civilian with the intent of sharing what I have been taught by others and what I have learned along the way in order to better prepare the future Army Acquisition Workforce.

What's the greatest satisfaction you have in being a part of the Army Acquisition Workforce?

After 22 years, the greatest satisfaction for me is still the privilege and honor of being a Soldier and the opportunity to work with, teach, train and mentor some of the great Soldiers and civilians we have in the Army and the AL&T Workforce. The best part of my job is going to the WIN-T Increment 2 units that test, field and train on our equipment and getting direct feedback from the operators on system performance, improvements, recommendations and areas that they like or dislike. The entire WIN-T Increment 2 team is a high-performing, dedicated and extremely hard-working group, and getting positive Soldier feedback on capabilities that the WIN-T Increment 2 Program Office has fielded is always one of the most satisfying parts of the job.

What advice would you give to someone who wants to get where you are today?

Embrace the Army values: live them, teach them and train them. Excel in every job that you have, take care of your people and workforce, take advantage of every training opportunity and always focus on mission accomplishment.

—MS. SUSAN L. FOLLETT

Scars *of* Service Recognized

CPT Clayton J. Cannon, an assistant product manager at Joint Program Executive Office for Chemical and Biological Defense, received the Purple Heart for wounds sustained during an attack in Afghanistan.

by Ms. Amanda Rominiecki

The oldest U.S. military combat decoration was awarded to an Aberdeen Proving Ground (APG) Soldier during a ceremony in Washington, DC, July 31.

CPT Clayton J. Cannon was presented the Purple Heart by the Principal Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)), LTG Michael E. Williamson, at the Pentagon.

The medal is awarded in the name of the president to members of the armed forces who were wounded, killed or who died of wounds received while in any action against an enemy of the United States.

Cannon was presented the Purple Heart for wounds received in action Aug. 28, 2013, in Afghanistan while assigned to the 1st Brigade Special Troops Battalion, 1st Brigade Combat Team, 10th Mountain Division.

"He was serving as an AG [adjutant general] officer and a fairly complex attack occurred in Afghanistan," Williamson said of the August 2013 attack. "A very large IED [improvised explosive device] detonated, followed by individuals attacking who also had explosives vests and devices. CPT Cannon acknowledged his wounds but his very first thought was to check on his teammates and to help in the defense of that FOB [Forward Operating Base]."

Williamson said the medal presentation served as a reminder that the effects of war are "very, very real, and that we [the Army] have folks every day who are put in challenging situations, and who often come back with scars and the effects of that environment."

"It's very easy to forget about the fact that there are people who are making the ultimate sacrifice; there are people who are wounded every day, and that this has been going on for the last 14 years," he said. "For some of us, the routine of the day—the routine of our position and our activities—can actually allow us to isolate ourselves from that stark reality."

Nearly 30 of Cannon's coworkers and battle buddies at the Joint Program Executive Office for Chemical and Biological Defense, where Cannon is currently the assistant product manager for obscuration at Joint Product Manager Reconnaissance and Platform Integration, traveled to the Pentagon to witness the Purple Heart presentation. Additional JPEO CBD personnel watched via video teleconference from APG.

CANNON HONORED

LTG Michael E. Williamson, with CPT Clayton J. Cannon, after presenting Cannon with the Purple Heart during a ceremony at the Pentagon July 31. Cannon was awarded the Purple Heart for wounds received in action Aug. 28, 2013, in Afghanistan. (Photo by Tricia May, ASA(ALT))

"I am honored and humbled to receive the Purple Heart," Cannon said. "And I was surprised and certainly appreciative of the turnout of those who came along [to the Pentagon]."

"If anything, I'd like to draw attention to the National Intrepid Center of Excellence in Bethesda, Maryland," he said, drawing attention away from himself and instead to the DOD institute that studies traumatic brain injuries (TBI).

"They do great work with our nation's wounded warriors. They have been conducting a 15-year study of TBI diagnosis and treatment. I want to give credit where credit is due and they're doing wonderful things; I'm so appreciative of the time they spent with me."

A native of Britton's Neck, SC, and a former police officer, Cannon began his military career when he enlisted in the U.S. Army in 2007 and entered the Adjutant General Corps. His assignments include battalion adjutant/S1 with the 21st Signal Brigade at Fort Detrick, MD; the strength management officer for the 21st Signal Brigade; and brigade S1 for the 21st Signal Brigade.

Cannon deployed to Afghanistan with the 1st Brigade Combat Team, 10th Mountain Division, serving as a member of Security Force Advise Assist Team 1 in the role of senior S1 Afghan National Security Force advisor to the 3rd Brigade, 203rd Thunder Corps, Afghan National Army.

Cannon was accessed into the Army Acquisition Corps in July 2013 and was assigned to the Communications-Electronics Research, Development and Engineering Center at APG, MD, where he served as the executive officer and interim military deputy to the center's Space and Terrestrial Communications directorate.

The Purple Heart was established by GEN George Washington at Newburgh, NY, on Aug. 7, 1782, during the Revolutionary War. It was then known as the Military Badge of Merit and took the form of a heart in purple silk with "merit" embroidered across it. It was re-established by the President of the United States per the War Department in 1932.

"While an individual decoration, the Purple Heart differs from all other decorations in that an individual is not recommended for the decoration," states the Army Purple Heart website. "Rather, he or she is entitled to it upon meeting specific criteria."

Cannon's other awards and decorations include the Army Commendation Medal (with two Oak Leaf Clusters), the Army Achievement Medal, the Army Superior Unit Award, the National Defense Service Medal, the Afghan Campaign Medal with Campaign Star, the Global War on Terrorism Medal, the Military Outstanding Volunteer Service Medal, the Army Service Ribbon, the Overseas Service Ribbon, the NATO Medal, the Combat Action Badge and the Drivers Badge.

This article was previously published in APG News in slightly different form, ***https://www.apg.army.mil/PDF/APGNews/archives/pdf2015/Aug0615.pdf.***

MS. AMANDA ROMINIECKI is a public affairs specialist for the U.S. Army Garrison APG, and the editor of the installation's weekly newspaper, "APG News." She has a B.A. in mass communication from the University of Delaware and a public relations certificate from Rutgers University.

FROM THE DIRECTOR,
U.S. ARMY ACQUISITION SUPPORT CENTER

Preparing Acquisition Professionals to Win in a Complex World

This issue of Army AL&T explores innovation, what sparks it, the many forms it takes and the products and processes it delivers. On Oct. 1, a giant step in business process innovation came to fruition as the Army Acquisition Center of Excellence (AACoE), a subordinate organization of the U.S. Army Acquisition Support Center (USAASC), left the U.S. Army Training and Doctrine Command (TRADOC) and became an independent Army proponent schoolhouse under USAASC.

Craig A. Spisak
Director, U.S. Army Acquisition Support Center

But the story of delivering cutting edge training to Army Acquisition professionals began well before Oct. 1. Innovation takes time, so this story starts in the 1980's, considerably before the establishment of the AACoE in 2011.

From 1985 to 2010, Army Acquisition Workforce (AAW) training course locations were literally all over the map. From the Acquisition Management course at Fort Lee, VA, to the Army Acquisition Basic Course at the Defense Acquisition University campus in Huntsville, AL, to the Functional Area (FA) 51 officer course at the University of Texas at Austin, these and other courses dispatched thousands of graduates to an ever-expanding acquisition workforce. Given that situation, coupled with the release of the Gansler Report in 2007, it was clear that it was essential for the Army to have a consolidated acquisition training hub to meet its increasing requirements and simultaneously provide better education and training for the AAW. That necessity became the basis for establishing the AACoE.

In 2010, the principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology created a combined center where all Army acquisition training could be taught and managed. Thus, in January 2011, the AACoE was born—an innovative, creative academic nucleus for Army acquisition, logistics and contracting training.

ONE-STOP LEARNING

In the nearly five years since opening the schoolhouse doors, AACoE has provided one-stop training, education and career development for Army officers, noncommissioned officers (NCOs) and civilians (on a space-available basis) in the AAW. Operating on the campus of the University of Alabama in Huntsville, the AACoE offers six education courses that provide Defense Acquisition Workforce Improvement Act (DAWIA) certification, professional development and professional military education for more than 500 military students per year.

AACoE is the first stop for officers and NCOs newly assigned to the AAW. The AACoE staff and faculty of acquisition experts, whose work experiences transform theories into fact in their classrooms, provide students their first look at their new career field and set the foundation for the positive impacts they will have on Army acquisition.

SOLDIERS, STUDENTS, FUTURE LEADERS

Keenan Sease teaches students in the Army Intermediate Contracting Course at the AACoE campus in Huntsville, AL. Among other educational opportunities, AACoE offers service members joining the acquisition workforce accelerated DAWIA certification and training for the transition from operational duty to a largely administrative and civilian-oriented office environment. (Photo by Michele E. Custer, AACoE)

Newly assigned military personnel serve a minimum of five to seven years in operational Army assignments before being selected as members of the AAW. The leadership acumen and operational experience gained by our officers and NCOs during these early years of their careers are the main reasons they are able to integrate quickly into their new roles and rapidly become contributing members in their new career field. While gaining operational and leadership experience is invaluable to the success of our military workforce members, bringing military personnel into acquisition after as many as 10 years of service in other specialties underscores the limited time available for them to gain acquisition experience, education and training.

The AACoE mitigates this to a large degree by offering Soldiers compressed DAWIA certification course curricula at the beginning of their acquisition careers, allowing more time for military members to gain more hands-on experience in their acquisition assignments and spend less time attending various schools and courses.

A NEW ERA BEGINS

Since day one, the AACoE has operated in conjunction with TRADOC and the Army Logistics University at Fort Lee, with leadership from USAASC. That arrangement worked, but it was not flexible enough to keep up with the demands DOD placed on the center. TRADOC is the gatekeeper for all Army training programs, and executes a very deliberate management decision process that often takes more time than what DOD gives AACoE to implement new curriculum and schedule changes. All parties agreed that this issue must be resolved, so USAASC and TRADOC rolled out a new plan.

This October, AACoE became one of only a handful of schools where the Army, from above, does not set the course standards. Like the Staff Judge Advocate and U.S. Army Chaplain professional schools, because of its specialized mission, AACoE is afforded more autonomy in making changes to its program of instruction than other traditional military schools.

Under the new setup, AACoE can better manage its mission of providing instruction covering Title X legislative requirements, DOD acquisition requirements and emerging trends from the field. This gives the AACoE the flexibility of a unified command chain, so that curriculum changes based on DOD requirements won't require approval from different organizations that don't necessarily specialize in acquisition.

The greatest benefit gained from this is that AACoE can more rapidly incorporate modifications made in DAWIA certification for contracting and program management Levels I and II. Under the former arrangement, changes to curricula could take 18 to 24 months for approval. This new independence promises to

increase AACoE's agility and capability in teaching the intricacies of acquisition, logistics, technology and contracting, making training more responsive to the evolving issues faced by Army acquisition professionals.

Classes offered include the Army Acquisition Foundation, Intermediate Program Management, Army Basic Contracting, Intermediate Contracting and Pre-Command Contracting (PCC) courses, as well as the FA51 Intermediate Qualification Course (IQC). Prospective students and organizational training managers can find details about these courses through the USAASC webpage at **http://asc.army.mil/web/organization/AACoE/**.

A HUB OF INNOVATION

Huntsville is a second home to many major defense contractors. It's also an ideal place for students learning about Army acquisition. Huntsville hosts Redstone Arsenal, home to Headquarters, U.S. Army Materiel Command, the U.S. Army Contracting Command, Program Executive Office (PEO) Aviation, and PEO Missiles and Space. According to the Huntsville Chamber of Commerce website, "the Huntsville community is recognized nationally by Inc. magazine, Forbes and the Wall Street Journal as one of America's leading technology communities." The website describes Redstone Arsenal as "a diverse federal campus for more than 60 federal agencies and organizations providing the highest level of technology development for national defense and space exploration. Army commands manage key missile and aviation programs while NASA's Marshall Space Flight Center is responsible for large components of America's space program."

The AACoE campus locale offers students access to government acquisition leadership as well as industry and academic leadership. These are important connections for students to make. Students make this link with leadership during visits to local academic institutions, contractors or commands, or in the classroom.

Teaching innovations in AACoE's IQC and PCC courses involves bringing different viewpoints on acquisition, contracting and business together in a unique setting not easily found anywhere else. Senior Army acquisition leaders speak about current trends and philosophies as well as their expectations for the newly assigned AAW members. Also, the IQC offers perspectives from industry leaders and tours of nearby government and contractor facilities, providing students a firsthand look at the products or services they may be managing during their acquisition careers. These varying perspectives reinforce the Army's approach to acquisition that can only be found at AACoE.

The transition from an operational unit to a largely administrative and civilian acquisition environment often represents a new leadership challenge for officers and NCOs new to the AAW. With that in mind, the AACoE now offers an innovative communication class called "Crucial Conversations," a professional development curriculum that emphasizes the need for increased communication effectiveness. The course provides students with practical skills that they can use to increase their individual and organizational influence in an often fluid and dynamic acquisition environment. This two-day course emphasizes effective communication within an organization to bring out the best ideas, make the highest-quality decisions and then apply them with unity and commitment.

LIFETIME LEARNING

The AACoE provides students with solid foundational skills, which are critical to achieving a successful career in acquisition. However, those skills are only the beginning. After the training, students must take that basic knowledge and build upon it every day, because it's inevitable that they will face the uncharted waters that come with being an acquisition professional. The good news is that they don't have to go it alone.

More than just a place to get DAWIA-required training, the AACoE is also a place that acquisition professionals can return to throughout their careers, not only for training but for research and consultation requirements.

Many acquisition professionals encounter situations on the job that seem to be beyond their sphere of knowledge, leaving them wondering where to turn. AACoE provides a ready source of experienced personnel who can point acquisition professionals in the right direction, and where those professionals can do some research on the more difficult questions encountered by the acquisition community. AAW members also can get help from across the acquisition community by consulting the Acquisitions Lessons Learned portal at **https://allp.amsaa.army.mil/**. There, they can browse lessons learned from across the acquisition enterprise and submit their own experiences.

CONCLUSION

Innovation cannot be forced; it has to be nurtured and cultivated. The schoolhouse at AACoE is just one example of how USAASC is creating an environment to do just that. We will continue to evaluate the training needs of the AAW and scan the horizon for new ideas to encourage innovation. In the process, we will keep developing adaptive thinkers and leaders to face the ever-changing requirements to win in a complex world.

ON THE MOVE

ACC WELCOMES NEW COMMANDER

The U.S. Army Contracting Command welcomed its new commander during a change-of-command ceremony at Redstone Arsenal, AL, Aug. 19.

MG James E. Simpson, left, became ACC's third commander. He succeeds **MG Theodore "Ted" C. Harrison III**, right, who has commanded ACC since October 2013. The ceremony was hosted by **GEN Dennis Via**, center, commanding general, U.S. Army Materiel Command (AMC).

During his remarks, Via recognized Harrison for his exceptional service during a challenging time in command. He addressed the challenges that ACC had faced in the past two years, adding that ACC had never failed to meet the challenges and had never failed to complete its mission. Via recounted some of ACC's achievements and said "ACC is one of the busiest commands in AMC." He said that Harrison had "commanded superbly" and that the conditions he had set would serve ACC well for years to come.

Next Via turned to Simpson, acknowledged his "wealth of command experience," and recounted some of his previous assignments, including Simpson's time as the ACC chief of staff. Via said Simpson is no stranger to the ACC family, that he knows the ACC mission, he knows the challenges he faces, he knows what ACC brings to the fight, and, more importantly, he knows the people of ACC. Via said that Simpson was the right general officer to lead ACC at this fiscally challenging time. "ACC will greatly benefit from your leadership," he added.

In his remarks, Simpson said the he was honored to take command of ACC and to reunite with the AMC family. He said that he was aware of the "high standards and contracting reputation ACC has established throughout the years."

He added, "ACC is known for providing the best contracting expertise while supporting the Army's mission." (Photo by Douglas Brewster, AMC Media Center)

AMC WELCOMES NEW SENIOR CIVILIAN

AMC welcomed **Lisha H. Adams** as the new executive deputy to the commanding general with a ceremony Aug. 20 at Redstone Arsenal. Adams, the organization's most senior civilian, is responsible for materiel life-cycle management, acquisition support, personnel and resource management, industrial base operations, enterprise integration and research and development.

Adams previously served as AMC's assistant deputy chief of staff for logistics integration before leaving in August 2014 to take on the role of deputy assistant secretary of defense for materiel readiness at the Pentagon. She has been a member of the Senior Executive Service since January 2011.

A graduate of the AMC's Maintenance Management Intern program, Adams has held various leadership positions in her 30-plus years of government service, including deputy director of operations for the U.S. Army Aviation and Missile Life Cycle Management Command. She holds an MBA from the Florida Institute of Technology and a B.S. in economics from Birmingham-Southern College. (U.S. Army photo by SFC Michael Zuk, AMC)

COGGINS APPOINTED TO SES

Kevin M. Coggins, a DA civilian in the Army Acquisition Corps, became a member of the Senior Executive Service (SES) as the Program Manager for Direct Reporting in the organization Program Manager Positioning, Navigation and Timing (PM PNT), during a ceremony June 16 at Aberdeen Proving Ground (APG), MD. The **Hon. Heidi Shyu**, assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and the Army acquisition executive (AAE), presided over the ceremony and administered the oath of office.

"Today we welcome a new member to the ranks of Army senior executives, the latest and newest, Kevin Coggins," Shyu said at the ceremony, describing PNT as "a critically important area for the members of our armed forces."

Before his appointment to the SES, Coggins served as deputy product director and product director for PNT. He also served as the project lead for the assured PNT cross-cutting capability for the Army's Common Operating Environment. Coggins will continue his responsibility for the development, acquisition, fielding and life-cycle support of the Army's portfolio of PNT programs—capabilities that enable Soldiers to access accurate, reliable time and position information. Coggins will report directly to the ASA(ALT) and will plan and manage PM PNT programs consistent with the policies and procedures issued by the AAE. (Photos by Sean Kief, U.S. Army Garrison APG)

MARRIOTT LEAVES AMC FOR AMCOM

William P. Marriott is the new deputy commanding general for the U.S. Army Aviation and Missile Life Cycle Management Command (AMCOM), Redstone Arsenal. He manages a multifaceted and diverse organization with an annual budget of over $4 billion and a global workforce of more than 11,000 military and civilian employees.

He previously served as AMC's deputy chief of staff for personnel, G-1, responsible for staff supervision and program management in several major functional areas. He also oversaw the human capital strategic planning for base realignment and closure as well as the Logistics and Technology Program. Marriott was appointed to the Senior Executive Service in July 2005.

AMC PROMOTES RESOURCE MANAGER

Susan J. Goodyear is AMC's new deputy chief of staff for resource management. She previously served as the command's assistant deputy chief for resource management and the executive director for business. In her new role, she is responsible for planning, programming, budgeting and executing AMC resources. Goodyear has been a member of the Senior Executive Service since August 2010.

PEO CS&CSS' TIGHE TIES UP FEDERAL CAREER

Margaret "Shannon" Tighe of the Program Executive Office for Combat Support and Combat Service Support (PEO CS&CSS) retired after 31 years of federal service, with a ceremony July 23 at the Detroit Arsenal, Warren, MI. **Scott J. Davis**, program executive officer, presented Tighe with the Superior Civilian Service Award as well as an American flag and other symbols of her service.

Tighe's career culminated as assistant PEO for operations, where she helped guide several efforts to assess and improve organizational performance, structure and climate. As the Product Director for Army Watercraft Systems, she was instrumental in establishing the first Army Watercraft Board of Directors, representing Army leadership, integrators, program managers and developers, to chart a common course for the watercraft fleet. She also spearheaded the development of a common Army watercraft life-cycle management strategy. (Photo by John Otwell, PEO CS&CSS Strategic Communications)

US ARMY PEO EIS
PEO Enterprise Information Systems

GFEBS-SA CHANGE OF CHARTER

LTC Matthew Schramm relinquished the charter for General Fund Enterprise Business System Sensitive Activities (GFEBS-SA) to **LTC Timothy McGrew** at a June 29 change-of-charter ceremony in Alexandria, VA, hosted by GFEBS Project Manager **COL William Russell**. As the first Product Manager for GFEBS-SA, Schramm faced the challenge of starting up a new sister program to GFEBS, the first enterprise resource planning structure to fully deploy within the DA. Today, GFEBS and GFEBS-SA, both programs of the PEO for Enterprise Information Systems (EIS), together provide sensitive-activity communities the tools for decision support and data analysis to sustain warfighting capability.

GFEBS INC II ASSUMPTION OF CHARTER

Project Manager for General Fund Enterprise Business System (GFEBS) **COL William Russell** hosted the GFEBS Increment II assumption-of-charter ceremony July 31 at Fort Belvoir, VA, welcoming **Brendan Burke** back to PEO EIS. Burke, formerly product director for Computer Hardware, Enterprise Software and Solutions, returns from Army senior service college. GFEBS is the Army's Web-enabled financial, asset and accounting management system. It standardizes, streamlines and shares critical data across the active Army, the Army National Guard and the U.S. Army Reserve.

IPPS-A INC II CHANGE OF CHARTER

Integrated Personnel and Pay System – Army (IPPS-A) Project Manager **COL Darby McNulty** hosted a change-of-charter ceremony July 30 in Alexandria, VA, for IPPS-A Increment II, a program of PEO EIS. **COL Kevin Vanyo**, who has led IPPS-A since its inception in 2012, relinquished the charter to **LTC Nicole Reinhardt**, who joins PEO EIS from PEO Soldier. IPPS-A Increment II supports Soldier personnel management records, pay and benefits.

ACWS CHANGE OF CHARTER

The Product Manager for the Army Contract Writing System (ACWS), a program of PEO EIS, observed a change of charter Aug. 7 during a ceremony at Fort Belvoir. **LTC Ossie Peacock**, who had led ACWS since its inception in 2013, relinquished the charter to **LTC Robert Wolfe**. ACWS provides a single enterprise contract writing and management system to achieve business process efficiencies and foster audit readiness across the enterprise.

I3MP CHANGE OF CHARTER

The Installation Information Infrastructure Modernization Program (I3MP) received a new leader at a July 10 change-of-charter ceremony at Fort Belvoir, hosted by Installation Information Infrastructure – Communications and Capabilities Project Manager Michael Padden. Former Product Manager for I3MP **LTC Robert Mikesh** relinquished the charter, which is now held by a product director, to **LTC Gus Muller**. I3MP, a program of PEO EIS, is charged with the continental U.S. network infrastructure mission at Army posts, camps and stations, and with supporting interoperability across DOD.

NEW PRODUCT DIRECTOR AT MC4

Matthew Maier assumed his role as the new product director for Medical Communications for Combat Casualty Care (MC4) during a ceremony July 7 at Fort Detrick, MD, hosted by PEO EIS' Enterprise Management Systems Portfolio Manager **Reginald Bagby**. MC4 integrates and fields the Army capability to digitally capture medical treatment data in operational environments, enhancing continuity of care and enabling a comprehensive, lifelong electronic medical record for service members.

DOD BIOMETRICS CHANGES LEADERS

COL Sandra Vann-Olejasz, the Project Manager for DOD Biometrics since September 2011, relinquished the charter to **COL Donald Hurst** in a July 16 ceremony at Fort Belvoir, hosted by **Douglas K. Wiltsie**, PEO for EIS. PM DOD Biometrics, part of PEO EIS, is responsible for the capture, transmission, storage, management, sharing, retrieval and display of biometric data to enable identification and verification on the battlefield and across DOD. Programs within the DOD Biometrics portfolio are Biometrics Enabling Capabilities and Joint Personnel Identification. Hurst was most recently the director of Fires and Force Protection, Office of the ASA(ALT), and is a graduate of the U.S. Army War College. Vann-Olejasz is now the military deputy to the PEO. (Photo by Sam Soleimanifar, PEO EIS)

AHRS CHANGE OF CHARTER

Lee A. James III, right, formally assumed the duties of the product director for Army Human Resource Systems (AHRS) from **Gregory D. Riley** at a June 15 change-of-charter ceremony presided over by **COL Darby McNulty**, project manager for Integrated Personnel and Pay System – Army. AHRS, a program of PEO EIS, delivers cost-effective, standardized and interoperable human resources solutions for Soldiers. (Photo by Sam Soleimanifar, PEO EIS)

P2E CHANGE OF CHARTER

LTC Gregory S. Soulé was introduced as the new product manager for Power Projection Enablers (P2E), a program of PEO EIS, during a change-of-charter ceremony hosted by Installation Information Infrastructure – Communications and Capabilities Project Manager Michael Padden June 30 at Fort Belvoir. Outgoing P2E Product Manager **COL Mollie A. Pearson** departed after a distinguished tenure, during which she won the 2015 Federal 100 Award and was nominated for the 2014 Secretary of the Army's Award for Product Manager of the Year. Pearson will be attending an Army senior service college for 2015-16.

Soulé comes to P2E from PEO Soldier, where he was the assistant product manager for Ground Soldier. He is Level III certified in program management and Level II certified in information systems, and has more than 18 years of military service. (Photo by Sam Soleimanifar, PEO EIS)

BEC CHANGE OF CHARTER

Brian Raftery, right, a retired Army lieutenant colonel, assumed the charter of the Product Manager for Biometric Enabling Capabilities (BEC) from **LTC Eric Pavlick**, who has led BEC since April 2012, during a change-of-charter ceremony presided over by PM DOD Biometrics **COL Sandra Vann-Olejasz**. BEC, a program of PEO EIS, is DOD's central authoritative biometric repository. Raftery manages a workforce of more than 25 military, civilian and contract personnel, and annual investments exceeding $60 million. (Photo by Sam Soleimanifar, PEO EIS)

TERMINATION OF CHARTER FOR PM JPI

COL Sandra Vann-Olejasz, left, then-PM DOD Biometrics, hosted a termination of charter and award ceremony June 24 at Fort Belvoir. The ceremony officially recognized the termination of the charter of the Product Manager for Joint Personnel Identification (JPI), part of PEO EIS, and the leadership of **LTC Jackquiline M. Barnes**. JPI was established to design, engineer, develop, acquire, field and sustain Army biometric tactical collection capabilities to capture data from non-U.S. persons of interest for the DOD Automated Biometric Identification System. Barnes, who had held the title of JPI product manager since February 2013, received the Meritorious Service Medal. (Photo by Sam Soleimanifar, PEO EIS)

ACQ BUSINESS HAILS NEW PRODUCT MANAGER

LTC Keith G. Harley assumed responsibility as product manager for Acquisition Business on July 2 at a change-of-charter ceremony hosted by **Douglas K. Wiltsie**, PEO for Enterprise Information Systems (EIS), in Alexandria, VA. Harley previously served as the acting deputy product manager and project lead integrator for another PEO EIS program, Medical Communications for Combat Casualty Care. He takes over from LTC(P) Delisa L. Hernandez, who received the Defense Meritorious Service Medal at the July 2 ceremony. (Photo by Sam Soleimanifar, PEO EIS)

NEW DEPUTY PEO AT IEW&S

In July, **MG Kirk F. Vollmecke** became the deputy PEO for Intelligence, Electronic Warfare and Sensors (IEW&S). He recently served as deputy commanding general, support, Combined Security Transition Command – Afghanistan, Operation Freedom's Sentinel, Afghanistan. Vollmecke's 31-year Army career also includes assignments as deputy for acquisition and systems management in the Office of the ASA(ALT) and commanding general of U.S. Army Mission and Installation Contracting Command.

PM PASSES WIN-T CHARTER

For the last four years, **COL Edward Swanson**, outgoing project manager for Warfighter Information Network – Tactical (PM WIN-T), has led the evolution of the Army's tactical network communications program. From fielding mobile network capabilities and developing expeditionary command post solutions to filling urgent operational needs with innovative satellite communications capabilities, Swanson played a pivotal role in making sure Soldiers stay connected.

"The last four years have been the most rewarding of my 28-year career because of the PM WIN-T workforce and our critical mission of providing tactical communications to Soldiers in support of full-spectrum operations," Swanson said.

Swanson passed the PM WIN-T charter to **COL Gregory Coile** during a change-of-charter ceremony July 20 at APG's Myer Auditorium. PM WIN-T is assigned to the PEO for Command, Control and Communications – Tactical (PEO C3T). Swanson will now serve as the chief of staff at the PEO IEW&S, also based at APG.

Coile takes the reins of the PM WIN-T program office following a stint at the U.S. Army War College, but is not a newcomer to PEO C3T. During the course of his military career, he served as the assistant product manager for Project Manager Mission Command's Tactical Battle Command and Command Post of the Future; executive officer to the PEO and product manager for WIN-T Increment 1 and Satellite Communications within PM WIN-T.

"My family and I feel very blessed to be coming home to PEO C3T and PM WIN-T," Coile said. "I am joining an extraordinary team with a vital mission, and I look forward to building on the tremendous success that PM WIN-T has earned under COL Swanson's leadership."

COL Gregory Coile, right, incoming Project Manager for WIN-T, receives the PM WIN-T colors from **Gary Martin**, PEO for C3T and host of the July 20 change-of-charter ceremony. At left is **COL Edward Swanson**, outgoing PM. (U.S. Army photo by Lynn Harkins, PEO C3T)

LTC Joel Babbitt, left, outgoing product manager for WIN-T Increment 1, passes the program's colors to the incoming product manager, **LTC Mark Henderson**, right, during a change-of-charter ceremony July 17 at APG's Myer Auditorium. The ceremony was hosted by **COL Edward Swanson**, center left, then the PM for WIN-T. (U.S. Army photo by Denise Rule, PEO C3T)

Gary Martin, PEO for C3T, hands the PM WIN-T charter to incoming Project Manager **COL Gregory Coile**, during the change-of-charter ceremony July 20 at APG's Myer Auditorium. (U.S. Army photo by Lynn Harkins, PEO C3T)

CHANGES AT PD WESS

Michael McGarvey assumed the duties of the product director for Wideband Enterprise Satellite Systems (WESS), a PEO EIS program, June 4 at Fort Belvoir, during a ceremony hosted by Defense Communications and Army Transmission Systems Project Manager **COL Charles Stein**, center. During the ceremony, the outgoing WESS product manager, **LTC Samuel Ancira**, was presented with the Meritorious Service Medal and the Signal Corps Regimental Association's Bronze Order of Mercury in recognition of his leadership.

McGarvey acted as product director until Aug. 14, when **LTC Joel Babbitt** assumed the charter for WESS. (Photo by Sam Soleimanifar, PEO EIS)

PM EW&C CHANGE OF CHARTER

COL Joseph Dupont, left, relinquishes the charter of the Project Manager for Electronic Warfare and Cyber to **COL Marty G. Hagenston** during a July 1 ceremony hosted by **Stephen Kreider**, program executive officer for IEW&S. (Photo by William Schofield, PEO IEW&S)

GENERAL OFFICER ANNOUNCEMENTS

The Chief of Staff, Army announces the following officer assignments:

MG Theodore C. Harrison, commanding general (CG), U.S. Army Contracting Command, Redstone Arsenal, AL, to director of operations, Office of the Assistant Chief of Staff, Installation Management, U.S. Army, Washington, DC.

MG James E. Simpson, director for contracting, Office of the ASA(ALT), Arlington, VA, to CG, U.S. Army Contracting Command, Redstone Arsenal.

The U.S. Senate confirmed the following nominations on Aug. 5:

LTG Anthony R. Ierardi, for reappointment to the rank of lieutenant general and assignment as director, Force Structure, Resources and Assessment, J-8, Joint Staff. He is currently serving as deputy chief of staff, G-8.

MG John M. Murray, for appointment to the rank of lieutenant general and assignment as deputy chief of staff, G-8. He most recently served as CG, 3rd Infantry Division and Fort Stewart, Fort Stewart, GA.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The first test flight of the Aerocycle was conducted by a combat-ready test pilot at the Brooklyn, NY, Army Terminal in 1955. (Photo courtesy of the U.S. Army Transportation Museum)

HOMEGROWN IDEA
Hoverbike inventor Chris Malloy on his original model outside his garage near Sydney, Australia, in 2011. Malloy said future Hoverbikes designed for private use will be classified as ultralight, meaning a pilot's license will not be required. However, start saving your money: The price tag will probably be more than 45,000 pounds, or $70,680. (Photo courtesy of Malloy Aeronautics)

During the mid-1950s (well before Army AL&T was first published), one of the major concepts in military aviation was the flying platform: an airborne vehicle designed to carry a standing, "combat-ready" Soldier to perform reconnaissance missions. One of the first to tackle this notion was Charles H. Zimmerman of the National Advisory Committee for Aeronautics (NACA). In 1954, he proposed that if the rotors of a helicopter were on the bottom, a pilot could use his own weight to steer the vehicle using kinesthetic control, similar to riding a bicycle. NACA found Zimmerman's idea valid, and three companies developed prototypes. The De Lackner Helicopter Co. of Mount Vernon, NY, developed one of them—the Aerocycle—for the Army.

After successful initial tethered and free-flight testing of the Aerocycle at the Brooklyn Army Terminal in 1955, the Army ordered 12 more variants and boldly predicted that the Aerocycle would be a modern version of the old horse cavalry, providing the "eyes and ears" for the infantry. However, after more testing in 1956 at Fort Eustis, VA, test pilot CPT Selmer Sundby concluded that the craft was much more difficult to fly than previously predicted and that "it would not be safe" for an inexperienced pilot such as an infantryman to fly. The low-mounted rotors kicked up rocks and debris, and the forward speed was limited by an "uncontrollable pitching motion." Additionally, two crashes occurred when the rotors collided and shattered, triggering an "immediate loss of control," and engineers were unable to find the reason for the malfunction. As a result, the Army terminated the project—but not the concept.

Fast forward to 2015, when the U.S. Army Research Laboratory (ARL) at Adelphi, MD, has completed the feasibility study of using a similar vehicle, called the Hoverbike, as a tactical reconnaissance vehicle (TRV).

Bearing a striking resemblance to transporters from a "Star Wars" movie, the original Hoverbike was built in 2008 by New Zealand-born engineer Chris Malloy in his garage in suburban Sydney, Australia, in the evenings after work and on the weekends. What started as a hobby quickly grew into a commercial enterprise, with interest from universities, farmers, search and rescue companies, private entities and the military, including notable visits from the U.S. Army G-3/5/7 and Lockheed Martin Corp.'s Advanced Development Programs, known as the Skunk Works.

Malloy said that the design of the Hoverbike was spurred by a comment made by his helicopter instructor. "He was an ex-Navy test pilot and kept talking to me about how the R22 [a light utility helicopter used for herding cattle] was a flying motorbike. I, of course, disagreed. So I set out to build a robust, workable flying motorbike. I think I'm reasonably good at seeing a design and improving on it, and the helicopter is just right for that."

Malloy said his Hoverbike design originally was tailored to one person of average weight, but, he noted, "the beauty of the design is its scalability." And that's what caught the eye of ARL. Though the military requirement would be for the Hoverbike to carry a payload of 400-800 pounds, the Army deemed the Hoverbike feasible for its TRV concept.

ARMY EVALUATION

ARL has been exploring the TRV concept for about a year, assessing whether the Hoverbike technology would be an effective way for Soldiers to maneuver away from ground threats. The Baltimore Sun quoted Timothy Vong, TRV project coordinator, as saying that the Hoverbike has "the potential to unburden Soldiers while increasing their capabilities regardless of the conditions, in manned or unmanned operations." Other options for the military variant could be to help Soldiers with communication, reconnaissance, mine detection and equipment transport.

CONCEPT + COURAGE

CPT Selmer Sundby, Army test pilot, test-flies the Aerocycle at Fort Eustis, VA, in 1956. Sundby used the motorcycle-type handlebars to control the speed and torque of the flying platform. (Photo courtesy of the U.S. Army Transportation Museum)

MULTIPLE POSSIBILITIES

The Hoverbike has "the potential to unburden Soldiers while increasing their capabilities regardless of the conditions, in manned or unmanned operations," said Timothy Vong, TRV project coordinator. The scaled-down version of the drone Hoverbike features Cyborg Buster, a one-third scale human model. The semiarticulated Buster is designed to mimic a human pilot and has space in its head for a GoPro camera. (Images courtesy of Malloy Aeronautics)

With the initial feasibility study concluded, the Army's next step is preparing for a full-scale TRV prototype. Over the next three to five years, the U.S. Army Research, Development and Engineering Command (RDECOM) will partner with Malloy Aeronautics and SURVICE Engineering Co. to deliver full-sized prototypes for testing in military applications. As the TRV concept progresses through the proof-of-principle phase and successfully meets milestones, ARL will transition project leadership to its sister organizations within RDECOM, which will take on the responsibility of maturing the TRV concept into a defense capability.

What about private-sector applications for the Hoverbike? Will we soon see people flying Hoverbikes around the city for a bird's-eye view of the skyline, or ranchers using them in rounding up their livestock? Yes, according to Malloy. If it works in the commercial world, "it will work well in the private sector," he said.

"If I'm walking down the road in five to 10 years' time and I see a Hoverbike working in a farmer's field, I will be immensely happy, whether it's mine or somebody else's. This will happen."

For more information about the Hoverbike, go to ***http://www.hover-bike.com/MA/****.*

For a historical tour of AL&T over the past 53 years, go to the Army AL&T magazine archives at ***http://asc.army.mil/web/magazine/alt-magazine-archive/.***

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"To encourage innovation, you have to empower your people and you have to create an organization in which your people have the resources and feel they can be effective. You give them the vision and direction and let them go."

COL Michael Thurston
PM for Mission Command, PEO C3T

Page 35

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