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ONE ROOF

Army AL&T interview with Undersecretary Ryan D. McCarthy

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APRIL - JUNE 2018

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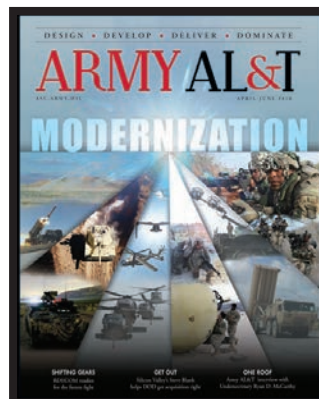
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Your people should write for Army AL&T magazine, the award-winning, premier publication of the Army acquisition community. It can help put your command or organization and the great work it does on the map. Our articles are published both in print and online, and reach thousands of readers across the Army, DOD, industry and Capitol Hill. Our workshop shows people how to write plainly about complex topics, and that's critical for acquisition.

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From the Editor-in-Chief

There was a time when the occasional playground fight wasn't all that unusual—whether it was a couple of friends horsing around, or a dustup between Little League rivals. Those of us who might have gotten involved in such altercations were told to “fight fair.” No kicking someone once they were on the ground, no throwing sand in their face, no hair pulling, no brass knuckles—you get the idea. Fair by these standards meant everyone had an equal footing and knew what to expect. Those were the Marquess of Queensberry rules (which made boxing civilized back in the 19th century) adapted for the sandlot.

On the flip side, if you ever lost a fight, your dad (or at least mine) would be the first one to tell you never to be the second one to cheat. (My dad was a World War II and Korean War veteran, so he wasn't much for losing.)

The battlefield isn't a playground, and the Army's opinion about warfare is pretty much the same as my dad's. It's summed up well in the 2009 Army Modernization White Paper: “We never want to send our Soldiers into a fair fight.”

That determination to dominate our adversaries continues today with the publication of the 2018 National Defense Strategy, “Sharpening the American Military's Competitive Edge.” Its focus is on building a lethal force “that possesses decisive advantages for any likely conflict” and “accelerating our modernization programs and devoting additional resources in a sustained effort to solidify our competitive advantage.” Cognitive dissonance, anyone? Not really. The perspective of “fair” changes dramatically when your life, or your Soldier's life, is at stake.

The strategy demands that we (the Army Acquisition Workforce, in collaboration with the rest of the Army enterprise) modernize key capabilities and build a more lethal force that includes generous helpings of each of the six modernization priorities outlined by Army Chief of Staff Gen. Mark A. Milley and by Undersecretary of the Army Ryan D. McCarthy last fall while McCarthy was acting secretary.

To top it off, Army Secretary Dr. Mark T. Esper and McCarthy have made modernization one of their top three priorities overall, along with readiness and acquisition reform. To make those three priorities a reality, Army leadership has created the new Futures Command and its eight cross-functional teams, providing unity

of effort and command under “one roof,” as McCarthy put it in our interview with him. It's going to take uncommon unity to bring all stakeholders together to speed capability development. (Read more about McCarthy and his priorities in “One Roof,” Page 19.) As this edition of Army AL&T went to press, the Army was rolling out the new command in the most significant Army reorganization effort since 1973.



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Future acquisition experts may look back and declare this a golden age, with a renewed focus on acquisition and a stated desire by leadership to do what's necessary to get it right. We'll see, but for now the Army Acquisition Workforce is doing its part to modernize and ensure that our Soldiers don't enter into any fair fights. For example, the Emerging Technology Office of the Army Rapid Capabilities Office is helping speed the development and maturation of promising technology by working with both traditional and nontraditional industry and academia to give their ideas a test bed. (Read “Honest Broker,” Page 32.)

Steve Blank, creator of the “Lean Startup” method and a co-founder of Hacking for Defense, has a great deal of advice for the Army and DOD on what to do—and what not to do—in modernizing the force and its institutions. One piece of that advice is “Get out of the building. There are no facts in the building.” (Read more in “Get Out,” Page 124.)

Finally, I want to recognize the acquisition members across the Army who, every quarter, provide us with the superior content that tells the Army acquisition story and makes this magazine a valued resource for the thousands who read it. In recognition, we hold an annual competition and award the best of the best with an ALTie! Read more about the award and this year's winners on Page 161. Congratulations to everyone who participated.

As always, if you want to contribute a story, have a story idea or just want to comment, please contact us at ArmyALT@gmail.com.

Nelson McCouch III
Editor-in-Chief



PROVING GROUND

Paratroopers assigned to 1st Brigade Combat Team, 82nd Airborne Division conduct a tactical ground movement through Pekha Valley in Nangarhar Province, Afghanistan, in September, moving to an observation post to provide base defense. In nearly two decades at war in Afghanistan and Iraq, the Army has seen the need for a more responsive acquisition system to meet the needs of its Soldiers in a timely manner—not the 12-year average timeline of the system in place. It has also seen what expedited acquisition processes can accomplish, such as the robots fielded in just 28 days in 2002 to explore the caves of Afghanistan, using Defense Advanced Research Projects Agency technology integrated with government and commercial off-the-shelf items. (U.S. Army photo by Cpl. Matthew DeVirgilio, 55th Combat Camera)





FROM THE ARMY
ACQUISITION EXECUTIVE
DR. BRUCE D. JETTE

FROM THE AAE

ADVANCING ACQUISITION



As the Army focuses on modernizing without delay in its six priority areas, the acquisition culture must change by embracing certain key principles

Gen. Mark A. Milley, Army chief of staff, made clear the reason why there is urgency in modernizing America's Army, stating, "We know over time that our competitive advantage has eroded and that our overmatch is being challenged in all domains. In today's increasingly contested domains, the supremacy of our Army is being tested like never before." It is for this reason that increasing the resources toward modernizing our Army is a necessity, along with changing the way we think, organize and execute our plans and programs.

Our Army acquisition community is at an inflection point where we need to change from the previous industrial-age models of program management and materiel procurement. We must equip Soldiers with the most advanced capabilities possible, and do so as quickly as achievable. Our readiness must allow us to fight across multiple domains in order to deter potential adversaries and, if necessary, rapidly defeat them. Today's modernization is tomorrow's readiness. Modernization is an ongoing and evolving extension of our readiness.

America's Army has spent the better part of two decades at war. During this time, our adversaries have studied our successes and challenges, then mimicked many of those successes and avoided the challenges. In the case of Russia and China, they have invested heavily in their capabilities in an attempt to bring themselves to near-peer status.

Our continuing fight and the constraints of sequestration have had an adverse effect on our ability to advance commensurate with our true technological and operational capabilities. Our "Big Five" remain our Big Five, and have only been incrementally upgraded over time. This approach limits the advancement of capabilities to an evolutionary scale and tends to preclude a revolutionary advancement.

Our acquisition and modernization approaches must change to provide our leaders the flexibility to apply new operational concepts that can ensure unquestioned overmatch, now and at all times in the future. This requires aggressively pursuing technology approaches that may not fare from well-worn paths, as well as those offered by familiar industry. We must make it our culture to know about and pursue innovations that may be more associated with commercial application but which we can leverage for our benefit by applying them, with or without modification, to visionary operational applications.

A FOUNDATION FOR CHANGE

As the Army Futures Command comes online, we must form a close partnership with those working to develop these operational visions and contribute to them by leveraging our military insight, joined to our technical and programmatic knowledge.

When I say our culture must change, at the core of that change is the need for the acquisition team to see itself as a significant

contributor to military thought as well as the Army's experts in providing material solutions.

To that end, I will be providing a series of papers that outline my thoughts and guidance as the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)). I believe senior leaders must provide a clear picture of their vision. We are very fortunate to have like-minded leadership in the secretary, undersecretary, chief of staff and vice chief of staff. All agree that we must work together to quickly advance our overmatch capabilities.

Let me, then, provide foundational concepts for achieving such an operationally oriented approach to acquisition and the culture into which we must transform.

1. Acquisition reform. Our secretary, Dr. Mark T. Esper, has outlined several initiatives to promote unity of effort, focused effort and measurable progress. Unity of effort drives the establishment of a single command structure that, in turn, drives modernization from concept to full DOTMLPF-P [doctrine, organization, training, materiel, leadership, personnel, facilities and policy] delivery to the warfighter in a timely enough manner to make a difference. This is the objective of the Army Futures Command.

The secretary and the chief of staff have made it clear that, for the remainder of their tenure, the top six priorities—long-range precision fires, next-generation combat vehicle, future vertical lift, the Army network, air and missile defense and Soldier lethality—will not change and shall be the focus of the Army's modernization strategy. Cross-functional teams are the primary mechanism to ensure consistency of progress

against known areas requiring development. Measurable progress on the acquisition component of these priorities has already begun as the ASA(ALT) implements an evolvable tracking system. My direction is to avoid any new requirement for data input and, instead, to leverage what exists and to consolidate the data in a manner that will provide insights necessary at the senior level. My objective is to enable our workforce to achieve, not to second-guess it.

2. Accelerated fielding. It is clear that we need a more responsive acquisition system to meet the needs of our Soldiers on time. Let me share with you my experience in this area. Following the tragedies of Sept. 11, 2001, the Army found itself fighting terrorists who effectively employed improvised devices and commercial technologies against our forces in Afghanistan. The formal acquisition process, still in place today and taking an average of 12 years to field a system, could not respond expediently.

In May 2002, I was “afforded” the opportunity to take robots into combat by forming a small team that integrated Defense Advanced Research Projects Agency robots with government and commercial off-the-shelf items. In only 28 days, we took them into the caves of Afghanistan rather than sending Soldiers with grappling hooks and grenades. Robots are now broadly used in combat operations. Perhaps more importantly, this instigated the Army and DOD's rapid acquisition model. There have been many years in which “rapid” acquisition was seen as an exception to “real” acquisition. We cannot afford “real” acquisition if it is going to take 12 years or even six years.

Our adversaries have revised their Cold War processes to leverage the ever-increasing availability of technology. We must do



THINKING BIGGER THAN THE BIG FIVE

An AH-64 Apache helicopter with the 12th Combat Aviation Brigade and M1 Abrams tanks from the 1st Infantry Division secure an area during an exercise in March at Grafenwoehr Training Area, Germany. The Army's modernization strategy seeks to accelerate development of technological and operational capabilities that will improve on its “Big Five” weapon systems, which have received only incremental upgrades over time. (U.S. Army photo by Spc. Hubert D. Delany III, 22nd Mobile Public Affairs Detachment)



AIMING FOR THE FUTURE

Paratroopers assigned to 3rd Battalion, 4th Air Defense Artillery Regiment conduct Stinger missile training using the Virtual Stinger Dome (VSD) in March at Fort Bragg, North Carolina. The VSD is a new training system that uses virtual reality technology to immerse Soldiers in a digital world. (Photo by Spc. Houston T. Graham, 3rd Brigade Combat Team, 82nd Airborne Division)

so as well or lose our overmatch. Culturally, I want all those involved in the acquisition process to look for ways that we can expedite it. This includes eliminating time-consuming and wasteful processes and reports. If my policies cause you to slow down, tell me about them, the recommended action to take, and you will get a response from me. The PEOs have already taken advantage of this.

3. Accelerated technology. Technology is global, and we are in a competition to access both technology and technical talent. Our adversaries have access to much of the same technology that we do. To retain overmatch in an open and pervasive technological environment with a limited budget, we must apply our resources to employ or develop those technologies that will provide the greatest military advantage and, specifically, not spend resources on reinventing what we can buy. The Army must focus our science and technology (S&T) investments on those technologies that contribute to the greatest advancements, first in the six priorities

and second in the underlying enablers. ASA(ALT) is developing a policy that will provide a means of funding allocation that requires an increasing degree of foreseeable relevance between a research project and potential military application but also provides clear flexibility for lab directors to look for leap-ahead technologies. A more disciplined approach to initiating and tracking development management, modeled on the commercial sector, will require that before a new project is started, the lead researcher show that the desired work is not a redevelopment of existing work, that the surrounding known work is well understood, along with the researchers and sources, and that the new work is an extension of the existing knowledge base, not being performed by anyone else.

Finally, a project plan will allow for incremental goals, associated with funding and timelines at which leaders can determine if additional resources are needed, whether goals have been achieved, and if continued work in the area is warranted or an “off ramp” is necessary. Additionally, we are fencing funds specifically to bridge the “valley of death” between research and program application in a deliberate manner and are taking, at the senior leader level, the responsibility for transition rather than leaving it up to the wiles of researchers and PMs.

4. Accountability. We are working to improve the way we do business in order to make the Total Army more lethal, capable and efficient. In doing so, we must ensure that our organizations, policies, processes and tasks that consume time, money and manpower deliver real value.

Today’s acquisition system is based upon an approach that encourages our professionals to follow a preset process and check appropriate boxes. One can complete a process and not have an outcome or product worth anything. This is unacceptable. It wastes time, money and talent. Process is there to facilitate achieving a product. It is NOT the product.

CONCLUSION

We must train and develop our workforce to do their jobs in the best way possible, to empower them with the ability to find processes that fit and to influence and change processes that don’t. This will allow for greater flexibility and accountability in the final outcome. In future articles, I will explain in some detail how to manage the processes to achieve a product and what is acceptable risk. I believe that it is essential for senior leaders not merely to tell those executing to take risk, but then to provide the limitation and clarity on what is acceptable risk to take.

Our people are the Army’s greatest asset. Managing talent is an enterprise-level effort to identify, grow and develop future military and civilian acquisition leaders to recognize opportunity, embrace new ideas, manage risk and realize their true potential. As we work to build a better, more responsive acquisition system, it is absolutely vital that members of the acquisition community have senior leadership guidance, encouragement and reassurance to innovate, understand and accept responsibility, and make smart decisions.

I look forward to hearing your opinions, recommendations and ideas as we continue to improve the way we deliver cutting-edge capabilities to our men and women in uniform.



TOMORROW'S SOLDIER

Pvt. Joel Perez, a rifleman with 3rd Armored Brigade Combat Team, 4th Infantry Division (3/4 ABCT) clears a building during a platoon live-fire exercise in July at the Grafenwoehr Training Area, Germany. Even though the Army has upgraded its combat training centers to reflect the stresses of actual combat, Army Chief of Staff Gen. Mark A. Milley warns that not enough has been done to develop the high-level leader and Soldiering skills required in future battle. (U.S. Army photo by Capt. Scott Walters, 3/4 ABCT)



MODERNIZING ARMY MODERNIZATION

The Army is at 'an inflection point,' and modernizing is job No. 1 and priority No. 1. But modernization will take every ounce of leaders' will and a massive culture change to the slowest, most hidebound acquisition system in DOD to make it a reality.

by Ms. Margaret C. Roth

There's a new wave of change—a big one—cresting in Army acquisition, with the potential to fundamentally reorganize how the Army will accomplish its modernization priorities and a sense of urgency born of real-time, real-life threats to U.S. military prowess.

About a dozen acquisition reform initiatives aimed at getting needed battlefield solutions to the warfighter faster have washed over the Army since the Soviet Union ceased to exist in 1991. Now Pentagon leadership has called for DOD and the Army to take quick, dramatic action in modernization and acquisition to address irrefutable advances in military technology by four major potential threats—North Korea, Russia, China and Iran—in addition to nonstate adversaries. Indeed, in many respects, the Army leadership team seems to have been handpicked by Secretary of Defense James N. Mattis to do just that.

As decades of great-power competition escalate to a bona fide threat of great-power war of a new and unfamiliar kind, the goal of streamlining Army acquisition is to reduce, by half, the time it takes to get a product from concept to contract award.

This time, there is an uncommonly strong consensus among government, Congress and industry that the Army has the slowest acquisition machinery of the three military departments and urgently needs to shift its focus from hidebound processes to useful and quick results.

The Army's new approach centers on the creation of a futures command, which will launch this spring and become fully operational by next summer. The new command will center on the eight cross-functional teams working the Army's six near- to midterm modernization priorities and using acquisition processes that speed up requirements generation, foster early prototyping and involve Soldiers in developing solutions from the very beginning to avoid wasting time, money and manpower on systems that prove unusable. (See "One Roof," Page 19.) Of equal urgency to modernization is speeding vital capabilities to the warfighter, starting with the six priorities but ultimately applying the same rigorous schedule to other acquisitions as well.

Since his swearing-in Nov. 20, Secretary of the Army Dr. Mark T. Esper has made acquisition reform one of his top three

priorities. The first priority, he said in his initial message to the force, is readiness "to deploy, fight and win across the entire spectrum of conflict, with an immediate focus on preparing for a high-end fight against a near-peer adversary." The second is modernization to build greater long-term capacity and capabilities—"growing our operational force while maintaining quality, reshaping it to be more robust and successful in all domains, and modernizing it with the best weapons and equipment available to guarantee clear overmatch in future conflicts."

To accomplish reform, Esper said, the Army must improve "the way we do business, including how we implement these priorities, to make the total Army more lethal, capable and efficient. This means changing the organizations, policies, processes and tasks that consume time, money or manpower without delivering real value, and applying the savings to our top priorities."

In prepared testimony Dec. 7 to the Senate Armed Services Committee, Esper stated, "Our failure to modernize as quickly as possible will most likely exacerbate the significant risks the total Army

now faces. This makes reform of our industrial-age acquisition system a strategic imperative. ... We intend to reduce the requirements development process from up to 60 months to 12 months or less."

FUTURES IN PROGRESS

A task force led by Lt. Gen. Edward C. Cardon, director of the Army undersecretary's Office of Business Transformation, has been laying the groundwork since last summer for senior Army leadership to make decisions on the new futures command. The official launch of the command took place March 26, the opening day of the Association of the United States Army (AUSA) Global Force Symposium and Exposition in Huntsville, Alabama.

Already, the command has become Topic A in Army acquisition, starting at AUSA's annual meeting Oct. 9-11 in Washington, where it was discussed in numerous forums. It's no small wonder. At a presentation Feb. 8 at the Brookings Institution, Undersecretary of the Army Ryan D. McCarthy said his office is keeping Congress informed of the evolving details because some of the changes being contemplated would require legislation.

CHANGE TAKES ROOT

Lt. Gen. Paul A. Ostrowski, principal military deputy to Dr. Bruce D. Jette, ASA(ALT), addresses members of the Army Acquisition Workforce Jan. 24 at Fort Belvoir, Virginia, about ways they can streamline acquisition. He has approved a new curriculum for acquisition personnel that places a greater emphasis on the technical aspects of program management. Ostrowski and Jette worked together in the early years of the REF, and some see their reunion as a harbinger of success for the latest modernization effort. (Photo by Catherine DeRan, U.S. Army Acquisition Support Center)





PLANS TAKING FLIGHT

CH-47 Chinook, HH-60 and UH-60 Black Hawk helicopter crews of the 1st Air Cavalry Brigade, 1st Cavalry Division take off Jan. 25 for their tactical assembly area inside the Hohenfels Training Area Airfield, Germany. The crews were part of Allied Spirit VIII, a multinational training exercise focusing on tactical interoperability and secure communications among NATO alliance members. "The U.S. military is not ready for the threats we face today," said Paul Scharre, senior fellow at the Center for a New American Security. "In a major power war, we will be required to innovate on timelines of months, not years. And we must have these processes of innovation in place today." (U.S. Army photo by Sgt. Gregory T. Summers, 22nd Mobile Public Affairs Detachment)



The fundamental difference that the new command is intended to make—to bring the stakeholders under “one roof” to make decisions that will produce effective, achievable, affordable capabilities and requirements rapidly and thus get the products to the warfighter fast—lies in the cross-functional teams, each led by a military or civilian leader from the operational side of the Army. Each cross-functional team has representatives from requirements development, program management, science and technology (S&T), test and evaluation, resourcing, contracting and sustainment, as well as U.S. Forces Command and, as needed, Army service component commands, the operational organizations that serve as Army components for combatant commands.

The teams, which report to the undersecretary of the Army and the vice chief of staff, will seek industry and academia’s

involvement early in the process of developing solutions to get their input on potential private-sector solutions available or in development.

Experimentation and technical demonstrations, will also be integral to the cross-functional teams’ capability development process, involving Soldiers to help determine if a solution will actually work, as needed, well before the Army decides to acquire or develop it. In remarks Oct. 10 at AUSA, Gen. Mark A. Milley, Army chief of staff, described this “significant streamlining of processes” as a

“shift to a SOCOM [U.S. Special Operations Command]-like model of buy, try, decide and acquire, rather than the current, industrial-age, linear model that takes years to establish requirements, decades to test and may take a long, long time to go from idea to delivery.”

Among experienced practitioners of rapid acquisition, hopes are high that the command will succeed, but there are caveats. The command will require a well-defined independence and authority, said Peter Newell, who directed the Army’s Rapid Equipping Force (REF)

“Our modernization strategy is now on a curve of diminishing returns.”

—Undersecretary of the Army Ryan D. McCarthy

from July 2010 to May 2013 and now heads BMNT, a consulting firm in Palo Alto, California, that connects DOD and corporations with cutting-edge Silicon Valley problem-solvers.

First, he said, “They have to have the authority to write and modify requirements. I personally think that they have to have the mandate to find problems and articulate them before they write anything.” The REF director has the authority to approve requirements, Newell noted, an authority handed down from the Army G-3.

Next, “They need experienced warfighters, as well as experienced contracting officers who understand the technologies that they’re going to be responsible for putting on the contract. They need acquisition officers who are agile, who understand innovation.”

What the command should not look like, Newell added, is the first version of the Defense Innovation Unit Experimental, which, he said, DOD established “with a big fanfare ... [but with] no people and no credit card and no authority. I hope they understand that they’re not actually gonna get it right until they’ve done a half-dozen or 20 or 30 things. They need breathing space to get the metrics they will be graded on right.”

“What the country really needs, and particularly DOD, is a much longer focus in building the apparatus they need to do things right,” he said.

Paul Scharre, senior fellow and director for technology and national security at the Center for a New American Security, testified Jan. 30 before the House Armed Services Committee that “the U.S. military is not ready for the threats we face today.” He said in prepared testimony

“Time will tell, of course, if the desired results emerge. But these are the largest confluence of changes I have seen in my entire acquisition career.”

—John T. Dillard



QUICK LIKE SPECIAL FORCES

Soldiers open fire on an enemy vehicle during a U.S. Army Special Operations Command exercise in June 2017 at Fort Bragg, North Carolina. Experimentation and technical demonstrations will involve Soldiers to determine if a proposed solution works, which Army Chief of Staff Gen. Mark A. Milley describes as a “shift to a SOCOM-like model of buy, try, decide and acquire.” (Photo by Michael Bottoms, U.S. Special Operations Command Office of Communication)



LINING UP SUPPORT

Army Chief of Staff Gen. Mark A. Milley meets with Soldiers and leaders of the 1st Infantry Division during a visit to Fort Riley, Kansas, Aug. 23. Milley has said that the capabilities fielded as part of the Army's push for modernization will require more sophisticated training capabilities, and that Soldiers at all levels will need to be able "to make thousands of simulated combat tactical decisions against a thinking and adaptive enemy in order to gain confidence and skill and learn from their mistakes." (U.S. Army photo by Sgt. 1st Class Andrew Porch, Office of the Chief of Staff of the Army)

that "in a major power war, we will be required to innovate on timelines of months, not years. And we must have these processes of innovation in place today."

With a nod to the creation of new organizations, such as DOD's Strategic Capabilities Office and the Army's Rapid Capabilities Office, to institutionalize some of the rapid innovation processes used in Iraq and Afghanistan, Scharre stated, "We must also make speed-to-market a goal in our standard acquisition process as well." A former Army Ranger who deployed multiple times to Iraq and Afghanistan, Scharre subsequently worked in the Office of the Secretary of Defense, where he played a leading role in establishing policies on unmanned and autonomous systems and emerging weapons technologies.

"The reason we have failed to adapt is because our system lacks sufficient strategic agility," Scharre stated. "We have seen these threats coming a long ways off. We have spent money. Yet we have a force that is not appropriately designed for the threats we face because we have not adapted quickly enough."

MODERNIZATION PIVOT POINTS

Identifying the most pressing needs was one of the Army's first steps toward an effective modernization strategy.

The Army's mission remains fundamentally the same: Move, shoot, communicate, protect and sustain. But as the barrier to entry continues to fall for extremely sophisticated technology, including, increasingly, artificial intelligence, the nature of battle has become ever more complex. Key systems

and equipment are far past due for replacement.

“Our modernization strategy is now on a curve of diminishing returns,” McCarthy said Oct. 11 at AUSA. In the past 16 years that the U.S. military has been at war in Afghanistan and Iraq, he noted, a technologically inferior enemy has created techniques to adapt quickly and cheaply. Potential adversaries Russia, China, North Korea and Iran have invested in technologies that had long been strengths of the U.S. military, “while we have made incremental improvements to our legacy close-combat capabilities.”

Russia, in particular, has invested significantly in standoff technology, especially anti-access and area-denial capabilities, including cyber, anti-ship, long-range fires, robotics, unmanned aerial systems and air and missile defenses.

“Our current ways of thinking, executing and organizing are limiting our capability to keep pace with change with respect to modernization and acquisition,” McCarthy added, saying, “To use a sports analogy, Russia and China are training as a boxer. We continue to train as a wrestler. They focus on throwing punches from a distance to prevent us from getting close enough to use our strengths, and they are improving faster than we are.”

HEIGHTENED FOCUS ON TRAINING

To beat the threats of the future battlefield, the Army will need modern systems that meet the challenges of this new era of multidomain battle. Supporting new capabilities will require significantly more sophisticated training, starting at the Soldier level, McCarthy and Milley said. “We want our leaders at all levels, at all echelons, to make thousands of simulated combat tactical decisions against a

thinking and adaptive enemy in order to gain confidence and skill and learn from their mistakes.”

The Army has upgraded its combat training centers to reflect the stresses of actual combat across multiple domains, Milley noted. Next, it plans to build a large-scale urban combat center. But even expensive, state-of-the-art, live-fire or live force-on-force training doesn’t provide nearly enough repetitions to develop the high-level leader and Soldiering skills that future battle will require, Milley said.

“We will do this by radically improving our synthetic training environment,” currently geared to helicopter pilots and some tank crews, with limited simulation systems available for individual and squad training.

“The technology exists now,” he said, “to conduct realistic training in any terrain in all the urban areas of the world with any scenario against any enemy—anything that the commander deems necessary. ... We just need at our level to focus our resources and provide them the opportunity.”

‘A LEADER ISSUE’

The Army’s dramatically new approach to modernization is much more than a capability road map, however. It represents a new way of thinking about acquisition leadership, said McCarthy, whose perspective on leadership reflects

broad-based experience—as a Ranger who was involved in early combat operations in Afghanistan, a special assistant to Secretary of Defense Dr. Robert M. Gates and the undersecretary of defense for acquisition, technology and logistics, a congressional staffer and, most recently, as a vice president of Lockheed Martin Corp. with an MBA.

Taken together, the Army’s plan for acquisition reform follows four principles to improve Army processes, he said:

- Early engagement and collaboration among stakeholders.
- Centralized planning with decentralized execution.
- Cost- and resource-informed decisions.
- Consistent metrics to evaluate success.

To that end, McCarthy, as acting Army secretary, directed the personnel supporting the capabilities and acquisition processes to obtain enhanced training, education and experience certification. “We will develop a broadening assignment program for DA civilians,” he said at AUSA, with opportunities to work in S&T, engineering, materiel development and sustainment as well as fellowships with industry to develop leaders with a broader understanding of the generation and acquisition of Army requirements.

“Initially, we will develop a talent management plan for future program managers to gain experience in science and technology

“Our failure to modernize as quickly as possible will most likely exacerbate the significant risks the total Army now faces.” — Dr. Mark T. Esper



and engineering and requirement contracting. This plan will include a one-year operational assignment between majors to full-bird colonels to enhance their understanding of user operational needs.

“This is a leader issue. We are adjusting our organization to put capable, proven leaders at the head of every organization who will be singly focused ... in order to provide focused clarity to the requirements process,” McCarthy said.

His directive, coupled with the congressionally mandated return of milestone decision authority for most acquisition programs to the services, promises to have sweeping effects on the education and career development of acquisition personnel, both uniformed and civilian.

In February, Lt. Gen. Paul A. Ostrowski, principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), approved a new curriculum for acquisition personnel to emphasize the technical aspects of program management over the traditional business administration focus. “Time will tell, of course, if the desired results emerge,” observed John T. Dillard, a retired Army project manager who is now a senior lecturer at the Naval Postgraduate School. “But these are the largest confluence of changes I have seen in my entire acquisition career.”

CONCLUSION

Is the Army really ready to make innovation happen as it modernizes?

There is a sense of urgency among major players that is unlike any in the recent past.

“At REF, I heavily invested in the teams that we had forward,” Newell said. “Their job was to find problems and pull

them from the battlefield, and not wait passively for someone to bring them something.” That’s exactly what McCarthy and Milley want to see.

The new futures command will need flexibility to innovate, Newell went on. “They need to be funded in a manner that doesn’t artificially tell them you’re going to buy 17 widgets this year. They don’t know how many problems they’re going to solve a year. ... The money they’re given needs to be treated as investment-like dollars.”

The first pieces are now in place for the most significant organizational change to the Army’s procurement system since Gen. Creighton W. Abrams replaced the Continental Army Command in 1973 with U.S. Army Forces Command and U.S. Training and Doctrine Command, which, with U.S. Army Materiel Command, have formed the foundation for the Army since then—organizing, equipping and training forces to conduct prompt and sustained land combat operations in support of combatant commanders.

As the new futures command takes shape, the Army has aligned 80 percent of its \$2.4 billion in S&T funding with the six modernization priorities and, through a threat-based strategy, has taken steps to ensure that technological solutions are mature before the Army transitions them to a program of record. Lastly, the Army is putting the right people in the right places to execute the newly streamlined requirements and acquisition processes.

“We are at an inflection point in history, as we must reform how we modernize our Army: the roles, responsibilities, structures, organizations,” Milley said. Readiness has improved in recent years, he said, “but we are not there yet. And we

must continue to lean into the readiness with a laser-focus sense of urgency like we’ve never had before.”

Judging from the Army acquisition leadership now in place, the futures command has a promising future. The current ASA(ALT), Dr. Bruce D. Jette, “brilliantly designed the Rapid Equipping Force,” said Newell, who called Jette “probably the most significant innovation figure that I know of who came out of uniform within the Army. He’s impassioned. I think that he will absolutely drive some folks crazy.

“Ostrowski also worked at REF and was a great counsel to me while I was at REF and he was the PEO [program executive officer for] Soldier. So you now have some guys who were together eight, nine years ago, 10 years ago, back together again—which I think is a great thing” for innovation, Newell said.

“I think within the Pentagon there’s a clear movement in that direction,” he said. “Now the question is how long it will take them to get the albatross to move.”

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

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FORMULA 809

Development of the futures command and cross-functional teams is taking place against the backdrop of a sweeping, independent, congressionally mandated review of how to speed up DOD acquisition and a major push within Army acquisition to streamline processes using authorities already available through recent legislation.

The “Report of the Advisory Panel on Streamlining and Codifying Acquisition Regulations,” known as the Section 809 Panel, from the FY16 authorizing legislation, envisions an acquisition system built around positive outcomes—the timely delivery of warfighting capabilities—not perfect adherence to processes.

In January, the 17-member panel released the first of three volumes of observations and recommendations based on its discussions with hundreds of stakeholders from industry, think tanks, DOD and other entities. Volume 1 introduces the concept of the “dynamic marketplace,” an alternative approach to acquisition that would make it easier for DOD to respond quickly to changes in global security threats and make it harder for competing powers to offset U.S. military capabilities.

The current acquisition system is inflexible and fails to differentiate between dissimilar products or services, such as a major defense acquisition program versus a basic commodity, the panel found. Further, it’s a cost-centric system whereby DOD often equates the

cost of a product or service with the risk of an acquisition, assigning arbitrary dollar thresholds in the form of acquisition categories that dictate the level of decision-making, the processes themselves and the degree of oversight. Inflexibility leads to unnecessary delays in getting warfighters what they need. The acquisition workforce has neither the incentive nor the encouragement to make decisions, much less take risk, the report stated.

The panel identified five essential attributes of a future outcome-based acquisition system:

- Competitive and collaborative.
- Adaptive and responsive.
- Transparent.
- Time-sensitive.
- Allows for trade-offs.

The panel’s “dynamic marketplace” is the result when DOD achieves these attributes—particularly effective collaboration within DOD, with industry, and with warfighters who can articulate problems, select the best solutions offered by industry for testing and save time in requirements development.

“An inability or unwillingness to collaborate with industry results in DOD lacking awareness of the full range of available potential solutions; creates barriers for nontraditional contractors to enter the defense marketplace; and results in DOD acquiring suboptimal products, services, and solutions,” the report stated. “DOD must foster collaborative partnerships across the entire

marketplace to accomplish its mission today and in the future.”

Within Army acquisition, Lt. Gen. Paul A. Ostrowski, principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology and director of the Army Acquisition Corps, has spearheaded a campaign to educate and motivate the Army Acquisition Workforce to seek ways of speeding delivery of capabilities by scaling down the processes involved. Ostrowski has visited program executive offices around the country. His message? To serve the Soldier, change the culture. Tools exist to simplify acquisition without special permission.

The current process has “put us in a position where we no longer can keep up with the threat and we no longer can keep up with the advances in technology with the speed at which they are turning,” Ostrowski told an audience at Aberdeen Proving Ground, Maryland, in December.

He outlined steps to simplify acquisition during a presentation in January at Fort Belvoir, Virginia, saying that Army acquisition has to “make it such that Soldiers are as force-protected, as lethal and as situationally aware that we can possibly make them because we owe that to them. Changing the culture is not hard in mind, because each and every one of you sitting in this room today ... you care about Soldiers. And this is about affecting Soldiers.”

—MS. MARGARET C. ROTH



ONE ROOF

Facing a perfect storm of urgent needs, Undersecretary Ryan D. McCarthy helps lead the push to modernize the Army from the industrial age to the information age.

by Mr. Steve Stark

The six priorities that Ryan D. McCarthy, then acting secretary of the Army, unveiled last October are just Army fundamentals. “We shoot, we move, we communicate,” he said when Army AL&T visited him in his Pentagon office on Jan. 31. “Every army in the world has to do these things.”

It’s not that the U.S. Army doesn’t do these things well. It does. The problem is the equipment, which, after more than a decade and a half at war, and in some cases nearly 60 years of service, is just plain old. And during Operations Iraqi Freedom and Enduring Freedom, the Army used only a narrow segment of its ability to shoot, move and communicate. Plus, that period gave near-peer adversaries the opportunity to upgrade their own ability to shoot, move and communicate, while keeping a constant eye on U.S. capabilities. What the Army is facing now is a perfect storm of urgent needs.



VOX POPULI

Secretary of the Army Dr. Mark T. Esper talks with Soldiers at the National Training Center (NTC), Fort Irwin, California, in December. Esper and McCarthy bring to their roles experience in government and the private sector along with a solid understanding of what Soldiers need—important factors if they’re to succeed in quickly moving the Army from the industrial age to the information age. (U.S. Army photo by John G. Martinez)

And so, while the Army has its six priorities, McCarthy, now undersecretary of the Army, has a single priority: Modernize. Fast.

Even if the doctrine, requirements, research and development, acquisition, contracting, testing, and logistics process moved at a lightning pace, the Army has a lot of needs to fill. But that process, wherein generating a set of requirements alone can take half a decade or more—or, worst case, a decade or more—is anything but fast. That, in McCarthy’s estimation—a calculation he shares

with Gen. Mark A. Milley, Army chief of staff; Dr. Mark T. Esper, Army secretary; and Gen. James C. McConville, the Army’s vice chief of staff—has to change. Changing it, McCarthy said, means changing the Army, and that means both structural and culture change.

Exactly what the realignment will look like has not been announced as of this writing. What has been established is that the Army plans to stand up the initial operational capability of a new Army Futures Command this summer. McCarthy’s Oct. 6 memo, which laid

the groundwork for the new command and established six main teams, one for each of the six modernization priorities. Army leadership announced details of the realignment March 26 at the Association of the United States Army (AUSA) Global Force Symposium and Exposition in Huntsville, Alabama.

THE FUNDAMENTALS

Given the mandate to shoot, move and communicate, “long-range precision fires; next-generation combat vehicles; future vertical lift; network communications; integrated air missile defense and Soldier lethality—this spans all fundamentals,” McCarthy said.

McCarthy emphasized that each of these priorities isn’t a single system, but a portfolio of capabilities. “If you think back to the big five [the Abrams tank, the

“We’re locking in on a set of priorities. We’re putting our money where our mouth is. We’re empowering our people. We’re bringing them closer together.”



Bradley Fighting Vehicle, the Apache attack and Black Hawk utility helicopters, and the Patriot missile defense system], it was really the big 64. There were five primary weapon systems. It was about another 59 programs that fell well underneath those capabilities—seriously.”

McCarthy is serious—and passionate—about the Army’s new big six. “If you look at the six priorities, long-range precision fires—there are several programs that fall under that. Future vertical lift could be tactical, it could be lift, it could be unmanned systems, but it’s all underneath that. Same thing [is] true with networks. Soldier lethality spans all fundamentals—shoot, move, communicate, sustain, protect. ... It’s very important that we manage these like a portfolio of capabilities, so that we get an adequate hedge.” That hedge is an important part of a tech portfolio, especially if one line of inquiry turns out to be far more significant than reasonably anticipated at first.

GETTING CHANGE DONE

How to make change happen in the Army to best effect modernization, McCarthy said, was on the table from the start of his discussions with Secretary of Defense James N. Mattis, who, he said, understood that “a critical element to America’s national defense is going to be a modernization program that’s focused against near-peer competitors. I knew this back when I interviewed with him in the spring, very early in the spring.”

It became abundantly clear at McCarthy’s confirmation hearing that modernization was going to be the most significant mission for the Army. “If you followed my confirmation testimony, I didn’t get a lot of questions, but the ones that I did were entirely about this subject,” he said.

But that subject was not a surprise to McCarthy. A graduate of the Virginia Military Institute, he was a U.S. Army Ranger who “went to war 17 years ago in a JSOC [Joint Special Operations Command] unit” in Afghanistan. Following his service, he earned an MBA, worked as a staffer on Capitol Hill, and for former Secretary of Defense Dr. Robert M. Gates during both the Bush and Obama administrations. Later he worked for Lockheed Martin Corp., so his passion for the Army is tempered only by his in-depth knowledge of the realities of the different aspects of acquisition.

In many ways, McCarthy approaches change in the Army both as someone who is Army green to the core, but also as a businessman. If the Army is to do its job, putting it in a position

to do so is a business proposition. And, for McCarthy, a lot of business is relationships. Most important among those are his relationships with Milley and McConville.

“I have a very strong relationship with the chief and the vice [chief]. I’ve known them from a previous life, served with them before.” Those relationships helped him when he came into office to start to “move quickly, because there was trust already established. In one of my early conversations with the chief, I said, ‘You’ve got to nail down the priorities,’ ” and then stick with them. Indeed, McCarthy said, he and Milley have agreed that for as long as they are in office, they will continue to hammer those six priorities so that everyone, from DOD to Congress to industry to the whole of the acquisition, logistics and technology enterprise, knows and understands them.

“We can’t change, because we need to have the system primed against these six capabilities. You’ve got to let industry know, you’ve got to let Congress know, you’ve got to let OSD [the Office of the Secretary of Defense] know about it so that they see the entire Army get into formation in phalanx and attack.” That’s exactly what is happening now, he said, even if decisions are still to be made.



ON THE SAME PAGE

McCarthy, left, has said that as long as he and Chief of Staff Gen. Mark A. Milley, right, are in office, they will continue to emphasize the Army’s six modernization priorities so that all stakeholders—including DOD, the Army acquisition enterprise and Congress—know and understand them. (U.S. Army photo by John G. Martinez)

PORTFOLIOS AND TEAMS TO MATCH

McCarthy said that, in developing the portfolios of priorities, “We knew that we wanted to stand up cross-functional teams to support” each of them.

That unity of effort is critical, he said, because none of the stakeholders will take the Army seriously if it can’t outline what its No. 1, No. 2 and No. 3 priorities are. As long as Army modernization priorities are clear to industry and Congress, industry will understand what to invest in and Congress will know what to fund and why.

The cross-functional teams are intended to bring together “under one roof” all of the stakeholders in the acquisition enterprise: requirements, acquisition, science and technology (S&T), test and evaluation, resourcing, contracting, costing, acquisition logisticians and U.S. Army Forces Command, as well as Army service component commands as applicable, according to the Oct. 6 memo.

Each of the teams is led by a director who is a “post-brigade command-qualified

officer.” That means someone at about the level of “a battle-hardened brigadier general,” as *Breaking Defense* put it in an article in October, although the leader of a cross-functional team could be a civilian. It also means that the user perspective will be represented on the team by someone who “has led in a tactical formation at the O-6 level, is more seasoned,” McCarthy said, adding, “... someone who has deployed recently and understands the key elements of how all of the weapon systems come together in a combined arms maneuver. So they understand not only the trade-offs, but how all the pieces come together like a clock to make it run.”

Cross-functional team leadership represents “that customer view, if you will.” This is a significant change for the Army and takes the notion that the user must be involved to its logical conclusion.

PERMISSION TO COMMUNICATE, DECIDE

For McCarthy, this is a critical part of the cross-functional team equation. Having an aviator lead the future vertical lift team may seem obvious, but having

user-experts run programs is not something that the Army has done a lot of in the recent past.

Those cross-functional team leaders, he said, “understand how the tactical formation runs, but they are also working with each other, because ultimately what they’re doing is putting together the analytical rigor” in requirements, research and acquisition “to examine and decide the types of capabilities that you need within a given portfolio to help inform leadership to make the best decisions possible.”

The beauty of this, McCarthy said, is that it enables real-time decisions, unlike the bureaucracy-mired, business-as-usual Army that has been the status quo for far too long. For instance, McCarthy said, “If you had a requirements meeting and the PEOs [program executive offices] aren’t in there—well, they’re either going to get it verbally [later] or someone is going to hopefully take very good notes. That’s what we have done historically.” With the new construct, however, “now they are all in there at once. You’ve got the screens up and people are beaming



REPEAT AFTER ME

Defense Secretary James N. Mattis formally swears in Ryan D. McCarthy as the 33rd undersecretary of the Army during a ceremony at the Pentagon Sept. 5. The U.S. Senate confirmed McCarthy on Aug. 1, following hearings that centered mainly on the topic of modernization—something that came as no surprise to McCarthy. (DOD photo by U.S. Army Sgt. Amber I. Smith)



READY IN ALL CONDITIONS

Soldiers with the 101st Combat Aviation Brigade (CAB), 101st Airborne Division (Air Assault) and the division's 3rd Brigade Combat Team participate in a large-scale air assault training exercise in January at Fort Campbell, Kentucky, designed to demonstrate the ability to integrate land operations with air support. The Army's new modernization priorities echo the fundamentals of shoot, move and communicate. Key to implementing those priorities are the cross-functional teams and the Army Futures Command. (U.S. Army photo by Sgt. 1st Class Andrew McClure, 101st CAB)

"That iPhone in your pocket is probably already irrelevant. That's how fast it goes. So I can't wait seven years to get something locked in."

in. You think you're at a JOCC [joint operations command center] in Baghdad. I mean, everybody is there and they all hear it at once."

That speeds decisions. "By doing it now, in real time, we compress the timeline." What the cross-functional team concept does is push "the requirements community to take a much bigger step forward in formalizing the relationship with our PMs [program managers] and PEOs from the acquisition community."

"And what is so important about it is that the formalizing of that relationship between requirements and acquisition makes the process much more dynamic. Historically, it's been "just this

mechanical process where they write up a requirement and they send it down the path. Now we have relationships" on the cross-functional teams, and they have the "responsibility to be very clear in the definition and in the interpretation of a requirement. And [to] put the acquisition community in the best position possible to lead that development process and acquire the capabilities that we need."

The cross-functional teams have been making decisions, he noted. "We've made decisions right there. We've moved millions of dollars, we've changed requirements—everything. Last fall we did an S&T review and we restructured the entire S&T budget of the Army in

What the Army is facing now is a perfect storm of urgent needs.



WHAT PROGRESS LOOKS LIKE

A Miniature Hit-To-Kill interceptor missile leaves the launcher during a test at White Sands Missile Range, New Mexico, in January. Getting new technologies fielded faster requires both structural and cultural change, in McCarthy's view; the shape of those changes will be spelled out later this year as development continues for the cross-functional teams and the Futures Command announced late last year. (Photo by Michael A. Smith, White Sands Missile Range Public Affairs)

four days. Granted, that was with McConville and me. They spent weeks getting ready for us.

"But we made the decisions; we had all the players in the room. We aligned 80 percent of the S&T budget against the six priorities. So you see how we are trying to do this. We're locking in on a set of priorities. We're putting our money where our mouth is. We're empowering our people. We're bringing them closer together."

MANY DESKS

A central issue with acquisition is the current disconnected disparity of the stakeholders, the variety of entities that are involved with weapon systems development, McCarthy said. "We have requirements, we have research and technology, we have all of the integration with that. And it's spread across all of the major commands—that's why it takes so long, because there's a lot more people involved than just the acquisition community," he noted.

Back in the spring, "when we went through this, we realized we've got to get all of this under one roof—or to start the process of getting it under one roof. I knew back in the spring [that] our PMs, they are hard-lined to ASA(ALT) [the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology]. They will be owned by the acquisition organization. But what we need to do is cross-functional because that fuses" all of the elements. "It makes you faster—speed, collaboration, the movement of information. We are in the information age; we have an industrial system today. So this is how we get faster."

This is one of McCarthy's mantras: The Army has an industrial system today and it needs to get into the information age.

Each cross-functional team puts all of the elements under one roof to "reduce the time span" of bringing a capability, whatever it is, from concept to fruition. "It's a very simple exercise," McCarthy said. "How many desks does it have to go through, how many commands does it have to go through? It's breathtaking how much energy comes into getting a requirement done." There had to be a simpler way, "because otherwise it takes five to seven years."

He continued, saying, "Take network, for example. How fast does information technology move? That iPhone in your pocket is probably already irrelevant. That's how fast it goes. So I can't wait seven years to get something locked in."



WHAT'S COMING NEXT?

A Soldier assigned to the 3rd Cavalry Regiment scans for simulated enemies during Decisive Action Rotation 18-04 at the NTC in February, part of an emphasis on ensuring that warfighters remain ready for current and future contingencies. According to McCarthy, "a critical element to America's national defense is going to be a modernization program that's focused against near-peer competitors." (U.S. Army photo by Spc. Esmeralda Cervantes, NTC Operations Group)



PERMISSION TO INNOVATE

"The cross-functional team part is easy," McCarthy said. "You get these subject matter experts from, like, the O-6 [colonel] to O-7 [brigadier general], O-8 [major general] level and they work this, and they perform the rigor and the analytics and they tee up decisions."

The challenge, he said, is "upper middle management, senior management—guys like me that ... people stay up all night putting presentations together for. How do you improve upon that?"

What the Army needs, McCarthy said, is an innovative organization to help "lead weapon systems development, the materiel development and design."

"The challenge is, how do you separate concepts from materiel design?" And, "How do you snap-link the big parts of the Army together, or do you take it all out and put it in one place?" The answer: the Army Futures Command.

RESTRUCTURING, NOT REORGANIZATION

Precisely how Army organizations are going to look, or how that snap-linking or putting in one place is going to work, would remain open until announcements were made in Huntsville in March. "Those are all the things that are being deliberated on right now. We are going to make a decision by the end of February," McCarthy said in his Jan. 31 interview. "But that's the hardest part here. If you did nothing at all and you kept

the CFTs [cross-functional teams] today, that's great, but they report to the vice chief and the undersecretary right now." Which means that if they do not form the heart of a new Army Futures Command, their authority with all of the other stakeholders is minimal.

McCarthy said that it's important to get the authorities within each of the disparate commands together to be able to make decisions quickly, which in turn will make modernization happen more quickly.

McCarthy's background gives him 360-degree perspective and, he said, "helps me to facilitate a good discussion and to ensure that all the stakeholders get to weigh in and make the best-informed decision. But it also helps with the understanding of how to deal with the external stakeholders." That includes not only the bigger, organizational decisions, but the smaller decisions on which weapon systems to prioritize. And in that case, there are lots of hoops to pass through.

"We've got to get it out of the Army to get it to OSD. We've got to get it out of OSD to get it to Congress. We've got to negotiate with vendors. I've sat at every one of those major angles within the prism, if you will, so that helps a great deal. It helps me be the conductor in the process."

That process now includes shaping how the Army develops the Futures Command. "Normally in government you always hear

‘reorganization,’ ” McCarthy said. “It’s like deck chairs moving around. In the private sector—and this is important—it’s restructuring. The commands will still stay there. There are aspects or roles and responsibilities within those commands that may go over here.”

This is where McCarthy’s business acumen, his relationships on Capitol Hill and his knowledge of the process come in handy. At an appearance at the Brookings Institution on Feb. 8, he said that the Army is keeping Congress informed because some of the restructuring that the Army is envisioning may require legislation. “You’re now getting into where we’re deliberating at the senior level to the final end state, what it’s going to be,” he said.

CHANGING ARMY CULTURE

The changes envisioned also include a major culture change. “Normally,” McCarthy said, “when you want to make a change in life, if it’s on your terms, it’s OK. But if it’s somebody coming and sliding a memo across the table,” that’s a different matter. To successfully make that kind of change, he said, “Then you’ve got to get them to buy into it. You’ve got to have a conversation. You’ve got to emphasize to them why we’ve got to make the changes that we do.”

Since the fall, McCarthy has been having just those kinds of conversations. It’s important, he said, for people “to understand the rationale behind” the coming changes. “When the leader gets out and has the conversation, one adult to another, ‘Here’s where we are trying to go,’ you learn.” That give and take—his own education as well as that of the Army’s stakeholders—is important to McCarthy. To make change happen, he said, “you have to listen and learn. And you also adjust. It will help make the best decision possible.” As an example, he said, he’s had roundtables with the PEOs. “They gave me a lot of good ideas,” he said.

“When we get to the announcement” of what the Futures Command will look like, he added, “it will require town halls or

roundtables” to make sure that his message is clear and people understand what he’s looking for.

CONCLUSION

On the wall behind his desk, in his otherwise sparsely furnished office, McCarthy keeps a glass-encased M-1 Garand. The weapon was the U.S. Army’s go-to rifle in World War II, the Korean War and saw some use in Vietnam. For McCarthy, the elegantly simple and effective semi-automatic weapon is a reminder of just how effective Army acquisition can be.

The acquisition community, he said, does “remarkable things. What I would ask them is just to afford me the time and the patience to go through this process.” He knows that change is hard, but getting the Army into the information age is critical. “When you’re making changes in big organizations, it takes time. And I know people are anxious about where we’re going.” Everyone should understand that many decisions are still to be made and should afford leadership—Esper, McCarthy, Milley and McConville—“the opportunity to talk them through the changes.”

That includes the S&T community, he said. He wants to see scientists and technologists working on systems that they know the Army is driving for, “and they are going to see it on their watch. There is no better way to incentivize somebody, especially the scientific and engineering community. They like to study and make things, but they like to see it fly, they want to see it explode, they want to see it drive.” And McCarthy wants to see that happen.

He made it clear that he holds the workforce in the highest esteem. “We have very talented people. We have tremendous capital investment. It’s getting them all aligned. And once we do that, I have no doubt we will do really special things faster. We do special things now; it’s just taking too long.” With respect to acquisition leadership, he said, “We have been blessed. The cross-functional team directors and the PEOs that are playing in this, they are the best we have, the best people we have.”

“It’s breathtaking how much energy comes into getting a requirement done.”

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





EMERGENCY INSURGENCY

Peter Newell, former chief of the U.S. Army's Rapid Equipping Force, thinks DOD and intelligence agencies execute their missions but won't do innovation well until innovation has a separate but integrated system of its own.

by Mr. Michael Bold



Peter Newell

Is the U.S. defense establishment structurally capable of fostering innovation? Peter Newell, a retired Army colonel and former director of the Army's Rapid Equipping Force (REF), doesn't think so. In his new role as managing partner of the Silicon Valley consulting firm BMNT, Newell is working to change that, helping to develop a national security pipeline to drive innovation in DOD at startup speed.

Newell is on the speed dial of leaders throughout the defense and intelligence acquisition communities, people who reach out for his company's help defining and solving tough problems and erasing organizational roadblocks that stop innovation in its tracks. With Steve Blank, the startup guru who launched the Lean Startup movement (See "Get Out", Page 124), Newell created Hacking for Defense, a national university program run by the nonprofit arm of BMNT that helps DOD and the intelligence community solve critical national security challenges.

Newell's work with REF and BMNT has given him a unique vantage point for understanding how government agencies and other large organizations can get innovation right. He points to two things that need to change for the Army to make progress in terms of innovation:

- Creating a separate but integrated innovation system.
- Changing how requirements are written.

TWO LINES OF INQUIRY

“What the defense and intelligence community need is separate systems for execution and innovation that operate in parallel, with permeable barriers that allow the easy exchange of people, ideas, problems, insights, and solutions,” Newell wrote in a Dec. 14 op-ed for Defense One, in which he described an insurgency of innovators doomed to failure without real support from the “greater defense establishment.”

Under the current system, he wrote, continuing the U.S. military’s technological superiority requires harnessing the work of “passionate, dedicated innovators who survive by skirting the bureaucracies that would grind them down.”

The Army, Newell said, needs to find and train a generation of entrepreneurs—people who are experts at moving the new ideas generated by innovators through the Army’s bureaucracy are critical to its future success. “I was successful with REF because I became an expert at legally manipulating the DOD’s requirements, acquisition, contracting and finance systems to get solutions deployed,” he said in a Jan. 10 interview with Army AL&T. “The role I played as the ‘Army’s entrepreneur’ from 2010 to 2013 needs to

be recreated in every division and major command in the Army. Professional entrepreneurs in uniform will be the ones who build, maintain and discipline the innovation pipelines that Steve Blank and I have described previously.

“Let’s have an honest conversation about what innovation really is,” he said. “I think that the word is overused and completely misunderstood across the national security space, across the government.

“Part of it is first recognizing that the enterprise system that we’ve built to very efficiently handle the national security budget ... will never, ever, ever be well-suited for fostering innovation inside. It’s just not designed that way, nor should it be. Which really means we need to go after a separate innovation ecosystem and system to support that. It’s not that I’m asking for another stovepipe. I think we have to be very careful that there’s a permeable barrier between the two. The innovation ecosystem is absolutely reliant on the ideas and the people and the problems that come from the enterprise, and they are absolutely responsible for delivering to the enterprise defense solutions, well-educated people and other things.”

Creating an innovation ecosystem is just one necessary step, Newell cautioned; the Army also needs to change the way it writes requirements.

“Fixing acquisition just means that we’ll just buy the wrong things faster if we don’t go after the requirements side,” he said. “... Instead of requirements, we need to be talking about problems.”

CHANGE STARTS AT THE TOP

And a change in the way the Army attacks those problems needs to come from the top, Newell said.

“All of that is surrounded by a discussion on what is innovation leadership,” he said. “What does it look like at different levels? And what’s it going to take to create a professional military education system that teaches and empowers leaders to be innovative at whatever job or level they’re in? At the same time, it must provide an avenue for professional development for those who truly are professionals: They get it, they’re good at it, they’re the types of people that would do well in Silicon Valley.”

Newell added that at the individual and tactical levels, providing access to training on Lean methodologies and



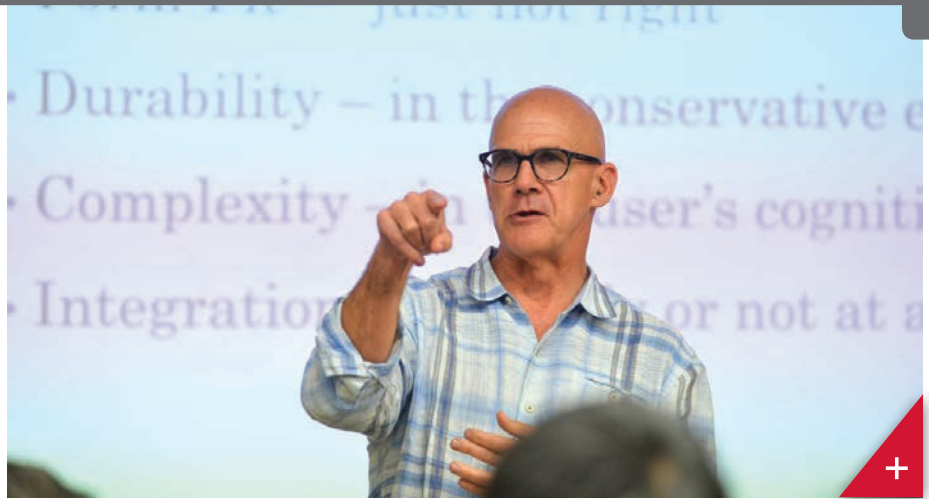
BETTER, FASTER

Warfighters from the Air Force National Guard 129th Rescue Wing demonstrate casualty triage to students from a Hacking for Defense class at Stanford University in September. The students were part of a team sponsored by the U.S. Army Medical Materiel Agency and tasked with evaluating methods to reduce bottlenecks in casualty care triage using wearable sensors. To truly advance innovation, what’s needed are more innovators on the front lines, according to Newell. (U.S. Army photo)



SUCCESS DESPITE ROADBLOCKS

Newell, who leads a Hacking for Defense class at Stanford University, contends that continuing the U.S. military's technological superiority requires harnessing the work of "passionate, dedicated innovators who survive by skirting the bureaucracies that would grind them down." (Photo by Rod Searcey, Stanford News Service)



the principles of design thinking—an iterative approach to problem-solving that intentionally seeks out people with different perspectives, knowledge, skills and experience and has them work together to create a practical solution for a real-world problem—is important but does not go far enough. The Army needs more makers and innovators on the front lines to generate a bottom-up feeder system that would help drive innovation faster, he said.

The Army should take a look at the educational programming its contract universities provide on Army installations and encourage the schools to provide more science, technology, engineering and math classes, as well as credentialing in 3-D printing and other advanced manufacturing systems, he said. It also needs to create "maker spaces" on military bases, Newell said, where credentialed classes are taught during the day and where a generation of innovators hang out at night to tinker on ideas in a collaborative environment.

THE ENTREPRENEUR CORPS

Finally, Newell said, at the strategic level the Army needs a cadre of "Sherpas"—people whose job is to monitor the innovation ecosystems across the force, searching for and solving systemic barriers to innovation. The Army will need the same group to capture, write and adapt

the doctrine for innovation across the force, he said.

The work Newell recommends is indicative of the kinds of change in culture and policy that Secretary of Defense James N. Mattis called for in the 2018 U.S. National Security Strategy, which provides the authority and guidance national security leaders need to make a significant commitment to creating a culture for innovation within their organizations.

"Success no longer goes to the country that develops a new fighting technology first, but rather to the one that better integrates it and adapts its way of fighting," Mattis wrote. "Current processes are not responsive to need; the Department is over-optimized for exceptional performance at the expense of providing timely decisions, policies, and capabilities to the warfighter. Our response will be to prioritize speed of delivery, continuous adaptation, and frequent modular upgrades. We must not accept cumbersome approval chains, wasteful applications of resources in uncompetitive space, or overly risk-averse thinking that impedes change."

CONCLUSION

In terms of culture change that will boost innovation in the Army, Newell warns that talk without action won't get the Army where it wants to go.

"Culture's an interesting thing," he said in the Army AL&T interview. "I think that next to 'innovation,' 'culture change' is the most overused phrase out there. You can't mandate or write an edict saying 'change the culture' and expect it to happen. You have to actually act. ... One thing I tell people is, 'You're going to have to show me what things you're actually going to do that reinforce what that culture is.' Think about it: Back in the '50s and the '40s, when we finally said we're going to integrate the military, what it took to change that culture. You had to force people to do things. ... You can talk about it all day long, but until you actually get down into the weeds where it happens—it has to be reinforced with a set of behavior patterns. Which means you've got to create activities and do things that will lend themselves to that culture so that people can see what it is you're talking about."

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



MS. NICKEE ABBOTT

COMMAND/ORGANIZATION: Army Rapid Capabilities Office, System of Systems Engineering and Integration (SOSE&I) Directorate, Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology

TITLE: Chief engineer, Army Rapid Capabilities Office; director for engineering and integration and chief engineer, SOSE&I

YEARS OF SERVICE IN WORKFORCE: 28

DAWIA CERTIFICATIONS: Level III in systems engineering

EDUCATION: M.S. in strategy and planning, U.S. Army War College; M.S. in electrical engineering, New Jersey Institute of Technology; B.S. in electrical engineering, Drexel University. Also attended Harvard Kennedy School's Senior Executive Fellows and Senior Managers in Government programs and Aberdeen Proving Ground Senior Leadership Cohort 3 Program.

AWARDS: Outstanding Achievement Award from the former Program Executive Office (PEO) for Integration and the PEO for Command, Control and Communications – Tactical, for Brigade Combat Team Integration Exercise; Commander's Award for Network Integration Evaluation; Outstanding Achievement Award for Association of the United States Army Integration; Outstanding Achievement Awards from SOSE&I and its predecessor organization, System of Systems Integration; the Honorable Dr. Claude Bolton Jr. Engineering and Systems Integration Professional of the Year, an Army Acquisition Executive Excellence in Leadership award

Change is what you make of it

Having encountered shifting missions and numerous reorganizations over her 28-year career as an Army civilian, Nickee Abbott knows a few things about change: It's good, mostly. It can be a little stressful. It offers tremendous opportunity. And it's one of the biggest challenges she faces in her work.

Abbott is chief engineer for the Army Rapid Capabilities Office (RCO) and chief engineer and director for engineering and integration for the System of Systems Engineering and Integration (SOSE&I) Directorate within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology. In those roles, she is charged with engineering, designing and assessing the performance of current and future architectures based on incremental Army modernization objectives and materiel development efforts that address immediate, near-term and emerging operational requirements.

With RCO and the recently formed cross-functional teams, "the Army is embarking on new initiatives to rapidly modernize, equip and provide increased capabilities to the warfighter," Abbott said. "These initiatives require disciplined systems engineering methods to design capability in a robust and extensible way so it is capable of incorporating emerging technologies into existing or future architectures. The key to building a good architecture is defining specific operational scenarios and then developing solutions that address the functional and performance characteristics derived from those scenarios. My greatest satisfaction comes when these solutions are deployed and the system performs as designed and meets all the operational requirements—as well as unexpected scenarios—as a direct result of the upfront systems engineering for flexibility and expansion."

Hers is not a position for the introverted. "In my work, you have to be integrated and involved, to be able to understand the problem and think outside the box," she explained. "There's so many moving parts involved in systems

engineering, within and across our organization, and if you are not hands-on or don't understand the big picture, you can build a house that has a second floor but doesn't have a staircase." Behind those moving parts are people, and Abbott works hard on developing relationships. "I know I can't do it all myself. I rely on subject-matter experts within and outside of my office. It's also important to have a clear blueprint of what we're trying to accomplish and to be able to articulate how each moving part fits into the scheme and what value they add," she said.

Whether it's a transformation in mission, a change in leadership or a reorganization, SOSE&I has evolved in the past several years, bringing with it some uncertainty. "Usually, as we're working through a reorganization, we draw boxes," she said, "and that can be stressful for some people: What box am I in? Who's in charge of it? Why is it smaller than the other boxes?" But change can also be a chance for growth, she added. "I tell my staff to try to keep a positive outlook, to be flexible and to look for new opportunities that changes can bring. The challenge is to look at each reorganization as an opportunity to do something good for the Army and for your career, to ask yourself, 'How can I demonstrate the value of what I can do for the new mission—and how can I do that in a short

period of time, given that the mission is likely to change soon?'"

Abbott got her start as an Army civilian with an internship as a software developer. "My father was a lieutenant colonel for South Vietnam during the Vietnam War. That influenced my decision to be a civil servant and instilled my passion to serve our military," she said. Following that internship, she worked in research and analysis at the Intelligence and Information Warfare Directorate within the U.S. Army Communications-Electronics Research, Development and Engineering Center. "From there, I went to a PM [program manager] shop, where I gained the knowledge of managing the acquisition of a system, then moved up to the PEO [program executive office] level, where I was responsible for integrating a family of systems within their portfolios."

During that time, she also earned a master's degree and attended the U.S. Army War College, thanks to mentorship and support from the late Maj. Gen. Harold J. "Harry" Greene. "At the Army War College, I learned the operational and strategic side of acquisition and the power of being a jack of all trades," Abbott said. "Knowing how to connect all these dots—from research to system-of-systems integration—is the most important aspect of my career growth. It

taught me how to apply those skills and experiences to enable the Army."

Much has changed in the course of her three-decade career. "The biggest change, which I'm excited to be part of, is this current period of transformation—the RCO and the cross-functional teams that the Army recently stood up to improve the quality and speed of delivery of new materiel and capabilities to the warfighter." Network Integration Evaluations were the first step in that transformation, Abbott noted, "where we emphasized working with the Soldier to get feedback to be sure that the capability met their need. Now we're seeing the next step in making acquisition faster: involving users, developers, the testing community, looking at doctrine and requirements, trying to see where we can streamline and get to a program of record faster."

Thanks to her efforts on that front, Abbott was recently named the Honorable Dr. Claude Bolton Jr. Engineering and Systems Integration Professional of the Year, as part of the Army Acquisition Executive's Excellence in Leadership Awards. "I was very honored and grateful for the award because I know I was competing against many great professionals across the Army," she said. "When I was presented with the award, I received it on behalf of the team that contributed to my accomplishments."

She's hoping it's not a one-off. "When I shook the secretary of the Army's hand and he said to come back again next year, I immediately was thinking about the next challenge that will bring me, or anyone from my team, back on that stage to continue to represent our organization."

—MS. SUSAN L. FOLLETT

'COME BACK AGAIN NEXT YEAR'

Abbott receives the Honorable Dr. Claude Bolton Jr. Engineering and Systems Integration Professional of the Year Award from Dr. Mark T. Esper, left, secretary of the Army; the Hon. Dr. Bruce D. Jette, assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)); and Jeffrey S. White, principal deputy to the ASA(ALT). The awards were given at a Jan. 18 Pentagon ceremony. (Photo courtesy of the Office of the Secretary of the Army)





DISRUPTIVE INNOVATION, ANYONE?

The Emerging Technologies Office uses open-house events at venues throughout the year as a way to interact with industry partners. At the last AUSA Annual Meeting and Exposition, held every October in Washington, ETO hosted a "Disruptive Innovation Open House," where any attendee could sign up and provide a 15-minute overview of disruptive technology solutions. (Photo by AUSA)

HONEST BROKER

Emerging technologies cell in Rapid Capabilities Office accelerates disruptive innovation while providing a reality check.



Rob Monto
Director, ETO

by Ms. Nancy Jones-Bonbrest

An ombudsman is a representative, an advocate who aims for balance—between the readers of a newspaper and its writers, for example, or between the consumers of a product and its provider.

In the case of the Army's Rapid Capabilities Office (RCO), the ombudsman is its Emerging Technologies Office (ETO), a dedicated cell set up to elicit ideas from, and deliver clear expectations to, members of industry and academia with innovations to offer. Since the launch of the RCO in August 2016, the office has spearheaded direct and continuous engagement with the commercial sector. This includes the Army's longtime partners in the defense industry as well as the small startups and academic organizations that are often on the leading edge of technology.

Without a doubt, the RCO set out to do things differently. The office is small and stealthy, shedding traditional bureaucracy in an effort to get critical strategic capabilities out the door faster than traditional acquisition methods allow. There is a short chain of command to keep the office agile and able to tailor acquisition, operational assessment, contracting and other functions to shorten the delivery cycle.

This fast-moving approach requires a balancing function, a neutral, impartial look at the new and emerging technology that comes into the RCO. With the ETO in the mix, the RCO has an ombudsman both to scout far and wide for disruptive technology



DELIVERING ADVANCED CAPABILITIES

A UH-60 Black Hawk helicopter from the 214th General Support Aviation Battalion, 12th Combat Aviation Brigade, supports Soldiers assigned to 4th Squadron, 2nd Cavalry Regiment (2CR) during an air assault in support of a counter-reconnaissance training exercise in the Grafenwoehr Training Area, Germany. The Army RCO used prototyping to deliver advanced electronic detection, support and attack capability to the 2CR. (U.S. Army photo by Staff Sgt. Jennifer Bunn, 2CR)

solutions and to filter them down realistically to address specific operational needs.

Implementing this vision is Rob Monto, director of the ETO. He brings an engineering background, friendly demeanor and deep knowledge of the tech sector to his role as an honest broker of technologies. In a discussion on Jan. 8, Monto provided his perspective on what lies ahead for the office and the RCO as they continue to evolve.

Would you explain the thinking behind the ETO and how it fits into the RCO?

The RCO charter specifically calls for the ETO to be an ombudsman: to fairly and honestly assess what different types of technologies could help provide overmatch or disruptive capabilities for the

Army. The Army wanted to have a dedicated cell to constantly interact, put the problems on the table and be honest with everyone in determining if an emerging technology fits the immediate need. We are focused on placing small bets in a bunch of different areas. And that's exactly what we are doing right now with electronic warfare, artificial intelligence [AI] and alternative position, navigation and timing [PNT].

Of course, this is just a start. Programs of record [PORs] are going down their path on what they need to do to support their requirements for fielding the entire Army with approved capabilities. At the same time, we are accelerating prototypes that help inform these PORs and will be in the hands of units overseas in Europe, and eventually Korea, much faster. We realize the speed of technology and that

it demands we go faster. As a small office, we can do risk reduction for the PORs through prototyping and experimentation to see what is possible, while also fielding 80 percent solutions in limited amounts to get real capabilities into the hands of the Soldiers today.

What is the ETO doing to help find electronic warfare, AI and PNT capabilities?

We are moving forward this year with a series of "burn-off" events and challenges that really target this next step in the discovery and prototype process. Industry, academia and the S&T [science and technology] community deliver white papers to us on promising technology. They have great ideas. The next step is finding out if [an idea] is really tangible. If so, then we want to try and demonstrate it and see how well it works. That's where the ombudsman comes in: We create a very low barrier to entry.

With burn-offs, we're not doing formal "tests" of anything, but we do want to provide the participants with feedback, because that's a business decision for them to invest their time and resources. We want to provide them something tangible, so even if their solution doesn't fit our needs, they can walk away saying that the Army RCO was interested in this capability and they got this assessment out of it. While it may not support a specific requirement today, maybe they could go for internal research and development dollars to enhance it. Or go to a science and technology organization and say they demonstrated it in this environment, it performed this and the Army RCO—or even Soldiers using the technology—gave this feedback. It's that going back and forth to really hit at technology acceleration that the Army is looking for. [Interested in what a burn-off

is and what burn-off events are upcoming? See “The Heat Is On,” Page 37.]

Without ETO, we’d be doing things the way we’ve always done. ETO gives the organization the flexibility to reach out and shape the solution collaboratively, versus having a predefined requirement from the start. Working as a team with anyone who has a possible solution, we start with the problem that will then lead us to the answer. The ombudsman is there to put pressure on folks to bring the right solution to meet a pressing problem. We’re the gatekeeper ... we need to do it quickly, rapidly. It might be a very promising technology, but if it’s not mature yet we have to move on. It doesn’t mean we lose sight of that technology forever, it’s just not the right solution for the problem we have in front of us at the time.

You also worked with the U.S. Special Operations Command (SOCOM) on an event called ThunderDrone late last year. What was the focus of ThunderDrone, and what’s next?

ThunderDrone took place at SOCOM’s SOFWERX facility in Florida. It was an event using prototyping and demonstrations to help better understand the potential and limitations of drones, robotics and artificial intelligence. This year, they are following it up with Game of Drones, their second rapid prototyping event, focusing on counter-small unmanned aircraft systems. The Army, along with the other services, will participate. ThunderDrone, Game of Drones, rapid experimentation—that’s what builds excitement and collaboration. It brings in industry, startup tech companies and others that normally don’t talk

to each other or were never introduced before, and who might not normally participate in a military tech event, and it levels the playing field for everybody.

But it’s also a different way of thinking. SOCOM breaks down the problem and then brings in a whole bunch of folks to see how they can tackle it. Initially, they truly don’t think about the materiel solutions. Instead, SOCOM farms it out to see what the best of breed is. And they iterate and iterate and iterate—and as things spiral out of it, they have a 40 percent solution, then a 50 percent solution, then a 60 percent solution. They continue to spiral it out, and they are willing to take the risk of not having the 100 percent solution from the beginning.

What else are you doing to get industry—both traditional defense contractors and others—into the mix?

We hosted several “open door” technology exchange events at venues such as AUSA [Association of the United States Army] Global Force in Huntsville, Alabama, AFCEA’s TechNet in Augusta, Georgia, and AUSA Annual in Washington, D.C. We did this to really be out and about where industry is already going to be and where they are already collaborating with each other. Again, it’s a very low barrier to entry and was offered on a first-come, first-served basis at minimal cost to us and industry because they are already attending these events. So we piggybacked onto these events to lay out our capability gaps and problems, and see what comes to the surface when you stir the water.

Any success stories?

Absolutely. The first is alternative PNT, or PNT solutions, without the aid of GPS. We saw through our open-door



INNOVATION TAKES WING

Brandon Tseng, a former Navy SEAL and founder of Shield AI, commands an autonomous drone during the ThunderDrone Tech Expo at SOFWERX in Tampa, Florida, in September. The expo provided an opportunity for industry, national laboratories and academia to discuss and promote new and innovative drone technology with the special operations community. ETO participated in the event to better understand the application of these technologies for conventional land forces. (U.S. Air Force photo by Master Sgt. Barry Loo, U.S. Special Operations Command)

sessions and white paper solicitations that there were a whole host of capabilities that are truly novel approaches, that really pushed us to say, hey, let's take it to the next level and see this in action. And that's what led to the burn-off events. The other success story is AI for electronic warfare. We thought that this would be a long-term type of action for the RCO, but after discussing some of the capabilities at one of our open-door sessions, we're pushing hard to integrate it to support requirements for deployed forces. We believe we can bring AI in and it will begin to help reduce the cognitive burden and workload on electronic warfare officers.

Other efforts we're looking at now are long-range fires and loitering space munitions. Loitering munitions are similar to UAVs [unmanned aerial vehicles], but are also munitions that can loiter in a space until a target is identified. Loitering munitions are already on station and can attack without calling in an airstrike or forces.

This all happened by chance. We were having discussions about other technical areas and this came up, and we brought it back to RCO leadership, who wanted to explore it more. That's one of the benefits of having us out there: You can identify solutions you didn't think were on the front burner and were still several years away. Truly, this is what the ETO is meant to do.

If an industry partner has an idea they want to share with the ETO, where do they start?

We encourage everyone to visit our website (<http://rapidcapabilitiesoffice.army.mil/eto/>) or LinkedIn page (<https://www.linkedin.com/company/us-army-RCO>). We use both of these sites for outreach and are continually updating them with any current events, upcoming efforts, RFIs [requests for information] and more. In addition, we are part of SOCOM's tech scouting database Vulcan. This enables any company with access to submit commercial technology. The database is not just sorted into an RCO category, or SOCOM entries, but instead the technology is shared so any government organization looking for technology for, say, PNT, can search it and see what pops up. It is meant to be collaborative and to break down silos. The link to our submission into Vulcan is through our website, on the ETO page, by clicking on Submit a Technology.

Is the ETO evolving as the mission of the RCO begins to expand beyond electronic warfare, PNT and AI?

It is evolving and will continue to evolve. I see it as a living organization that will continue to meet whatever the needs of the RCO and Army are. It's already evolved from the days of just being an ombudsman, being that filter, to now doing these small bets in different areas, trying to test drive capabilities and really putting ourselves out there. We are always looking at what the next big focus might be for the Army. It can change rapidly. For example, we could begin looking at capabilities to support megacity operations. With these operations, you have to think about it differently, thinking about how you use PNT while on a clearing mission of a 100-story building versus a movement and maneuver in an open space; being able to communicate with folks in subway tunnels or wherever it might be. It's much harder to communicate through traditional means [in these situations], and we are looking at how we can deliver prototypes to deployed forces in these areas more rapidly.

Any set goals for the next 12-15 months?

By the end of the year, I would like to see a clear transition path for whatever comes out of those small bets we're placing. I really, truly believe there are capabilities out there today that could help provide enhanced function to either electronic warfare or PNT in helping achieve a rapid capability to support deployed forces. And we are starting to see some of those transition paths build now. Already, in just a few short months, the RCO fielded initial mounted and dismounted electronic warfare prototypes to forces in Europe that are helping them detect and understand enemy activity in the electromagnetic spectrum. We'll continue along this path by upgrading those prototypes based on user feedback, while also focusing on what's next. What capability gap will combatant commanders come to us with next, and how can we move quickly enough so that we are not caught without a rapid solution?

For more information, go to <http://rapidcapabilitiesoffice.army.mil/eto/> or <http://rapidcapabilitiesoffice.army.mil>.

MS. NANCY JONES-BONBREST is a staff writer for Data Systems Analysts Inc., providing contract support to the Army Rapid Capabilities Office. She holds a B.S. in journalism from the University of Maryland, College Park. She has covered Army modernization for several years, including multiple training and testing events.

The heat is on:

Burn-offs move ideas to the field for assessment



CHALLENGES OF THE URBAN ENVIRONMENT

Civilian role players feign frustration toward U.S. Soldiers assigned to Joint Task Force Civil Support during a field training exercise in 2014 at Muscatatuck Urban Training Center. In March, RCO teamed up with SOCOM to examine alternative PNT capabilities at the urban training center. Navigation in a dense urban environment, where GPS might be jammed or harder to access, presents new technical challenges that RCO is trying to solve. (U.S. Air Force photo by Master Sgt. Barry Loo, SOCOM)

Taking an idea from paper to operational assessment can be a lengthy and costly endeavor. Now, the Army Rapid Capabilities Office (RCO) is offering a middle ground that could speed up the process of getting prototypes to the field.

In March 2017, RCO began a series of “burn-off” events as a way of demonstrating whether a promising new technology works and if it is mature enough to close important capability gaps in areas that include electronic warfare and alternative position, navigation and timing (PNT).

“We get white papers on new technologies all the time,” said Rob Monto, head of RCO’s Emerging Technologies Office (ETO). “The burn-offs are really to get hands-on and see how well they potentially could perform in support of the next phase. It’s that operational feedback that we are after: Does it perform the way it says on paper, and what do the Soldiers think of it?”

The burn-off brings together commercial capabilities in an operational demonstration to size them up against a set of criteria and determine if the Army can use a new technology—either by itself or in combination with existing technology—to meet a specific need. For industry, the events provide a chance to showcase capabilities and receive formal and informal feedback. For the Army, they yield a greater awareness of what promising new technology is available now and how it performs.

Burn-offs provide an opportunity for industry to see how its proposed technology performs in an operational environment without the do-or-die atmosphere of a formal test. The process starts with the Army issuing a request for information (RFI) soliciting proposals in a specific technology area. Companies with proposals of interest are then invited to participate in the burn-off, which takes place at a test range or training center environment, for example. Each vendor has the opportunity to demonstrate its capability against a specific operational scenario. Afterward, the participants can receive an individualized report on their performance, and the Army is better positioned to judge how close—or how far—a proposed technology is from meeting an operational need.

For example, last year RCO participated in a burn-off led by the Army’s Rapid Equipping Force (REF) to assess dismounted electronic warfare systems. The



ON-SITE APPRAISAL

Rob Monto, left, now head of RCO's Emerging Technologies Office, in Afghanistan in May 2011 when he was with PM Battle Command (now PM Mission Command). He was there fielding kit and piloting enhanced capabilities. (U.S. Army photo)

exercise, which took place at Yuma Proving Ground, Arizona, assessed different capabilities against a series of set threats. The data shared from that event helped mature and advance electronic warfare prototypes that RCO moved forward to field in Europe beginning in January 2018.

"With burn-offs, we'll be able to determine if the technology is tangible now," Monto said. "We'll demonstrate it and see how well it works. For industry, this could potentially lead to additional demonstrations, prototyping and, if [the technology] mature enough, limited production opportunities. Most importantly, it's a way to find solutions to capability gaps faster, by placing small bets in several different technology areas. It may only be a 70 or 80 percent solution, but it meets an urgent need, while helping to inform long-term programs in the months or years to come."

This year RCO is participating in several burn-offs. The first came in March, when RCO partnered with the REF and the Project Manager (PM) for Electronic Warfare and Cyber on a burn-off at Yuma Proving Ground. This event assessed immediate, short-term and long-term capabilities for mounted, tactical electronic warfare systems that can provide electronic support and attack capabilities to enable freedom of maneuver in the electromagnetic spectrum.

Also in March, RCO teamed up with the U.S. Special Operations Command (SOCOM) to examine alternative PNT capabilities at the Muscatatuck Urban Training Center in Indiana. RCO led the PNT portion of the SOCOM event to demonstrate non-GPS solutions in an operational environment. This environment

includes open, forested and urban terrains, as well as day and night operations in multiple weather scenarios.

Later in the year, RCO will hold additional burn-off-type events, to look at artificial intelligence for electronic warfare and at aerial electronic support and electronic attack capability.

When the Army finds that a capability, or the performance of a specific system, is exceptional compared with the rest of the industry, there may be an opportunity to quickly procure and deploy a minimal number of those systems to address operational needs. By participating in the burn-offs, industry partners also gain an awareness of their systems' strengths and limitations vis-à-vis Army requirements, enabling them to better focus their investments of internal research and development funding.

"The burn-offs support a new concept we are evolving this year," said Douglas K. Wiltsie, director of RCO. "What we want to be able to do is address a capability gap in terms of: Decompose the problem, engineer the problem and see if there's technology that will allow us to get started very, very quickly. The intent is to put the problem out there and find the best of breed that is available today, and move out."

For more information, go to <http://rapidcapabilitiesoffice.army.mil> or follow RCO at <https://www.linkedin.com/company/us-army-RCO>.

—MS. NANCY JONES-BONBREST



THE 'ARMYZON' EQUATION

DOD could save billions, fast, and get commercial products to commanders, fast, if it switched to an e-commerce platform—an 'Armyzon' where businesses large and small could compete for government contracts.

by Lt. Col. Rachael Hoagland

The federal government purchased \$53 billion in commercial off-the-shelf (COTS) items in 2016, according to a memo from the Coalition for Government Procurement, a nonprofit association of commercial contractors.

If the government reduced those costs by just 5 percent, it would save \$2.5 billion annually. And those savings are just the low-hanging fruit from the purchasing part of a multipart equation.

As an example, four Xerox printer toner cartridges—magenta, yellow, cyan and black—cost \$1,102.34 on the U.S. General Services Administration's (GSA) Advantage portal. However, through the Amazon Business portal, the same Xerox cartridges were, at this writing, \$962.99. The difference may not seem that enormous, but given the volume at which the federal government buys such products, that savings of \$139.35 adds up fast.

In a high-volume office, where printer cartridges may be replaced monthly, the total savings for a year would be \$1,672.20. Even if that replacement rate were halved to just six times a year, there would still be a savings of \$836.10 a year for a single printer. But we are not talking single printers.

If we narrow the picture to just DOD, in the Pentagon alone there are about 10,000 printers. Let's just say, hypothetically, that all of those printers are the same model. If so, and if each set of toner cartridges were replaced once a year, the savings would be \$1,393,500. If the toner cartridges in each of those printers were replaced six times per year, the savings jumps to \$8,361,000, and if they were replaced monthly, the savings climbs significantly to \$16,722,000. Of

course, prices fluctuate, as does usage. The idea here is not that DOD should stop buying from GSA and start buying from Amazon. The idea is that in an online marketplace where vendors could compete with one another for DOD's business, there is a huge, untapped potential for savings—and this is just toner cartridges. That marketplace exists today. It's the Amazon Business platform.

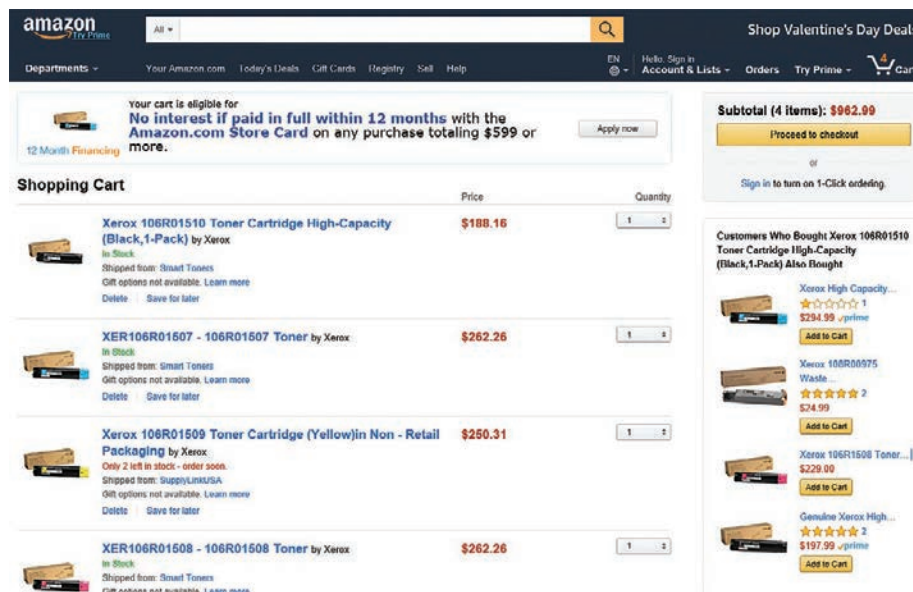
SAVINGS, AND THEN SOME

Savings to be had in this marketplace could be massive, but there also would be a variety of collateral savings. There are lots of ways these savings could accrue, from the small to the large. In addition to lower cost as the benefit of competition, there are also the tax implications. But the government doesn't pay sales tax, so purchases through Amazon Business

would be tax-free. The Army has many warehouses, and while an e-commerce platform wouldn't mean that it could get rid of all of them, there are real potential operational savings to GSA for no longer having to maintain warehouses stocked with COTS products. I have been very conservative in my estimations of cost savings here, with 5 percent as likely savings on purchases, but it seems very likely that savings across the Army and DOD could increase significantly once the change happens.

In addition to those savings, such an e-commerce platform also would have workforce savings. No one would have to go to the GSA store to order purchases, then pick them up. Contracting officers would have more time to concentrate on higher-priority efforts, such as major defense acquisition programs, which currently take 2 1/2 years to move from request for proposal to contract. During congressional testimony on Dec. 7, the Hon. Ellen Lord, then the undersecretary of defense for acquisition, technology and logistics (and now the undersecretary of defense for acquisition and sustainment), set a goal of reducing that timeline to 12 months.

By authorizing Army-designated purchasers to buy commercially available items online, more time could be spent on contracts that help build a more agile and adaptive Army. Shifting from writing contracts for COTS products to contracts that support the Army chief of staff's six modernization priorities, which represent the core of the Army's mission, would save time and money.



OFFICE SUPPLIES ADD UP

Printer toner cartridges—an item that the government buys regularly and in huge quantities—represent one opportunity for small per-item savings that can add up to big gains overall. One possible way the government could capture those savings is to purchase through an online marketplace, like Amazon's Business portal, where vendors compete to sell to the government. (Image courtesy of Amazon.com Inc.)

THIS COULD HAPPEN NOW

The flexibility and agility for designated personnel to purchase and receive commercial products through online marketplaces like Amazon, Grainger, Staples



IT'S NOT JUST AMAZON

There are several online marketplaces where government buyers could shop. What they have in common is the option for comparison shopping, the ability to quickly gather many price quotes, and several delivery options. The author argues that contracting with one such online marketplace for commercial items like office supplies would be better than using contracting officers' time and the GSA's store. (Image courtesy of USAASC/Silent47/Getty Images)

We think nothing of putting guns, ammunition, rockets, missiles, tanks or Soldiers' lives in the hands of combatant commanders, but allowing them to purchase what they want when they need it is considered too risky.

and Walmart could exist today. With very little development and potentially very little cost, the government could place an application on an e-commerce portal that would meet Federal Acquisition Regulation (FAR) requirements to allow warfighters to order and receive commercial products directly.


The focus needs to be on simplified acquisition and on the type of supplies that already are delineated within the simplified acquisition threshold of up to \$250,000. Doing so would put purchasing power into combatant commanders' hands, allowing them to buy what they need, and would very likely speed delivery. E-commerce would lessen the burden on contracting commands, provide greater transparency—and could be easily implemented within the next six months.


Many labor under the misconception that purchasing through e-commerce sites such as Amazon or Walmart would amount to a sole-source contract to those companies. In fact, those e-commerce platforms could easily be made to comport with DOD regulations to be a marketplace.

The Amazon Business marketplace, for example, is essentially an online shopping mall, with millions of vendors selling hundreds of millions of products. The vendors in these marketplaces compete on price and use the marketplace to attract buyers. Therefore, e-commerce portals are the embodiment of competition.


IN ADDITION TO WHICH, IT'S A CONGRESSIONAL MANDATE

In Section 846 of the National Defense Authorization Act for Fiscal Year 2018,





SAMPLE INVOICE



Quantity	Item #	Description	Price	Selling unit
2	XER106R01508	TONER,6700,HI CAP,MG	*GSA 75 ITEM*	290.40 EA
2	XER106R01508	TONER,6700,HI CAP,YL	*GSA 75 ITEM*	307.75 EA
1	XER106R01507	TONER,6700,HI CAP,CN	*GSA 75 ITEM*	290.40 EA
1	XER106R01438	TONER,HI CAP,PHR7500,YL	*GSA 75 ITEM*	495.45 EA
1	MMMC50	TRAY,POST-IT,ORGNIZER,CC		18.99 EA
2	XER106R00865	CARTRIDGE,WASTE, PHR7500		43.93 EA
2	XER106R01510	TONER,6700,HI CAP,BK	*GSA 75 ITEM*	213.79 EA
1	XER106R01507	TONER,6700,HI CAP,CN	*GSA 75 ITEM*	290.40 EA
1	MMMC50	TRAY,POST-IT,ORGNIZER,CC		18.99 EA

User: KPF
Total line items: 9

Sale subtotal:
Tax:
Total:

COMPARISON SHOPPING

Xerox printer cartridges were cheaper on Amazon than through the GSA's Advantage portal at the time of writing. Many more vendors sell through commercial online marketplaces, like those run by Staples and Walmart, so prices are sometimes lower. (SOURCE: the author. Images courtesy of Amazon.com Inc. and GSA)

Congress mandated that the government establish a program to procure COTS items through e-commerce portals without creating a government-unique portal. The purpose of shifting to commercial e-commerce is to expedite procurement, enable market research, enhance competition and ensure reasonable pricing.

Given the congressional mandate and how advanced industry is in regard to supporting government requirements, commanders could start purchasing from a commercial marketplace within six months of proposal. The Amazon Business portal is working to become fully FAR-compliant and has done so at no cost to the government.

PUTTING IT TOGETHER

As previously mentioned, there is no need to write a contract for COTS items already available on the marketplace. The contract with Amazon to use its business portal would instead focus on configuring an application with Amazon's existing portal to meet our government needs. Even with all that Amazon already

has accomplished, there is still work to be done, but most of it is just software development.

First, we need credentialing. The most sensible thing for DOD would be to use the almost-ubiquitous Common Access Card (CAC). Each card has a unique number and certificates. Those could be tied together with a database to control purchasing permissions, tying users to commands, budgets, accounts and so forth, much as CACs identify us in nearly everything else we do online.

Next, the platform would have to comply with the AbilityOne Program, which employs people who are blind or significantly disabled. Since Amazon already has certified small disadvantaged business vendors, it would need to ensure that AbilityOne vendors are selling on Amazon Business as well. There also would need to be a way to ensure that vendors have the correct certification to classify themselves as such. I am by no means asking Amazon to certify all its vendors—with hundreds of millions of vendors that would be an impossible task. What needs to be in

Ownership/Diversity Credentials

- ☐ Registered Small Business
- ☐ Women-Owned Business Enterprise
- ☐ Women-Owned Small Business
- ☐ Economically Disadvantaged Woman-Owned Small Business
- ☐ Veteran-Owned Small Business
- ☐ Service Disabled Veteran Owned Small Business
- ☐ Minority-Owned Business
- ☐ SBA-Certified 8(a) Firm
- ☐ SBA-Certified HUB Zone Firm
- ☐ SBA-Certified Small Disadvantaged Business
- ☐ LGBT Business Enterprise

SMALL-BUSINESS FILTERS

This screenshot shows the small disadvantaged business categories a shopper can choose to buy from on the Amazon Business portal. By checking one or all of the boxes, users see vendors with those credentials. If an organization needs to buy its office supplies from a particular category—to meet the required percentage of purchases from small businesses, for example—a buyer from the organization can filter options by checking the appropriate boxes. (Image courtesy of Amazon.com Inc.)

place is a way for the vendor to self-certify and a way for the government to be able to see and verify that certification.

Finally, we need a way to link to the government payment system. That would be the General Fund Enterprise Business System (GFEBS). For the user, the payment system would be transparent, much in the way it is now for conventional Amazon customers. In this case, though, the government would pay the bill. Again, this would just be a matter of developing software to tie the user to the CAC and the system.

Current payment methods, such as government purchase cards, purchase orders and invoices, as well as the ability to load your tax exemption form, are available on Amazon Business today. Direct interface with the Army GFEBS for payment could easily be implemented into the current payment system.

EXTRA BENEFITS

One of the major side benefits of such an e-commerce platform would be the transparency to both the government and to the user. That's because a platform like the Amazon Business portal provides an analytics dashboard that makes it easy to track and analyze an organization's

spending. Army leadership could gain greater insight into what, when, how and from whom the Army is buying. Users could create and download custom reports to meet any government requirement. If a user wanted to know how much an organization spent on toner, all she would have to do is simply click a box.

Amazon's search algorithm allows users to filter small business categories, which would help an organization to achieve its small business goals (e.g., making a certain percentage of purchases from woman- or minority-owned businesses). Amazon's data analytics would enable the Army to measure its socioeconomic goals for small and disadvantaged businesses. Small businesses certified through the U.S. Small Business Administration could be loaded directly into the Amazon database for easy identification. Currently on the Amazon portal, users need to check blocks to activate the vendor credentials they want to search by. Part of the contract with an e-commerce portal would adjust search results or control what gets into the "buy box," so that the top option supports FAR requirements.

The user could request spend-analysis reports, which would provide transparency and accountability, vital for efficient operations. With such information, users could identify items purchased in large quantities from across units, which in turn could lead to more efficient bulk purchases.

In addition, exclusive price and quantity discounts exist on more than 5 million products for those with an Amazon Business account. Price breaks on multi-unit product purchases mean an additional cost reduction when buying in bulk. Finally, business purchasers can negotiate prices with vendors through the portal.

E-commerce would lessen the burden on contracting commands, provide greater transparency — and could be easily implemented within the next six months.



NODES IN THE NETWORK

The author, second from right in the front row, visited an Amazon fulfillment center with her group of Training with Industry fellows, all from Army acquisition. After a year spent working at Amazon, the author suggests that an online marketplace, with thousands of vendors and multiple delivery options, seems a more efficient way to make recurring purchases of basic items that acquisition staff currently have to spend time contracting for. (Photo courtesy of the author)

Within the portal, the purchaser can see whether it is beneficial to purchase goods in bulk and can negotiate with vendors for discounted products.

Items requested through Amazon's e-commerce portal could be delivered within two days in the continental United States. This would provide users a better way to manage their funds by using just-in-time supplies. Amazon's world-class logistics network also provides choices for how and when orders are delivered, so commands could consolidate deliveries. Of course, Amazon's logistics model would have to expand to manage the enormous increase in orders if the United States government started doing much of its purchasing through Amazon.

In addition, the same items can be shipped to locations around the world. Amazon uses local companies to cover the last mile, and has "lockers" for pickup in locations where address information isn't reliable or package theft is common. Authorizing commanders to shop on e-commerce portals would increase

efficiency and decrease waste by having them receive goods as they are needed, thereby reducing inventory. These processes would prevent units from stockpiling items "just in case we need it." Many governmental units or offices maintain cabinets full of paper, toner, cleaning supplies, etc. This abundance of inventory is because of the lack of transparency, slow delivery and lack of faith in the acquisition system.

Sourcing requirements could be satisfied with multiple sellers' offers on a single page. The portal could save data showing three prices from three vendors; operational needs statements could be typed directly into the portal or uploaded; additional notes from the purchaser or approver could also be added; and all of the information could be tracked for auditability. The screenshot on Page 40 shows Amazon Business portal prices from four vendors and a recommendation of a vendor; eventually, it's possible the same screen could display why Amazon recommended the vendor it did.

NECESSARY APPROVALS

Automated workflow approvals can be set up easily on Amazon Business, which quickly processes requests for purchases. Workflow rules enable the user to have email alerts sent to higher-level purchasers for approval. Depending on how many approvers a commander would prefer, Amazon could implement the roles for purchasing officials, approving official (is the purchase appropriate?) and authorizing official (are funds available for the purchase?). For example, a company supply officer could go onto the e-commerce portal and put the items he would like to purchase in the organization's virtual shopping cart. Then the next higher purchasing official at the battalion level would get an email alert to approve it.

In addition to workflow approvals, unauthorized items can be flagged. The Army has mandated that the Army's Computer, Hardware Enterprise Software and Solutions contract be the primary source for purchasing COTS software, desktop and notebook computers regardless of dollar value. If a user attempts to purchase one of these items on the e-commerce portal, a notification would inform them that it is against policy to purchase this item.

CONCLUSION

It's hard to calculate the potential cost savings that an Army-zon would accrue. If, for example, DOD started with Amazon Business, others, such as Staples, Office Depot, Grainger or Walmart, might decide to build FAR-compliant platforms. That would further increase competition and make for more savings. But there are other possibilities for savings, too.

If implemented correctly, opportunities exist to use artificial intelligence to do predictive analysis for combatant commanders. E-commerce portals could contact ordering officials about purchasing an item again based on their purchase history. For example, the platform might send an email asking, "Over the last six months, we noticed you purchased four black ink cartridges every month. Would you like us to set up an automatic monthly delivery of four black ink cartridges?" This would cut down on the manpower needed to manually track and order supplies on a daily, weekly or monthly basis.

Having an e-commerce company analyze government purchasing data and highlight opportunities for savings would take the burden off commanders and contracting personnel.

Peter Drucker, the late consultant, educator and author who has been called "the inventor of modern management," suggests

that what hinders innovation is not the lack of good ideas, but the failure of teams and organizations to be willing to discard old ones. With current technology and a multitude of options, now is the time to change our culture and make the shift to e-commerce. By doing so, we can provide flexibility and agility to combatant commanders and save billions of taxpayer dollars.

While spending a year with Amazon as a Training with Industry fellow and seeing the inner workings of e-commerce, it became clear that online marketplaces were the way of the future for the Army. I tried to establish a pilot program with the Army and Amazon to show the possibilities and savings. However, I met with resistance and negativity.

Upon reflection, I realized that it wasn't policy I needed to change, but the culture. Henry Kissinger said, "The basic motivation of a bureaucracy is its quest for safety." It measures success by errors avoided rather than goals achieved. We think nothing of putting guns, ammunition, rockets, missiles, tanks or Soldiers' lives in the hands of combatant commanders, but allowing them to purchase what they want when they need it is considered too risky.

In an effort to change the culture, I am working with Defense Acquisition University (DAU) to develop a case study illustrating how a great idea that could save billions of dollars was met with such strong resistance. As a future commander, I want the power and flexibility of e-commerce to purchase what I need, when I need it, and get it fast. As a taxpayer, I want the transparency, accountability and cost savings e-commerce would provide. We must change the culture within the Acquisition Corps to ensure that we have a premier Army that is ready to fight tonight.

For more information, contact the author at rachael.m.hoagland.mil@mail.mil.

LT. COL. RACHAEL HOAGLAND is the assistant executive officer for the Deputy CIO G-6. She has an M.S. in global leadership from the University of San Diego School of Business, a B.S. in diplomacy and military history from Hawaii Pacific University, a B.A. in communication from the University of Tampa and an associate degree in photography from Mohawk Valley Community College. She spent a year as a Training with Industry fellow at Amazon.com Inc. She is a graduate of DAU's Program Manager's Course, PMT 401, and is Level III certified in program management.

ALL CLEAR

One of the most hazardous situations for aircraft pilots is degraded visual environments, which include darkness, snow, rain, blowing sand, dust, fog, smoke and clouds. The S&T community, industry, academia and the other services are developing capabilities like the Degraded Visual Environment Mitigation Program, which will allow aviators to maintain an asymmetric advantage on the battlefield in all weather conditions, including brownouts. (U.S. Army photo)





SHIFTING GEARS

| How RDECOM is responding to the new modernization imperative.

by Maj. Gen. Cedric T. Wins

Central to the Army's future is the decision by Army Chief of Staff Gen. Mark A. Milley and then-Acting Secretary of the Army Ryan D. McCarthy to adopt a new modernization model, with the main focus on making Soldiers and Army units more lethal to win our nation's wars and come home safely. The U.S. Army Research, Development and Engineering Command's (RDECOM) part in this mission is to provide the research and development (R&D) for technologies that will enable the Army to dominate on the battlefield.

To support the new modernization model, the Army asked RDECOM, a major subordinate command of the U.S. Army Materiel Command, to shift its focus from general R&D to the six modernization priority areas: long-range precision fires; next generation combat vehicle; future vertical lift; the network and command, control, communications and intelligence; air and missile defense; and Soldier lethality.

RDECOM'S ROAD MAP

As the Army's key science and technology (S&T) enabler, RDECOM responded with a series of S&T deep dives on the hundreds of projects that support the modernization priorities. Based on this information, RDECOM informed senior decision-makers on the state of the technical front, including a time frame when technologies that support the modernization priorities could be delivered.

Addressing metrics such as cost, schedule, technical performance and maturity, as well as transition planning with Army partners in the program executive office (PEO) community, RDECOM also ensured that funding was preserved for enabling technologies and potentially disruptive technologies that show promise for acceleration.

To support the multidomain battle of the future, maintaining the right balance of technologies in development and keeping the technology pipeline full will be critical.

While we evaluated how to accelerate technologies to match the six modernization priorities, we also had to ensure that resources were available within the existing budgetary framework. That meant reviewing previously approved funding strategies and shifting the emphasis on planned and ongoing work to focus on the new modernization priorities.

Based on these discussions, the Army's senior leaders made investment and divestment decisions that will affect all of the Army's S&T accounts for fiscal years 2019 through 2023. This resulted in a shift of \$1.2 billion with focus on the Army's six modernization priorities. This major review and shift in resources with

senior leadership laid a strategic S&T foundation for RDECOM and its hundreds of U.S. and international partners in industry, academia and other government agencies as it drives R&D internally.

As RDECOM adjusts its sights on the relatively distant target, the command's S&T advisers are engaged with the Modernization Task Force and cross-functional teams as they explore the framework of an organization to specifically address Army modernization. The new futures command will leverage commercial innovations, cutting-edge S&T and warfighter feedback to develop modernization requirements, concept validation and experimental prototypes, and drive capabilities to Soldiers.

To support this effort, RDECOM's scientists and engineers will provide the expertise and knowledge for the cross-functional teams to explore technology to build new capabilities and systems that will give Soldiers a decisive edge in battle.

AS TECHNOLOGY EVOLVES

Many Army technologies have evolved through the years, as Soldiers' needs changed, along with how battles were fought. For example, Soldiers used the M1 combat helmet, also known as the "steel pot," from World War II until

1985. While this helmet, made of manganese steel, was effective for many years, Soldiers needed more protection as weapons became more powerful and sophisticated and we better understood the effects of blast on the human body. As military operations became more complex and Soldiers needed to carry more equipment, which can vary from 80 to 100 pounds depending on the mission, the Army required a lighter helmet.

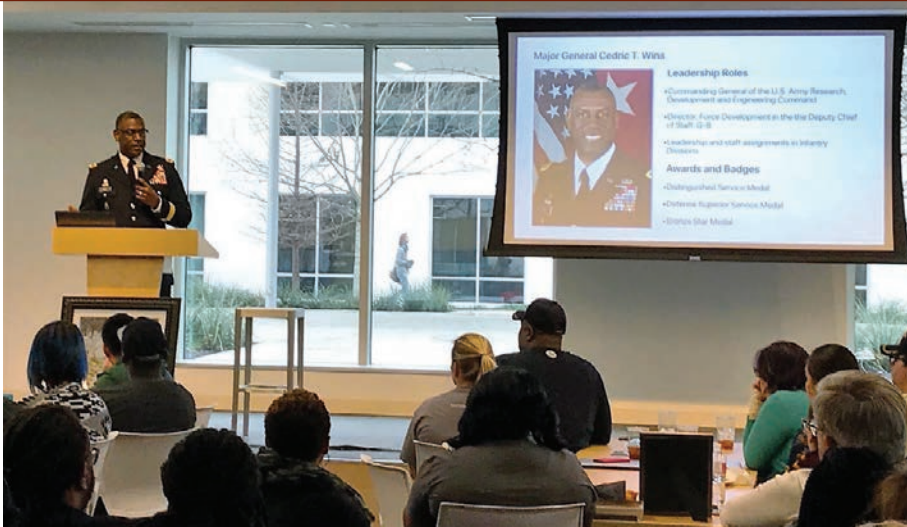
In response to this need and to provide better protection, the Advanced Combat Helmet was developed. The helmet, which uses Kevlar and is 24 percent lighter than the steel pot, provides greater protection and reduces fatigue and stress for Soldiers. Used in Iraq and Afghanistan, the Advanced Combat Helmet was replaced in 2014 by the Enhanced Combat Helmet, which incorporates lighter materials and provides enhanced ballistic protection. The lightweight helmet consists of a ballistic shell, suspension pads and a four-point strap, as well as a reversible helmet cover, a bracket for night vision goggles and attachments for additional hardware and devices.

Technologies often begin as prototypes. Prototypes enable us to refine technologies and mitigate technology gaps, eliminating the need to procure large



DESIGNS FOR THE FUTURE

Dr. Paul D. Rogers, center, director of the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), shows Undersecretary of the Army Ryan D. McCarthy a combat vehicle design from a Soldier Innovation Workshop during a Jan. 18 tour of TARDEC. The workshop brings together the industrial design skills of students from Detroit's College for Creative Studies and the battlefield experience of Soldiers to develop innovative approaches to Army projects. (U.S. Army photo by Sean Kimmons, Defense Media Activity – Army)



ARMY TO APPLE

Maj. Gen. Cedric T. Wins speaks to employees at the Apple Inc. campus in Austin, Texas, on Feb. 22 about his experience in the Army, as well as African-American military leaders who inspired him. As part of African-American History Month, Wins gave an overview of RDECOM and the importance of diversity in the workforce. (Photo by Capt. Joshua Blanc, aide-de-camp to RDECOM Maj. Gen. Cedric T. Wins)

quantities and avoiding the repetition of acquisition failures. By fielding the prototype, we use Soldier feedback to refine requirements for next-generation or future capabilities.

The Multi-Mission Launcher (MML), which began development in 2012, started as a prototype. A mobile, ground-based weapon system designed to defeat unmanned aircraft systems, cruise missiles, rockets, artillery and mortars, the MML was developed after the Indirect Fire Protection Capability Increment 2 – Intercept product office approached RDECOM to determine if such a capability was feasible from an engineering standpoint. Working together, RDECOM engineers and the product office moved the project forward and delivered two MML prototypes in 2015.

INTEGRATING TECHNOLOGY

Focusing on the right technology is important, but it is equally important to integrate these technologies into systems. Technology integration will be critical in the multidomain battle, where joint forces will need to adapt swiftly to changes in the operational climate. By adding new capabilities to existing platforms, warfighters will have capabilities beyond what each technology offers; feedback from these capabilities will help develop new ones.

When we develop technology timelines, we incorporate maneuver space, the necessary “wobble room” to ensure that the technology is moving in the right direction and at the right pace to meet or exceed the constant and changing threats of our adversaries. Maneuver space includes time to plan resources, cost, schedule, technical performance and maturity, as well as how and when the technology will transition to the PEOs.

Moving technology from initial S&T to a level of maturity for a PEO to further develop and procure requires close collaboration and planning. RDECOM works with hundreds of domestic and international industry and academia partners, as well as other Army organizations and DOD laboratories, to develop and test S&T efforts and then push them to a PEO or program management office. This process puts the most advanced technology in Soldiers’ hands.

CONCLUSION

Giving Soldiers the best technology is RDECOM’s mission and the result of teamwork across the command. To support this mission and the Army’s modernization strategy, RDECOM is syncing requirements with the cross-functional teams and providing the R&D needed for technology to become critical capabilities.

While some capabilities will start as prototypes that will enable us to refine requirements for next-generation technology, other technology, such as future vertical lift, will begin as a technology demonstrator that will incorporate existing and experimental capabilities.

As we continue to focus on next-generation technologies, we will continue to make new discoveries and develop new technologies to keep the pipeline full. These technologies, which may not be needed for many years, will allow the Army to dominate whatever challenge it faces whenever that challenge appears.

For more information, go to www.army.mil/rdecom or call the RDECOM Public Affairs Office at 443-395-3922.

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

TEST DRIVE

Soldiers with the 83d Chemical Battalion gather at Fort Stewart, Georgia, where they provided troop support for a field experiment involving the MERLIN Imager and Applique. With them are civilians supporting the development of the new MERLIN sensors, including Jeffery Musk, chief, research and development, DTRA; Megan Hower, acquisition product manager for M2PRDS, JPDL-RND; Maj. Kurt Gerfen, MERLIN/VIPER project manager, DTRA; Karen Bowen, acting deputy JPDL-RND; and Robert Carter, logistics management specialist for M2PRDS, JPDL-RND. (Photo by Richard Kroger, Space and Naval Warfare Systems Command Systems Center Pacific)



ALL TOGETHER, NOW!

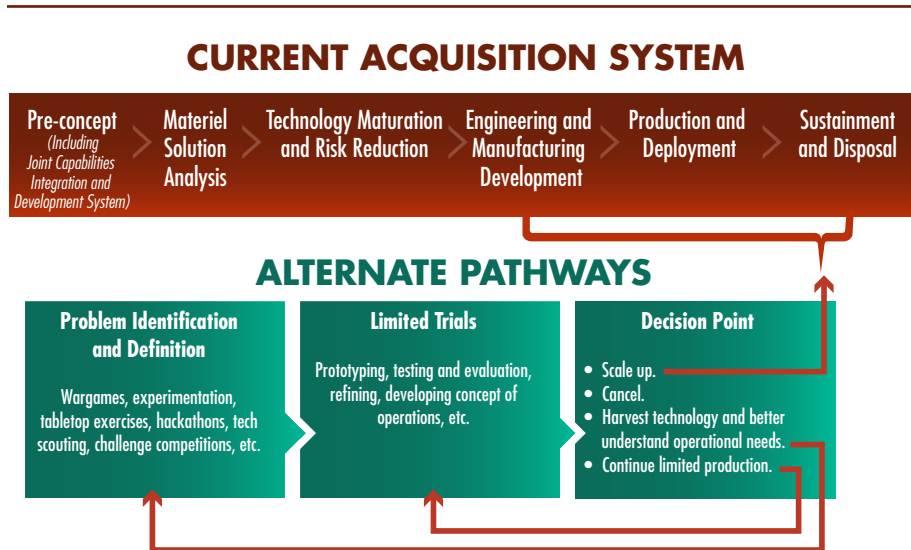
The Manned Mounted Platform Radiological Detection System represents an alternative acquisition approach with uncommon collaboration across stakeholders, early and often.

by Mr. Valentin Novikov and Lt. Col. Kelley Litzner

Army logistics has long been burdened with supporting radiological and nuclear sensing equipment that dates back to the Cold War. It is no longer feasible to continue supporting these systems in the field, given the negative balance of spare systems and repair parts in Army depots. Two teams within the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD) and the Defense Threat Reduction Agency (DTRA) are resolving these obsolescence issues by providing Army units with new systems that are ruggedized and networkable for both radiological-nuclear point detection and mobile standoff detection. This partnership between JPEO-CBD and DTRA ushers in a new type of intergovernmental technology transition.

Manned Mounted Platform Radiological Detection System (M2PRDS) program officials carved out a process that bypasses the stagnation that typically accompanies the acquisition of transformational technologies, usually attributable to budget constraints, to accelerate the acquisition of new radiological-nuclear capabilities for the Army's mounted forces, in the same vein as the concept of "middle tier" acquisition pathways

FIGURE 1



FASTER ALTERNATIVE

This streamlined acquisition approach enabled the product team to produce the M2PRDS a year sooner than the standard approach because it freed up the team to prototype and field quickly. The approach requires early involvement of all stakeholders, as well as constant communication. (SOURCE: "Future Foundry: A New Strategic Approach to Military-Technical Advantage," by Ben FitzGerald, Alexandra Sander and Jacqueline Parziale, Center for a New American Security, Dec. 14, 2016)

established in the National Defense Authorization Act for Fiscal Year 2016. The Joint Product Leader for Radiological and Nuclear Defense (JPDL-RND), in collaboration with DTRA's Research and Development Enterprise Nuclear Technologies Division (DTRA-NTD), is executing this middle tier strategy to develop and accelerate the acquisition of enhanced radiological and nuclear detection and reconnaissance capabilities for the Army's mounted forces. (See Figure 1.) This streamlined acquisition approach enables JPDL-RND, assigned to the Joint Project Manager for Guardian, to produce the M2PRDS a year sooner than

through the standard approach because it facilitates rapid prototyping and rapid fielding.

An exceptional degree of partnership made possible the design, development and testing of the detection and reconnaissance prototypes and their transition to JPDL-RND, along with the technical data packages. Specifically, the effort featured the direct contributions of not only the acquisition program manager but also the combat developers, traditionally not part of a typical science and technology (S&T) project. All stakeholders took part in decisions on the design, test strategy

and transition plan, while DTRA-NTD funded the prototype development.

DTRA-NTD spearheaded the rapid maturation of the M2PRDS internal point-detection sensor, a smaller and more sensitive radiation detector that resembles the currently fielded AN/VDR-2 detector. The sensor is slated for use across military ground vehicle platforms and provides vehicle crew protection through early warning of radiological-nuclear hazards. DTRA-NTD also developed an externally mounted radiological-nuclear sensor that provides vehicle crews with warning of radiological-nuclear hazards and situational awareness of threats from outside their vehicles through standoff radiological detection, threat localization, isotope identification, visualization and mapping. These sensors are known, respectively, as the Vehicle Integrated Platform Enhanced Radiation Detection, Indication, and Computation (VIPER RADIAC or VIPER) and the Mounted Enhanced RADIAC Long-Range Imaging Networkable (MERLIN) system. MERLIN has two subsystems: the MERLIN-Imager (MERLIN-I) and the MERLIN-Appique (MERLIN-A).

The MERLIN-I and MERLIN-A sensors are complementary but operate independently of each other. The MERLIN-I sensor, mounted on the outside of the vehicle, enables rapid stationary stand-off radioisotope detection and provides source location and imaging of radioactive hot spots. MERLIN-A, which consists of four sensors mounted on the corners of a vehicle, enables on-the-move

This new approach to acquisition provides a successful example of how to improve efficiency by reallocating resources from business operations and redundant testing to technology development.

standoff detection and identification with source location and mapping of the radiation field.

VIPER is the internal point sensor and is specifically tailored for mounted operations in radiological-nuclear environments. It has a wide operating range compared with the legacy AN/VDR-2 it is replacing; it provides warning and situational awareness for vehicle crews and supports vehicle-mounted reconnaissance and surveillance operations. MERLIN and VIPER are part of the Stryker Nuclear, Biological and Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite Upgrade program. Only VIPER is slated for use across military vehicle platforms.

COLLABORATIVE RAPID PROTOTYPING

DTRA-NTD and JPDL-RND worked with several partners on the collaborative rapid prototyping effort: combat developers from the Maneuver Support Center of

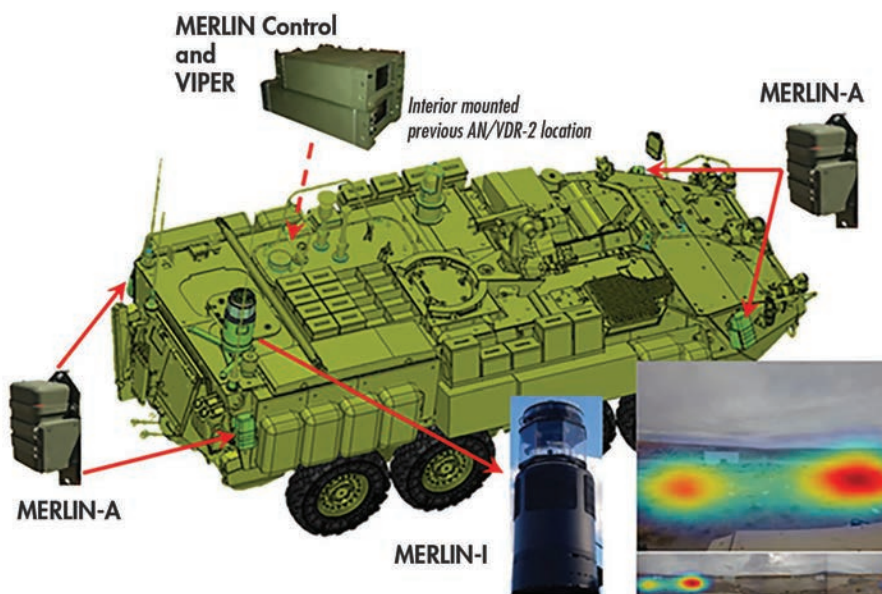
Excellence at Fort Leonard Wood, Missouri; the joint staff's Joint Requirements Office for Chemical, Biological, Radiological and Nuclear Defense; the Stryker NBCRV sensor suite product manager and the Stryker Brigade Combat Team project manager. The Radiation Detection Branch of DTRA-NTD initiated three key parallel elements to meet the relatively short 18-month acquisition timeline required to produce 12 viable prototypes by existing deadlines to upgrade the NBCRV sensor suite.

First, as the basis for each detection system, DTRA-NTD made an initial decision to leverage 10 years' worth of agency research and development efforts in imaging and radiological-nuclear detection technology for countering weapons of mass destruction. This required using the original contractors (Alion Science and Technology Corp., H3D Inc. and Loco Labs LLC) to mitigate risk and ensure a rapid test-model-test framework with experienced staff.

Additionally, DTRA-NTD project officers worked closely with the DTRA contracting office to elevate MERLIN-I to a top priority. The buy-in from the contracting office prevented schedule and project changes from delaying the overall effort throughout the development process. Similarly, the division's program manager used technology designed through a partnership with the Space and Naval Warfare Systems Command to repurpose and repackage hardened versions of the sensors, allowing DTRA-NTD to meet standoff detection requirements for the MERLIN-A sensors as well as internal dose, dose rate and spectroscopic requirements for the VIPER sensor in the time allotted. (See Figure 2.)

The second element involved coordinating and marketing the concept with all stakeholders, including users. In addition to those already discussed, DTRA representatives worked with members of the Army staff responsible for chemical,

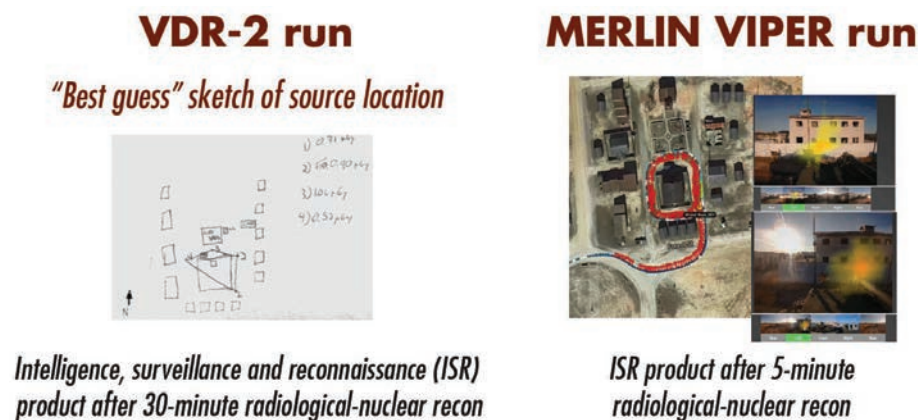
FIGURE 2



THE PIECES COME TOGETHER

VIPER, MERLIN-A and MERLIN-I on a Stryker NBCRV. The inset is a first-of-its-kind distributed source image from tests conducted in late 2017 at Idaho National Laboratory in Idaho Falls, Idaho. The project team committed to repurposing as much existing government technology and research as possible to speed fielding and cut costs. (SOURCE: the authors)

FIGURE 3



A CLEARER PICTURE

This side-by-side illustration compares the performance of the previous radiological-nuclear point detector, VDR-2, and the MERLIN VIPER. Both performed a reconnaissance run in an urban village training area, and MERLIN VIPER provided Soldiers with a more detailed picture of radiological-nuclear hazards in much less time. (SOURCE: the authors)

biological, nuclear, radiological and explosive (CBRNE) programs for funding, size and acquisition parameters; the U.S. Army CBRNE Agency to develop new, realistic scenarios for testing and evaluating never-before-fielded sensors; and multiple Army chemical battalions and combatant commands for real-world field testing and user feedback. (See Figure 3.)

Constant communication with all member organizations by the joint DTRA and JPDL-RND teams ensured that the effort remained flexible enough to accommodate changes while informing stakeholders when key design decisions became permanent. This unity of effort, involving nearly every office and staff element with a current or future role in fielding the equipment, smoothed the path for transition from DTRA to JPDL-RND and eventually to end users.

The third element involves the DTRA-NTD program office's early commitment to using as many government off-the-shelf materials as possible for prototype development, including newly designed sensors and inventory parts already in production. Additionally, project officers established ground rules for physical and electronic hardening so that all detector casings and internal components could withstand harsh, contaminated military environments with minimal maintenance needs. DTRA-NTD invested early in modeling scenarios and computer-aided drafting designs to determine optimal detector configurations and vehicle emplacements, maximizing detection capability while minimizing the use of expensive components. DTRA-NTD's modeling and design efforts, coupled with extensive prototyping and testing with government materials, mitigated production risks and maximized cost benefits for future production models.

RAPID FIELDING

Ensuring an acquisition path to field DTRA-NTD's technology solutions rapidly required new approaches for JPEO-CBD. In contrast to traditional models for technology transition, JPDL-RND initiated an acquisition product office for the M2PRDS program at the same time as the kickoff of the dedicated S&T efforts. Rather than having separate research and acquisition teams, members of the acquisition product office and members of the S&T office functioned as a single program team with separate focus areas.

Such close partnering necessitated modifying standard processes for both organizations. This entailed building a common language where similar terms historically had had different interpretations. For example, the team developed a heavily tailored set of technical reviews and used that as the protocol for accelerating the development of M2PRDS. The team eliminated the use of conventional names such as "preliminary design review" and "critical design review." Instead, the focus was on determining up front where the parallel efforts needed to be in sync and how best to assess whether those objectives had been met successfully. These technical reviews provided decision points and the opportunity for each organization to revise their processes if needed based on assessment of risk.

Test and evaluation also required modification of language and processes. The JPEO-CBD is seeking to reduce the amount of retesting that occurs after technology transitions. For M2PRDS, the research and acquisition team had to reach a common understanding of differences in concepts such as iterative versus phased builds and what that means for the ability to receive formal evaluation of any testing.



PROTECTED, INSIDE AND OUT

MERLIN sensors are mounted on the outside of a vehicle; VIPER point sensors are inside. Together the two are part of the upgrade to Stryker NBCRVs. (SOURCE: the authors)

The program developed a concept in which DTRA provides its assessment when experimentation has progressed to the point where a viable prototype could be built. Concept validation demonstrations conducted in the field have more of an S&T bent and are both flexible and informal. Lastly, justification demonstrations are conducted with increased formality, with the objective of creating prototypes for developmental testing.

Neither phase is identical to traditional, strictly S&T-style or acquisition-style concepts. This new concept represents a common ground for compromise in future efforts, making it possible to leverage data gathered by the S&T community without fully burdening research teams with the strictures of acquisition.

In the fourth quarter of FY18, the JPDL-RND will receive hardware, technical data packages, test data and other information products from DTRA. These will support the path to rapid fielding

developed by JPDL-RND and made possible by the collaborative, upfront user evaluations, mature technologies, early platform risk-reduction events and open involvement of diverse acquisition stakeholders. VIPER is scheduled for fielding as early as FY20, resolving long-standing logistical challenges associated with legacy equipment. MERLIN is prepared for inclusion in the pending upgrade of the NBCRV's sensor suite, years ahead of what the program managers could accomplish using a traditional technology maturation and risk reduction approach.

CONCLUSION

The innovative acquisition approach for the M2PRDS program demonstrates the value of intergovernmental collaboration and improved business processes to accelerate acquisition and fielding of cutting-edge technology to upgrade the Army's radiological and nuclear detection and reconnaissance capabilities. One of the many advantages of this new approach is the way that JPDL-RND and DTRA leveraged prototyping, experimentation and other critical developmental activities to mitigate the technical risks inherent in systems acquisition.

Beyond the CBRNE community, though, this new approach to acquisition provides other program executive offices with a successful example of how to improve efficiency by reallocating resources from business operations and redundant testing to technology development, thus enabling the acquisition community to field superior technology to the warfighter quickly and at a more affordable cost.

For more information, go to the JPEO-CBD website at <https://www.jpeocbd.osd.mil/home> or contact Steve Lusher, JPEO-CBT public affairs officer, at steven.y.lusher.civ@mail.mil.

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LT. COL. KELLEY LITZNER is chief of radiation detection in DTRA's Nuclear Detection Division. He served eight years as an infantry officer, culminating with command of a light infantry company in Paktika Province, Afghanistan. He then transitioned to become a functional area 52 (nuclear and counterproliferation) officer. He served as chief of the Physics Branch in DTRA's Nuclear Weapons Effects Office before taking over as chief of radiation detection. He holds an M.S. in applied physics from Columbia University, an MBA from New York University and a B.S. in mechanical engineering from the United States Military Academy at West Point.

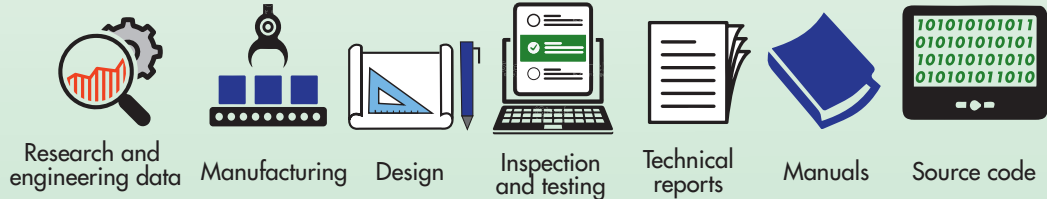
CONTRIBUTORS:

Ms. Megan T. Hower, chief systems engineer and product manager, JPDL-RND; **Maj. Kurt L. Gerfen**, MERLIN VIPER project manager, DTRA; and **Mr. Robert F. Carter**, M2PRDS logistics management specialist, JPDL-RND.

WHAT IS CONTROLLED TECHNICAL INFORMATION (CTI)?

CTI is unclassified information that, by itself or when aggregated, can provide significant insight into Army capabilities. It can have military or space applications and is subject to controls on access, use, reproduction, modification, performance, display, release, disclosure or dissemination.

CTI can include:

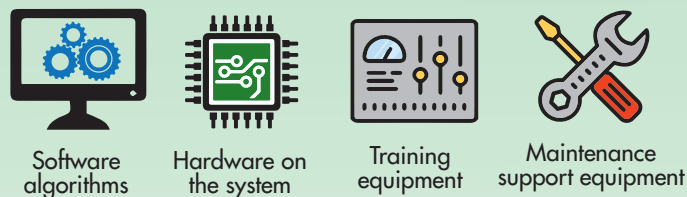


WHAT CTI ISN'T.



CTI is commonly confused with critical program information (CPI). CPI is generally classified and resides on the system. CTI is data and documentation that do not meet the definition of CPI but may provide sensitive details that, if compromised, provide insight into CPI and its performance capabilities.

CPI can include:



CTI is vulnerable to loss by traditional and nontraditional intelligence collection because it is unclassified.

WHAT HAPPENS IF CTI GETS OUT?



CTI loss can degrade U.S. technological superiority, undermine military capabilities and hinder modernization.



The U.S. Army and DOD will continue to be the target of adversaries' efforts to collect CTI. And because most technical data resides on unclassified, non-DOD networks, traditional methods of protection are no longer enough.





INFORMATION INSECURITY

New DOD cell focuses on protecting unclassified data. But if data is unclassified, why do we need to protect it?

*by Mr. Andrew Fulton, Mr. Keith Ramsey
and Mr. Thomas Quigley*

When it comes to protecting classified information, military personnel, civilians and contractors know the rules by heart. And if they don't, required annual or semianual retraining reminds everyone of the rules.

But for at least one category of unclassified information, those rules become murky. This sometimes overlooked aspect of maintaining U.S. technological superiority is a growing concern as global access to the internet increases and cyberattacks become more sophisticated and commonplace.

In February, Deputy Secretary of Defense Patrick M. Shanahan suggested new regulations may be set to ensure that industry partners better secure their computer networks and the information residing on those networks. "We want the bar to be so high, it becomes a condition of doing business," Shanahan said at the annual 2018 WEST Conference in San Diego.

The security challenge is particularly complex when it comes to what is known as controlled technical information (CTI). This unclassified information can, by itself or when aggregated, provide significant insight into

THE ABCS OF CTI

A better understanding of CTI, which people often confuse with classified critical program information or critical technologies, is necessary if DOD's efforts to forestall its loss and compromise are to succeed. (Graphic by U.S. Army Acquisition Support Center and DIBCSO)



SHARING TO SAFEGUARD

Polaris company representatives demonstrate products to representatives of the U.S. Army Materiel Command (AMC) organic industrial base in Madison, Alabama, in August. With the establishment of DIB CS, DOD and industry strengthened voluntary information sharing on cybersecurity methods they can use to better protect unclassified information. (U.S. Army photo by Sgt. Eben Boothby, AMC)

Recognizing that reactive reporting can only go so far, DOD also determined that there was a need for a strategic effort to address data losses.

U.S. Army capabilities. CTI is often information used in the design, production, manufacturing, development, testing, operation or maintenance processes of goods or materiel with military applications.

More specifically, according to DOD, this critical information can include research and engineering data, engineering drawings, specifications, manuals, technical reports and even catalog-item identifications or source code.

Developed and used in support of DOD acquisition programs, CTI is vulnerable to loss by traditional and nontraditional intelligence collection because it is

unclassified. When enough CTI is lost, that can significantly degrade U.S. Army technological superiority and the resultant military capability, undermining modernization efforts.

CTI exists on both DOD-owned and contractor-owned systems and networks. With a growing threat from nation-state and nonstate actors to infiltrate private computer networks and gain access to CTI, the manufacturing and innovative edge that the U.S. currently holds could be in jeopardy. In FY17 alone, cyber actors compromised at least 2.4 terabytes of DOD information residing on unclassified networks at companies that are part of the defense industrial base.



Now, DOD is approaching the problem from a fresh perspective. A new reporting requirement that went into effect earlier this year aims to track the damage comprehensively. At the same time, the Army is working proactively to protect the information from getting out in the first place. For program managers (PMs) and program executive officers (PEOs), the challenge is to accurately identify and protect CTI while meeting cost, schedule and performance objectives without any degradation of requirements supporting the Soldier.

EARLY EFFORTS

DOD efforts to mitigate cyber intrusions into the defense industrial base date to 2007, when the department first established a voluntary cybersecurity information-sharing program, the Defense Industrial Base Cyber Security (DIB CS) Program.

With the purpose of enhancing and supplementing the ability of defense industrial base companies to safeguard DOD information that resides on or travels through their unclassified information systems, the program created a process for voluntarily reporting cyber intrusions on their unclassified networks. This marked the first joint effort between defense industrial base companies and DOD to identify and assess compromised unclassified program information that ultimately could put the warfighter at risk.

The information gathered by the DIB CS Program gave DOD insight into the scope of damage to unclassified technical information and patterns of compromise. But it was still voluntary—meaning that DOD could obtain only limited insight into the total loss of information within the defense industrial base.

WIDENING THE NET

The voluntary has since become mandatory. A clause amending the Defense Federal Acquisition Regulation Supplement (DFARS) took effect on Nov. 18, 2013, requiring all companies doing business with DOD to report any instances of possible exfiltration, manipulation or other loss or compromise of unclassified CTI. At the same time, these companies must also provide adequate cybersecurity measures to protect CTI on their unclassified information systems from unauthorized access and disclosure. Any DOD information compromised in cyber incidents must go through a specified damage assessment, originally established for voluntary incident reporting.

To address the appropriate level of security, DOD, in coordination with the National Institute of Standards and Technology, published a full list of security controls



IN THE CYBER BATTLESPACE

Sgt. Randy Sweet, a network defender with the Army National Guard's Cyber Protection Team 173, participates in core methods of cyber protection during an exercise at Camp Williams, Utah, in April 2017. A new approach to sharing and protecting information, including CTI, is vital with the increasing reliance on technology to support the warfighter. (U.S. Army photo by Sgt. Michael Giles, 100th Mobile Public Affairs Detachment)



DEFENSIVE TACTICS

Staff Sgt. Brian Jones, an intelligence analyst with the Texas Army National Guard's 102nd Information Operations (IO) Battalion, monitors his workstation in Austin during Cyber Shield 17 to counter the opposing team's efforts to hack into his system. The exercise, which was held last spring and included members of the National Guard from 44 states and territories, the U.S. Army Reserve, state and federal government agencies, nongovernmental organizations and private industry, was designed to enhance participants' ability to respond to cyber incidents. Across DOD and its private-sector partners, efforts are intensifying to safeguard unclassified technical information against cyberattacks. (U.S. Army photo by Maj. Ray McCulloch, 102nd IO Battalion)

in "Protecting Controlled Unclassified Information in Nonfederal Information Systems and Organizations." Companies are now required to be in full compliance with these security controls, which went into effect Jan. 1, 2018.

However, recognizing that reactive reporting could only go so far, DOD also determined that there was a need for a strategic effort to address data losses. To supplement the reactive reporting, the department established a joint analysis capability, known as the Joint Acquisition Protection and Exploitation Cell (JAPEC), to integrate existing acquisition, intelligence and law enforcement and counterintelligence data, analysis, processes and tools to protect unclassified CTI in DOD's most critical programs and technologies.

A TERABYTE OF PREVENTION

JAPEC is set up to proactively mitigate future losses and exploit opportunities to deter, deny and disrupt adversaries

that threaten U.S. military advantage by accessing unprotected CTI. It aims to prevent DOD data compromise by increasing the sharing of data and information deemed highly advantageous to potential adversaries across the acquisition, intelligence, security, law enforcement and counterintelligence communities.

For example, DOD organizations may share a technology related to a missile system. One service identifies this technology as CTI and develops countermeasures designed to lower the risks of compromise by the adversary. That service then shares this information with the JAPEC community, providing all involved organizations with situational awareness and ultimately raising the ability to thwart adversary attacks.

At the Army level, the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) is leading a JAPEC Army working group to focus

critical resources and leverage existing program protection processes to enhance protection of CTI. The working group, with participation from Army G-2, G-3/5/7, the U.S. Army Acquisition Support Center, the System of Systems Engineering and Integration Directorate (SOSE&I), the deputy assistant secretary of the Army for research and technology, and PEOs, is designed to integrate stakeholder activities and resolve policy and process issues. The working group's initial actions resulted in an ASA(ALT) policy memorandum assigning roles and responsibilities for identifying and protecting unclassified CTI.

Also within ASA(ALT), the Army Defense Industrial Base Cyber Security Office (DIBCSO) is responsible for coordinating the proactive protection of Army CTI through the JAPEC. Each year, ASA(ALT) develops a critical programs and technologies (CP&T) list to facilitate this process. The list prioritizes key Army programs and technologies

This unclassified information can, by itself or when aggregated, provide significant insight into U.S. Army capabilities.

identified by Army PEOs, PMs and science and technology project managers.

The CP&T list includes program, project and technology names and descriptions, contract numbers and contractor cage codes—short ID numbers that provide a standard method of identifying contractors and their facilities. This information is cross-checked with JAPEC to determine if the systems or technologies have been threatened or compromised elsewhere across DOD. This provides PEOs and PMs access to a wide array of intelligence threat reporting, law enforcement and counterintelligence reports and security information with which they can make informed risk management decisions. For example, if a hacker breached the system of a Marine Corps contractor and obtained data related to a joint program, Army stakeholders would know quickly and could then take steps to prevent further intrusion and damage.

To further assist PMs, the Office of the Undersecretary of Defense for Research and Engineering will soon publish a DOD directive that establishes policy and assigns responsibilities to assess technical information losses and determine consequences. In the interim, ASA(ALT) drafted a policy memorandum and implementation plan that defines the roles and responsibilities for the Army acquisition community to identify and protect CTI. Additionally, DIBCSO is educating all Army PEOs on the JAPEC and their responsibility to identify and protect CTI.

CONCLUSION

With the increasing reliance on technology as a vital part of Army modernization, DOD and the Army will continue to be the target of adversaries' efforts to collect CTI. Because most technical data resides on unclassified, non-DOD networks, traditional methods of protection are no longer sufficient.

The DOD JAPEC is helping to thwart these attempts by developing a system that makes it easier for DOD stakeholders to increase information sharing, collaboration, analysis, risk management and protection. Through this work, JAPEC strives to evolve current practices from reactionary to proactive, with the end goal of preventing degradation of the U.S. advantage in the battlespace.

SOSE&I continues to work with JAPEC to establish Army processes and methodology that can be consistently applied across all Army critical programs and technology. Effective processes and methodology are key to ensuring that we deny our adversaries access to our most critical unclassified CTI and, as a result, retain our innovative capabilities.

For more information on DFARS requirements, go to <http://dodprocurementtoolbox.com/faqs/cybersecurity>. For more information on JAPEC, go to <https://www.acq.osd.mil/selbriefs/2016-10-24-NDIA-SEC-Hughes-MilAdvantage.pdf>.

MR. ANDREW FULTON is a damage assessment specialist for DIBCSO within the SOSE&I Directorate. He previously served as the Army's liaison officer to the DOD chief information officer in DIBCSO, where he helped the Army shape policy and processes to ensure that unclassified Army information is protected within the defense industrial base. He holds an M.A. in international security from Georgetown University and a B.A., magna cum laude, in world politics and French from Hamilton College. He is Level II certified in life cycle logistics.

MR. KEITH RAMSEY is a damage assessment specialist for DIBCSO, where he supports the JAPEC process by maintaining the Army's annual input to the CP&T list and developing CTI identification and protection methodologies. He holds an M.S. in cybersecurity policy from the University of Maryland University College and a B.S. in psychology from Texas A&M University. He is Level II certified in life cycle logistics and in program management.

MR. THOMAS QUIGLEY is a program protection policy specialist for DIBCSO, where he is the team lead for the Army's JAPEC initiative. He previously served as director of operations for the Project Manager for Soldier Sensors and Lasers within the PEO for Soldier. He holds an MBA from Troy University, an M.S. in national security and strategy studies from the U.S. Naval War College, an M.S. in national resource strategy from the Dwight D. Eisenhower School for National Security and Resource Strategy of National Defense University and a B.S. in marketing from Ohio State University. He is Level III certified in program management.

TECHNICALLY SPEAKING

A SERIES *of*

AWARD-WINNING

ASSERTIONS

The challenge of describing our work in acquisition—be it engineering or accounting—for ‘outsiders’ is part of our work. We have to be up for it. Some of this year’s winners of the Major General Harold J. “Harry” Greene Award show the way.

The acquisition community tries to carry forward the work of Maj. Gen. Harold J. “Harry” Greene through the namesake Awards for Acquisition Writing, created to honor his legacy and committed to shaping the dialogue about the future of Army acquisition and how to give Soldiers the best—the mission to which Greene dedicated his career. A booklet collecting the winning papers comes with this issue of Army AL&T magazine.

Confident that writers who could prevail in a field full of good ideas were up to an additional challenge, we asked the winners to sum up the central point from their articles in simple, conversational English. We defined this as “words a high schooler could understand, and no alphabet soup.”

Admirable clarity and brevity ensued. The responses show that it is possible to write about acquisition,

logistics and technology in terms a taxpayer, congressional staffer or reporter can understand. Why does this matter? Because the conversation about how we equip the men and women who go into battle is too important, and the problems too multifaceted, to keep it within the circle of people who understand acquisition lingo—our jargon, acronyms and abbreviations. Any discussion about improving acquisition has to start with clarity. If we don’t talk in terms people outside the community understand and use, then we’re only talking to ourselves.

The quotes that follow from the 2017 Major General Harold J. “Harry” Greene Award winners not only suggest new ideas, but they do so in language clear enough to engage people inside and outside acquisition in this important dialogue.





“Program managers: We can’t afford to execute programs the way we did five years ago. Take full advantage of acquisition tailoring and push back on the bureaucracy so we can focus on product instead of process.”—Col. Richard Haggerty, “Driving Out ‘The Stupid’: Leveraging IT Lessons Learned from DOD and Industry”

“Creating a team of military and civilian acquisition professionals to advise the congressional staff who write the National Defense Authorization Act would result in better laws and policies for both the warfighter and taxpayer, with fewer unintended consequences from politically motivated or industry-requested additions.”—U.S. Air Force Capt. Christopher W. Piercy, “Creating a Defense Acquisition Consulting Team”

“The Army is currently running two parallel acquisition systems with no plans for how to move products from the urgent track to the deliberate track; with revised vocabulary, milestones and responsibilities for the major players in each system, the Army can bridge that gap.”—Mr. Stephen F. Conley and Dr. Craig M. Arndt, “A Model and Process for Transitioning Urgent Acquisition”

“DOD is investing \$80 million in a partnership with the Advanced Regenerative Manufacturing Institute, which pledged \$214 million. Our goal is to make it possible and practical to manufacture tissue, so we can offer service members a better chance of fully healing after catastrophic injuries.”—Ms. Kristy Pottol and Mr. John Getz, “Seeking Innovative Ways to Restore Our Warfighters”

“Following completion of a detailed side-by-side comparison, the Army determined that establishing government-run repair and supply depot operations for its aerial sensor program

(versus the existing depot run by the sensor’s manufacturer) would save the program a significant amount of money. Additionally, the manufacturer remained available to provide limited support.”—Lt. Col. Kecia Troy, Ms. Carla Miller, Mr. Joshua Erlien and Dr. Christina Bates, “Ready for Future Operations: Establishing an Organic Depot to Maintain the Army’s Premier Aerial Sensor System”

“The maneuver commander needs to destroy an enemy target NOW with a GPS-guided munition. Unfortunately, the only available weapon is in a valley and the mountainous terrain is blocking it from seeing the required number of GPS satellites in the sky—but network-assisted GPS can ‘tell’ the munition where the satellites are ... fire for effect!”—Mr. Paul Manz, “Network Assisted GPS ... Coming Soon to a Precision Fire Mission Near You!”

“Tactical power affects all Army warfighting functions and must be integrated into the future combined arms fight. Microgrids and hybrids—generators paired with advanced batteries—will offer significant operational and logistical benefits and will be key enablers for multidomain battle.”—Mr. John M. Spiller, Lt. Col., USA (Ret.), “Tactical Power for Multidomain Battle”

(For details on Lt. Col. Rachael Hoagland’s paper on what the Army can learn from Amazon, see “The ‘Armyzon’ Equation,” Page 39.)

—ARMYAL&T STAFF



RESUPPLY on the FLY

Forward support companies are ideally positioned to use autonomous aerial resupply capabilities to support maneuver elements in a multidomain battle.



PREPARE FOR THE FUTURE FIGHT

In the battlespace of the future, the Army will be denied the use of static safe havens, including forward operating bases and logistics hubs. A possible solution for resupplying Soldiers on-the-move is the joint tactical aerial resupply vehicle (JTARV), shown here in an exercise of the 3rd U.S. Infantry Regiment ("The Old Guard") in September at Fort A.P. Hill, Virginia. (U.S. Army photo by Pfc. Gabriel Silva, 3rd U.S. Infantry Regiment "The Old Guard")



*by Lt. Col. Jeremy C. Gottshall
and Capt. Richard A. Lozano*

The concept of using unmanned aerial systems (UASs) to transport equipment and supplies continues to gain momentum and widespread acceptance by Army leaders. For example, the Army Operating Concept, the Robotic and Autonomous Systems Strategy, and the Army Functional Concept for Movement and Maneuver all call for developing this capability.

Accordingly, the Army and its joint and industry partners have been working to introduce and refine autonomous aerial resupply capabilities to expedite sustainment operations and to minimize Soldiers' exposure to risk. However, the focus has shifted from large, unmanned helicopters carrying thousands of pounds of supplies between static forward



ON THE MOVE

The Army is exploring how unmanned logistics systems like the JTARV could improve resupply to BCTs' forward maneuver formations. Here, Soldiers with the 2nd Infantry Division/ROK-US Combined Division fire at enemy targets during a convoy live-fire exercise in August at Story Range, Paju, South Korea. (U.S. Army photo by Sgt. Michelle U. Blesam, 210th Field Artillery Brigade)

operating bases to a smaller, decentralized, organic capability supporting small, dispersed maneuver formations.

To be sufficiently responsive in the dynamic, rapidly changing conditions of close combat, an autonomous aerial resupply capability must reside in the organization that sustains the lowest echelons of maneuver forces: the forward support company (FSC).

SPEEDING RESUPPLY FOR MULTIDOMAIN BATTLE

Driven by a renewed emphasis on readiness, capability developers have been examining how unmanned logistics systems could improve distribution from within the brigade combat team (BCT) to the BCT's forward maneuver formations. This effort is even more imperative for the future operational environment.

In the future fight, Army forces will face highly capable adversaries who will challenge U.S. dominance in every domain—air,

land, sea, space and cyberspace. The enemy will challenge U.S. air superiority and deny the Army use of static safe havens, including forward operating bases and logistics hubs. To win in this scenario, Army forces will organize by task at the lowest practical level and operate semi-independently to exploit temporary windows of advantage.

Dispersed and semi-independent maneuver elements require their own decentralized sustainment capabilities to maintain a high operating tempo, endurance and operational reach. Because windows of advantage are fleeting, the ability to move quickly against an enemy's weak points is crucial. In this environment, the virtue of autonomous aerial resupply is its ability to move mission-critical equipment and supplies when other modes of transportation are not available and before a window of opportunity closes.

Responsive logistics, including aerial resupply, are paramount in this operational environment. Unfortunately, access to manned



MEDICAL AID

An intravenous solution bag equipped with a metal plate is loaded onto a JTRV in July for transport from a simulated forward operating base to a Marine special operations company in the field at Marine Corps Base Camp Pendleton, California. The Army and the Marine Corps established an integrated product team in October 2016 to explore autonomous aerial resupply. (Photo by Sgt. Salvador R. Moreno, U.S. Marine Corps Forces Special Operations Command)

aviation support for resupply is typically a 72- to 96-hour process. Maneuver and logistics commanders can expect similar delays from unmanned cargo aircraft assigned to aviation units because they use the same multi-echelon air movement request and approval procedures. For a commander executing maneuver in a multidomain battle, waiting this long for resupply or transportation of mission-essential equipment could mean the loss of an initiative when a temporary window of local superiority closes.

The Army should decentralize unmanned aerial resupply capabilities by assigning them to FSCs for local control and immediate response just as unmanned intelligence, surveillance and reconnaissance capabilities are assigned to BCT maneuver formations. Resupply metrics should be in minutes, not days.

WHY THE FSC?

In the future operational environment, fleeting periods of local dominance will require rapid, timely action; this action will require responsive sustainment. Robust organic sustainment

is even more critical in an access-denied environment, where lines of communication—including air, ground and mission command networks—could be regularly interdicted by enemy action.

Maneuver units at all levels must become less dependent on higher echelons. Therefore, autonomous aerial resupply should be integrated at the lowest level possible.

According to Field Manual 3-96, The Brigade Combat Team, FSCs provide the greatest flexibility for logistics support within the BCT. Although organic to the brigade support battalion, FSCs are frequently attached by the BCT commander to their supported maneuver battalions, and they provide the link from the brigade support battalion to the supported battalions.

Because FSCs normally operate in close proximity to their supported battalions or squadrons, they are best positioned to react quickly to changing conditions and logistics requirements.



SUPPLY FROM THE SKY

Soldiers of the 3rd U.S. Infantry Regiment ("The Old Guard") participate in an exercise using the JTARV in September with ARL at Fort A.P. Hill. During the exercise, JTARV showed its potential for one day enabling Soldiers on the battlefield to order resupply and then receive those supplies from an autonomous unmanned aerial vehicle. (U.S. Army photo by Pfc. Gabriel Silva, 3rd U.S. Infantry Regiment "The Old Guard")

Furthermore, the FSC commander can divide the company and place some elements forward with the supported unit and other elements in the brigade support area. By doing this, the FSC can anticipate and rapidly respond to urgent movement requirements. It can deliver supplies and mission-essential equipment from either the brigade support area or the maneuver battalion's combat trains.

The FSC is ideally situated to use an autonomous aerial distribution capability as an additional means to fulfill routine or urgent resupply requests. This capability would reduce the supported elements' vulnerability to enemy action and increase their ability to exploit an enemy's weakness. Essentially, autonomous aerial resupply gives the FSC a solution to support multidomain battle maneuver.

CHALLENGES AND THE WAY AHEAD

Providing UASs for sustainment support directly to maneuver formations would present some challenges that would need to be addressed before the capability

could be effectively implemented. These hard questions first must be answered:

- How will unmanned logistics systems be operated to maximize safety for other aircraft and personnel on the ground?
- How will these systems be integrated into the tactical airspace control network?
- Who will operate these systems for the FSC, and what level of training will they require?
- How will the systems be maintained, and by whom?
- Will these systems displace other equipment in the FSC?
- How will cyber and network security concerns be addressed?
- How much payload should one system deliver?
- How fast and how far should the systems be able to go?

To tackle these issues, the Army and Marine Corps established the requirements integrated product team for the joint tactical autonomous air resupply

system (JTAARS) in October 2016. The team is exploring these questions and refining procedures in order to successfully implement autonomous aerial resupply at the most forward tactical echelons.

The integrated product team consists of capability developers and subject matter experts from the Sustainment, Maneuver, Mission Command and Aviation Centers of Excellence and from Marine Corps headquarters and other stakeholders. The team's ultimate objective is to fully document JTAARS requirements and transition the system to a program of record.

In the meantime, Army research organizations and their industry partners are tackling the technical challenges to develop air vehicles with the physical characteristics, automated navigation systems and associated human-control interfaces that will allow the systems to be integrated into FSCs.

Multiple DOD organizations are actively pursuing technology to deliver capabilities simple enough to maintain and operate within the FSC. The U.S. Army Armament Research, Development and Engineering Center has teamed with an industry partner to develop the joint tactical aerial resupply vehicle, formerly known as the Picatinny Pallet. The U.S. Central Command is also pursuing a cargo UAS.

Together, these representative technology approaches were submitted as a single joint capability technology demonstration proposal. The proposal seeks to develop and demonstrate air vehicles capable of autonomously delivering payloads of 300 to 600 pounds, which aligns closely with the JTAARS integrated product team's preliminary requirements



analysis. While this joint capability technology demonstration was not funded, the work to investigate this solution continues.

Additionally, the U.S. Army Research Laboratory (ARL) and the Office of Naval Research are working with an industry partner to scale down an existing helicopter autonomy package for integration into smaller unmanned aerial vehicles such as the joint tactical aerial resupply vehicle. This would greatly reduce the requirement for operator control inputs.

In a separate effort, the Telemedicine and Advanced Technology Research Center of the U.S. Army Medical Research and Materiel Command is seeking to develop capabilities for future combat medics.

These capabilities include medical resupply and casualty evacuation with UASs that use vertical takeoff and landing when conventional medevac assets are denied access or are unavailable.

CONCLUSION

Regardless of what form the technical solution ultimately takes, autonomous aerial resupply will provide the FSC commander an additional tool to accomplish the mission of providing adaptable and flexible distribution support for the maneuver battalion. UASs may not immediately replace existing capabilities within the FSC, but they will provide a uniquely responsive distribution option to help maneuver forces seize, maintain and exploit the initiative in multidomain battle.

For more information, go to the Combined Arms Support Command website at <http://www.cascom.lee.army.mil> or contact Maj. Drew Scruggs at andrew.m.scruggs.mil@mail.mil.

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CARE FROM THE AIR

The Telemedicine and Advanced Technology Research Center of the U.S. Army Medical Research and Materiel Command (USAMRMC) is working with Dragonfly Pictures Inc. to develop medical resupply and casualty evacuation capabilities using unmanned aerial systems. (USAMRMC photo)



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LISTEN CLOSELY

Can the Army transition to an IP-based voice architecture? Lessons learned when Fort Leonard Wood went to an all-IP phone system will help.

*by Mr. Alberto Dominguez, Mr. Willie Matthews
and Mr. Joseph Casazza*

In a complex world, sometimes old questions require new answers. With the changing nature of work and the mission requirement to boost the Army's agility, modernizing the voice architecture at Army installations supports the Soldiers' need to collaborate from anywhere, at any time and from any device.

Advancing Internet Protocol (IP)-based technology, which transmits all data traffic via Ethernet cables, can now deliver a reliable voice service that competes with legacy technology, known as time-division multiplexing (TDM). Currently, Army installations employ TDM technology to deliver voice services, such as local 911 calls, faxes and inbound phone calls from outside the installation. Outdated and costly to maintain, TDM technology fails to deliver the new voice services commonly available on an IP-based system, such as mobility, voice mail and caller ID.



MAKING CONNECTIONS

After decommissioning the old telephone system at Fort Leonard Wood, I3MP installed clear fiber-optic patch panels that allow cables to be cross-connected in a controlled environment. (U.S. photo by Scott Sundsvold, I3MP Strategic Communications)

The end result is a new telephone solution that reduces the time needed to establish commercial service from months to weeks while eliminating the need to maintain legacy circuits and equipment.

When the Army decided to modernize its telephone system, it called upon the Installation Information Infrastructure Modernization Program (I3MP), part of the Program Executive Office for Enterprise Information Systems (PEO EIS). I3MP supports the Soldier through information technology, infrastructure modernization and life cycle management of the Army's Installation Campus Area Networks and command centers within the continental United States.

The I3MP office set out to deliver installation capability sets using state-of-the-art information technology to connect Army customers to the network. This involves converting installation voice circuits to IP, transitioning from TDM to Voice over Internet Protocol (VOIP) technology and

connecting to Defense Information Systems Agency (DISA) VOIP architecture.

From 2013 to 2017, I3MP performed an installation capability set modernization on Fort Leonard Wood, Missouri, to move approximately 19,900 users to an IP-based communication system. By upgrading its network with IP communications, Fort Leonard Wood has reduced the operations and maintenance costs for its voice services while providing Soldiers with new collaboration capabilities to improve timely knowledge exchange and decision-making by Army leaders.

Fort Leonard Wood is the first Army installation to use DOD's Assured Services Session Initiation Protocol (AS-SIP) trunking for Defense Switched Network

calls as well as all commercial calls. A telecommunications trunking system enables many clients to share a standard set of telecommunication lines, or frequencies, to access the telecommunications network, in much the same way as the roots and branches of a tree share a common tree trunk.

As such, Fort Leonard Wood served as the test bed for I3MP and its project partners to identify and overcome numerous challenges, learning valuable and sometimes difficult lessons. The experience will help the Army move forward with the deployment of VOIP using AS-SIP.

WHY VOIP?

The maturity of IP technology, the increasing competition among internet service providers and the improved network security offered by IP technology provided compelling reasons for Army installations to transition. But AS-SIP was not a simple solution to install for the first time. While it is a better, faster and cheaper technology than TDM, AS-SIP

is not widely understood. A scarcity of the necessary technical knowledge, skills and expertise within both the public and private sectors has complicated the effort.

AS-SIP, based on the commercial standards for the Session Initiation Protocol, is the DOD standard signaling protocol used on information system networks that provide end-to-end assured services. Using IP networks, AS-SIP enables internet telephony for voice and video calls, as well as instant messaging, in much the same way as a smartphone.

THREE PROBLEMS FOUND

On a VOIP telephone system, a phone call is technically an “AS-SIP session.” To avoid confusion, this article will refer to an AS-SIP session as a “session call.” During Fort Leonard Wood’s transition from TDM to IP, I3MP identified three things that can go wrong when initiating an AS-SIP session—that is, when making a session call. (The specific reasons for why a session call fails are too complex and varied to describe in detail.)

- No call: User A tries to invite User B to join a session call, but the invitation is not completed.
- Failed call: User A invites User B to join a session call, but the network never initiates the session call, so it is not made.
- No audio: User A initiates a successful session call with User B, but User A is not able to hear User B, or vice versa. Or User A initiates a successful session call with User B, but neither user can hear the other.

RECOMMENDED RESOLUTIONS

When AS-SIP receives an invitation to join a session call, an AS-SIP message responds with an interpretation of a corresponding request and a receipt. When protocol failures happen, error messages occur. These error messages are useful for troubleshooting.

In the case of the three identified issues, the only error message sent was “488 Not Acceptable Here,” which does not define

SURVEYING THE SYSTEM

Brendan Burke, right, product manager for I3MP, tours Fort Leonard Wood’s new voice telephone service in December. The installation capability set modernization, a four-year effort, moved approximately 19,900 users to an IP-based communication system and pointed the way for other Army installations to transition to a voice architecture for reliable installation communications offering mobility, voice mail and caller ID. (U.S. Army photo by Scott Sundsvold, I3MP Strategic Communications)





IN WITH THE NEW

The IP-based voice system installed at Fort Leonard Wood and shown here replaces the TDM technology, which fails to deliver the voice services commonly available on an IP-based system. (U.S. Army photo by Scott Sundsvold, I3MP Strategic Communications)



OUT WITH THE OLD

Each TDM cabinet replaced at Fort Leonard Wood contained a circuit that enabled the transmission and reception of independent signals over a common signal path. Other Army installations still employ TDM technology to deliver voice services, including local 911 calls, faxes and inbound calls. (U.S. Army photo by Scott Sundsvold, I3MP Strategic Communications)

a specific problem to resolve. In mechanical terms, this error message is like saying your car is making a funny noise, but the “check engine” light is off. This error could indicate many issues—hence the complexity of the problem and the need to understand the processes and procedures for initiating and terminating a session call.

When a caller initiates a session call on a VOIP phone, a data packet travels from the caller’s phone to their local session controller, which exerts control over the signaling and media streams to initiate, conduct and end an AS-SIP session call.

From a software switch—a central device that connects calls across a telecommunications network—the data packet travels to the receiver’s VOIP phone. When a session call fails, the issue may be a failure anywhere in the telecommunications system.

Therefore, AS-SIP troubleshooting is a team effort. Installing and testing a DISA AS-SIP circuit requires coordination with all parties involved as well as new skills and tools. For example, troubleshooting an AS-SIP issue requires a network protocol analyzer, a computer program or hardware capable of intercepting and logging traffic over an IP network. The analyzer captures each data packet and decodes the packet’s raw data to analyze its content as data streams flow across the network. When troubleshooting the call path, the analyzer makes it possible to capture traces to and from suspect equipment.

LESSONS LEARNED

Fort Leonard Wood is the first site where I3MP installed AS-SIP trunking for voice calls on the Defense Switched Network as well as all incoming and outgoing calls on a public switched telephone network.



Through comprehensive and complete call testing to verify system interoperability and to identify anomalies, I3MP learned three lessons about preventing each of the three aforementioned problems:

- **No call:** Ensure that the local session controller can handle the data packets by properly configuring the installed local session controller and session border controller.
- **Failed call:** Verify that the local session controller and session border controller configurations match with the DISA and vendor networks.
- **No audio:** Coordinate and collaborate with DISA to ensure that the local session controller and session border controller handle all AS-SIP protocols appropriately. Thoroughly test the system compatibilities to ensure that it is fully operational.

TDM technology requires that each element involved in the call be installed, maintained and operated individually. AS-SIP technology is a break from the past in that it is an integrated, not a stand-alone, solution. AS-SIP is an end-to-end communication



TECHNOLOGY RELIC

In all, I3MP decommissioned 26 cabinets containing Fort Leonard Wood's old telephone systems, which were outdated and costly to maintain. (U.S. Army photo)

technology, and if any stage of the session call does not transfer the protocol, it fails. Therefore, all stakeholders need to understand DISA methods and procedures.

CONCLUSION

The lessons learned from this first TDM decommissioning at an Army installation within the continental United States demonstrate that the Army can transition to an IP-based voice architecture. In the coming years, I3MP will apply the lessons it has learned as it continues to modernize Army installations. The end result is a new telephone solution that reduces the time to establish commercial service from months to weeks while eliminating the need to maintain legacy circuits and equipment, helping the Army win in a complex world.

For more information, go to <http://www.eis.army.mil/programs/i3mp>.

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ALL HANDS

Streamlining modernization of the Army's home station mission command centers requires close coordination among stakeholders, from home station to the battlefield. (Image by Scott Sundsvold, I3MP Strategic Communications)





LESSONS LEARNED^{IN} MODERNIZATION

I3MP gleans proven practices and lessons learned the hard way from the Army's first modernization of home station mission command centers.

by Maj. Aleyzer Mora and Dr. Linda O. Jones

An Army commander must be able to communicate with geographically dispersed forces to command effectively. A home station mission command center (HSMCC) increases a commander's ability to communicate with military partners anytime, anywhere.

Designed to enable the Army to "fight tonight," an HSMCC is a joint operations center that nests within the mission command network to provide expeditionary, uninterrupted mission command through a network of intuitive, secure, standards-based capabilities adapted to commanders' requirements and integrated into a common operating environment. The Army needed to address the fact that over the past decade, corps and division headquarters have procured a variety of nonprogrammed, non-standardized systems to supplement their tactical equipment. So it initiated a three-phased effort that will provide both a technology refresh and deliver a standard HSMCC capability across 18 headquarters (11 divisions, three corps and four other headquarters).

The initial operational capability phase of the HSMCC provides common core capabilities through standardization of warfighting and nonwarfighting tools, technical refresh of supporting audiovisual and network infrastructure components, and normalization of the HSMCC integration into installation and theater networks.

In this phase, the Installation Information Infrastructure Modernization Program (I3MP), within the Program Executive Office for Enterprise Information Systems, modernizes the existing command centers to deliver mission command capabilities, giving commanders what they need to win the fight tonight. I3MP completed the first four HSMCC modernization projects in 2017. The following proven practices and lessons learned promise to have a significant impact on the ongoing HSMCC initiative.

PLANNING THE PLAN

1. Build buy-in.

Issue: I3MP has developed and implemented a defined, repeatable process to ensure the rapid, cost-effective fielding of this innovative information technology solution, which requires significant planning and coordination among multiple organizations, including the unit's leadership, the command center's facility manager, the local department of public works, the network enterprise center and the unit's cybersecurity team.

Recommendation: Use the signing of the project concurrence memorandum

at the start of the project to define the roles and responsibilities of each stakeholder.

2. Build an integrated master schedule.

Issue: Each HSMCC project is a custom job, designed around an existing joint command center networked with five conference rooms. The number of different groups involved creates issues in scheduling, coordinating and managing tasks.

Recommendation: Build an integrated master schedule to track and monitor the following supporting plans to keep the project on schedule and on budget.

3. Build a logistics support plan.

Issue: Command center modernization is a multimillion-dollar project. As a result, acquiring, tracking and storing the high-value items is a high priority. Delays in equipment turnover, lost shipments, and missing or damaged items can all cause significant project delays and budget overruns.

Recommendation: Build a logistics support plan that describes the necessary

logistics activities, assigns responsibility for those activities and establishes a schedule for completion.

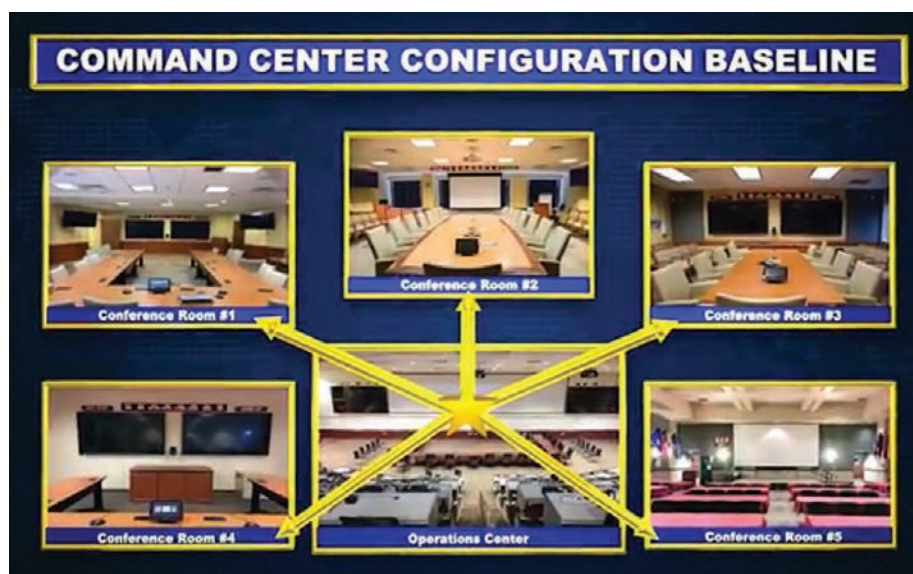
4. Build a cybersecurity plan.

Issue: The cybersecurity risks at command centers when connecting new equipment to the network are considerable, and review of the information assurance requirements takes a minimum of 90 days per conference room. Altogether, the six rooms take 540 days to complete.

Recommendation: Build a cybersecurity strategy before the installation to drastically reduce the review process from three months per conference room to three months for the whole command center.

5. Build a quality assurance engineering implementation plan.

Issue: These HSMCC projects are the Army's first efforts to standardize joint operations centers. As a result, the engineering plans are continuously improving, resulting in multiple versions of the same documents and creating challenges in tracking



COMPACT REVIEW PROCESS

Command centers face high cybersecurity risks when connecting new equipment to the network. I3MP personnel have found that building a cyber strategy before installation to review information assurance requirements for the whole command center, rather than going through reviews for each conference room, dramatically reduces the review process. (Graphic by Maj. Aleyzer Mora, I3MP)

approved changes and coordinating support.

Recommendation: Use a quality assurance engineering implementation plan that describes how the engineers will manage the quality assurance process during the installation to ensure the application of defined standards, practices, procedures and methods.

6. Build a strategic communications plan.

Issue: Keeping all stakeholders informed of project activities and challenges is a systemic problem.

Recommendation: Build a strategic communications plan with the unit's public affairs office to establish clear channels of information.

WORKING THE PLAN

1. Use the in-progress review meetings.

Issue: No plan survives first contact. During the first HSMCC projects, every site encountered incidents that significantly impacted the installation. Unresolved issues early in the project become costly delays. For example, the lack of a clear cyber strategy to address the information assurance requirements for all six of the conference rooms will prevent the rooms from connecting to the network.

Recommendation: Use the weekly in-progress review meetings, and in some cases the quarterly progress review, with all stakeholders to voice new issues and seek immediate resolutions.

2. Use a tiger team to solve systemic problems.

Issue: The first project site experienced video teleconferencing issues within the unit's conference rooms that produced extended delays. I3MP formed a

select group of engineers, called a tiger team, to investigate and solve the technical and systemic problems impeding completion of the installation.

Recommendation: The tiger team proved valuable in maintaining any gains achieved during the planning, ensuring that work on the project did not inhibit the unit from completing its mission.

CONCLUSION

A strong partnership with project stakeholders is vital to ensuring that the project has minimal impact on a unit's day-to-day operations. As such, stakeholder participation during the first site visit to the command center is the first opportunity for all stakeholders to apply these lessons learned, helping to ensure the project's success.

Streamlining Army modernization to sharpen the Army's competitive edge in an increasingly dangerous world requires close coordination and cooperation among all stakeholders. I3MP hopes the insights captured here will be used and validated at future HSMCC projects so that they can be institutionalized, contributing to the Army's

continuous learning and rapid delivery of cost-effective information technology solutions to the warfighter.

For more information, go to the I3MP website at <http://www.eis.army.mil/programs/i3mp>.

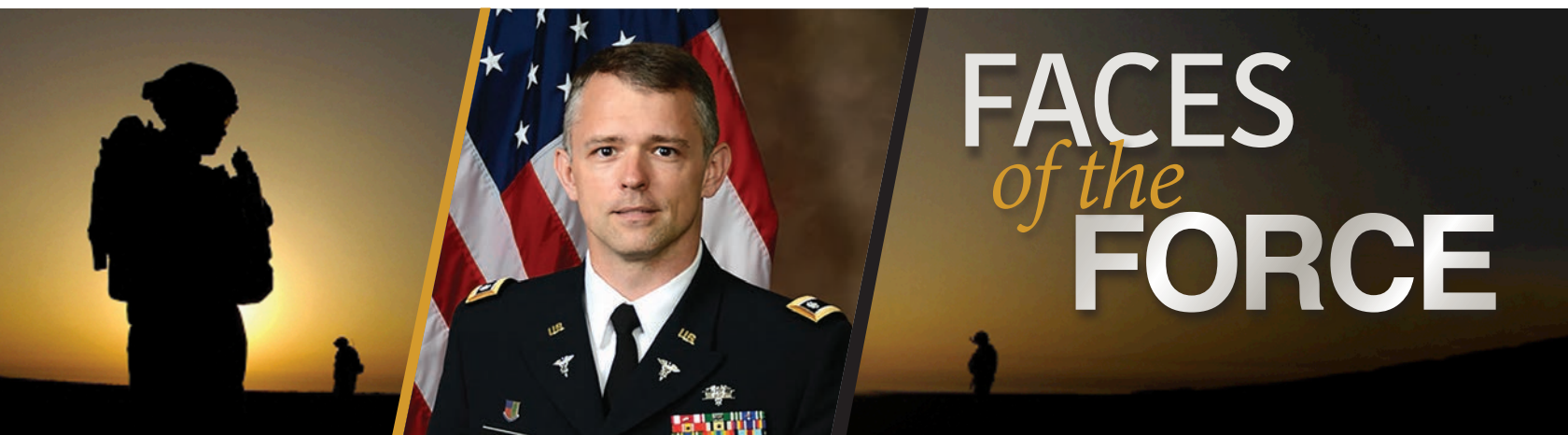
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DR. LINDA O. JONES has been the I3MP master scheduler since April 2016. She holds a Ph.D. in education from Walden University and an M.A. in management from Regent University, and bachelor's degrees in political science and business administration from Virginia Wesleyan College. She is a certified Project Management Professional and Scrum Master, and is Level II certified in program management. She also holds certifications in cybersecurity, Security+ and ITIL v3 Foundation.



BETTER COMMUNICATIONS, AGILITY OF COMMAND

The 1st Infantry Division's Joint Operations Center at Fort Riley, Kansas, recently underwent an HSMCC tech refresh. An HSMCC is a joint operations center that nests within the mission command network to provide expeditionary, uninterrupted mission command to improve battlefield communications and warfighter agility. (U.S. Army photo by Thomas "Karl" Brenstuhl, I3MP)



LT. COL. MATTHEW G. CLARK

COMMAND/ORGANIZATION:

Joint Product Manager for Chemical Defense Pharmaceuticals, Joint Project Manager for Medical Countermeasure Systems, Joint Program Executive Office for Chemical and Biological Defense

TITLE: Joint product manager

YEARS OF SERVICE IN WORKFORCE:
17

YEARS OF MILITARY SERVICE: 26

DAWIA CERTIFICATIONS:

Level III in program management and science and technology management

EDUCATION:

Ph.D. in behavioral and neural sciences, Rutgers University; B.A. in psychology and Distinguished Military Graduate, Coe College; Project Management Professional certification from the Project Management Institute

AWARDS: Army Medical Department "A" Proficiency Designator; Behavioral Sciences and Leadership Teaching Excellence Award; Order of Military Medical Merit; Meritorious Service Medal (seventh award); Army Commendation Medal (third award); Army Achievement Medal (second award); National Defense Service Medal (second award); Iraq Campaign Medal; Global War on Terrorism Service Medal; Korean Defense Service Medal; Overseas Service Ribbon; Army Service Ribbon; Expert Field Medic Badge; Army Staff Identification Badge

Acquisition a 'perfect fit' for Army scientist

As joint product manager for Chemical Defense Pharmaceuticals assigned to the Joint Project Manager for Medical Countermeasure Systems (JPM-MCS), Lt. Col. Matthew G. Clark leads a team of acquisition and technical experts to ensure that U.S. troops are protected from the effects of chemical, radiological and nuclear threats. He's responsible for providing centralized research, development, acquisition management and joint service integration for countermeasure products transitioning from the technology base through full life cycle management once they've received approval from the U.S. Food and Drug Administration (FDA).

A component of the Joint Program Executive Office for Chemical and Biological Defense (JPEO-CBD), JPM-MCS provides U.S. military forces and the nation with medical solutions to counter chemical, biological, radiological and nuclear threats, and facilitates acquisition of medical countermeasures and systems to enhance the nation's biodefense capability.

"Most people don't know that DOD engages in pharmaceutical development to protect service members," he noted. "The capability is critical for the services, but it also serves the public: Most of the capabilities become a part of the Strategic National Stockpile that supports civilians and [responses to] other crises around the world." The stockpile comes under the Centers for Disease Control and Prevention.

The biggest challenge Clark currently faces is accelerating development and delivery of autoinjectors that protect warfighters from chemical warfare agents. "Drug-device combination product development is inherently expensive, and it's a long process because you have to develop a drug and engineer the right kind of device that can be reliably produced," he said. "To be effective, you need to develop a resource-linked schedule and stick to it."

In addition to developing that schedule, his team works to engage senior leadership to ensure that they remain focused on the program's priorities. "Teams need to act

SCIENCE & TECHNOLOGY

“Most people don’t know that DOD engages in pharmaceutical development to protect service members. The capability is critical for the services, but it also serves the public.”

tactically and think strategically to be successful,” he said. He also has increased the frequency of meetings with the FDA to help that agency understand the military context of products in development. “That has been one of our biggest accomplishments, and it has given us more flexibility in product development,” he said. “In one case, it helped us with significant cost avoidance while simultaneously enhancing readiness for service members.”

Clark has been in the Army for 26 years. He got his start in acquisition as a research psychologist at an Army medical lab, conducting bench work supporting JPEO-CBD. “When I started, I didn’t really know what acquisition was and couldn’t get a satisfactory explanation from anyone I asked,” he said. “So I took the acquisition training that was offered and realized that it’s a perfect fit for a military scientist. It’s a natural progression of how we can use our analytical and research skills to develop and field systems that help warfighters.”

He used those skills in the field in 2006, when he served on a Field Assistance in Science and Technology (FAST) team in Iraq. The team’s mission was to explore innovative ways to support combat operations through research, development and acquisition. His team was tasked with developing requirements for medical and nonmedical technology to counter improvised explosive devices (IEDs). At the time, IEDs restricted unarmored vehicles to forward operating bases, particularly in Iraq, which made casualty evacuation difficult.

“We needed a timely means of moving patients receiving en-route care by medics on medically equipped vehicles to enhance recovery and to reduce the potential for long-term disability—in short, an armored ambulance,” said Clark. However, demonstrating the need for the ambulance was complicated by several challenges. “One of the biggest issues was that no one understood how evacuation was actually taking place in combat,” he explained. Additionally, the data necessary to understand the issue was scattered across various places in theater, held by troops on the ground, specialized units and other sources.

Clark gathered and analyzed relevant data and worked with the team to write the urgent requirement request. After returning stateside in 2006, he worked with U.S. Central Command, the joint staff and the Joint Rapid Acquisition Cell to secure funding for 16 heavy armored ground ambulances (HAGAs), a variant that eventually transitioned into the Mine Resistant Ambush Protected (MRAP) vehicle system. He served as a subject matter expert in the design of the HAGA, and by 2008 nearly 700 armored ambulances were fielded through a combined effort involving Marine Corps Systems Command and the MRAP Joint Program Office. As a result of his success, he was assigned to work on rapid acquisition issues in the Asymmetric Warfare Office of the Army G-3/5/7, an unusual assignment for an Army research psychologist.

Not long after his deployment, Clark spent a year at the U.S. House of

Representatives through the Army Congressional Orientation Program. Originally assigned as a military legislative assistant to Rep. Elijah Cummings, D-Md., Clark also served as medical liaison, managing the health and military legislative portfolios. He prepared questions and background briefing materials, met with constituent groups to discuss foreign policy and veterans’ issues and advised Cummings on legislative developments in several policy areas.

“I learned so much from that assignment,” he said. “Having the chance to see ‘how the sausage gets made’ is invaluable,” Clark said. Members of Congress, he explained, “are in tune to their constituencies and how issues affect them.” To be effective on the Hill, “the Army needs to be able to articulate the impact of an issue or the value of a program for a particular constituency,” Clark said. “That same skill is needed to lead a program. And it’s also essential to know how programs are built, maintained and funded—the power of the purse.”

Clark is also a published author in leader development, behavioral neuroscience and psychology. “Writing is about personal development and perfecting your thinking and your craft while also giving back,” Clark said. “I’ve learned that to be effective, you must have a character-driven clarity of intent, which comes through writing. Serving with character should speak for itself. We are not always perfect, but we strive for it at all times.”

—MS. SUSAN L. FOLLETT



THANK YOU FOR YOUR INPUT

During the system refinement demonstration at Fort Hood, Texas, in September, Lt. Col. Mark Henderson, second from left, product manager for Network Modernization, presents certificates of appreciation to Soldiers from the 57th Expeditionary Signal Battalion for their efforts in testing an expeditionary radio system during NIE 17.2. "We have to get past that ingrained mindset that system acquisition and modifications have to take years," Henderson said. (U.S. Army photo by Amy Walker, PEO C3T Public Affairs)

FORTIFIED BY FEEDBACK

Even cutting-edge and high-tech systems are about people. Gathering Soldier feedback, implementing it quickly and then showing test units the improved product helped PEO C3T get a new expeditionary radio closer to the field.

by Ms. Amy Walker

As the Army faces potential peer adversaries, it is searching for solutions to reduce traditionally long acquisition timelines and modernize its tactical network more rapidly.

In support of this quest, Soldier feedback from Network Integration Evaluation (NIE) 17.2 and user focus groups helped to rapidly refine a tactical line-of-sight radio within 45 days after the event concluded.

Once the enhancements were complete, the program office went to Fort Hood, Texas—home to the 57th Expeditionary Signal Battalion, 11th Theater Tactical Signal Brigade, which operated the system during NIE 17.2—and provided a hands-on demonstration so the unit's Soldiers could see for themselves that the program office had implemented their feedback, directly and immediately.

“The biggest value of this effort to the Soldiers was the quick turnaround, as opposed to previous fieldings of other Army capabilities,” said Col. David Thomas, commander of the 11th Theater Tactical Signal Brigade. “The most important thing was that the Soldiers’ opinions mattered.”

During NIE 17.2, in July 2017, the 57th Expeditionary Signal Battalion evaluated the expeditionary line-of-sight radio. Just back from deployment, the battalion put the capability through its paces during operational training missions in the harsh desert environment of



TALKING POINTS

Lt. Col. Patrick Lane, commander of the 57th Expeditionary Signal Battalion, addresses troops following a look at refinements made to a line-of-sight radio during the demonstration at Fort Hood. Leveraging Soldier feedback from in theater and events such as user juries, coupled with greater outreach to industry partners, will help the Army get new capabilities to Soldiers more quickly. (U.S. Army photo by Amy Walker, PEO C3T Public Affairs)



PUTTING NEW GEAR THROUGH ITS PACES

Shortly after returning from Iraq to Fort Hood, the Army's 57th Expeditionary Signal Battalion supported the operational test of a line-of-sight radio during NIE 17.2, conducted in July at Fort Bliss, Texas. The program office used Soldier feedback from the event to make refinements to the system within 45 days after the NIE. (Photo by Keith West, Mission Command Test Directorate, U.S. Army Operational Test Command Public Affairs)

Fort Bliss, Texas. Armed with the unit's feedback, the Product Manager for Network Modernization, assigned to the Project Manager for Tactical Network within the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T), worked with industry to integrate more than 12 refinements to the radio within 45 days.

THE LISTENING EDGE

"We have to get past that ingrained mindset that system acquisition and modifications have to take years," said Lt. Col. Mark Henderson, product manager for Network Modernization. "We have to listen to what the Soldiers are telling us they need, then work with industry to deliver smart commercial off-the-shelf solutions at an expedited pace whenever possible. Our enemies are not going to drag their feet to get capability to the field, nor should we."

"It's all about relationships and people," he added. "This rapid process could not have happened as fast as it did without the terrific relationship we have with the Soldiers we support, like those in the 11th Signal Brigade." (For more on how to make acquisition faster, see Henderson's commentary, "From Idea to Front Line," Page 142.)

Lt. Col. Patrick Lane, commander of the 57th Expeditionary Signal Battalion, said that he would be comfortable deploying with the enhanced system, and affirmed that it met the Soldiers' expectations. "In terms of the modifications with setup and operating in the environment that they did out at Fort Bliss, I think the enhancements were significant. ... The improvements made to the components enhanced the overall durability of the equipment and made it easier to transport. The [Soldiers'] contributions and feedback will have a lasting impact on the Army's ability to communicate for years to come," Lane said.

The program office's full follow-on capability demonstration at Fort Hood on Sept. 20 enabled the 57th Expeditionary Signal Battalion and the 11th Theater Tactical Signal Brigade to see firsthand that the capability was ready to be fielded.

"What I thought was most impressive was the follow-up and then the response time in terms of speed to action," Lane said. "Sometimes you don't know if they take your feedback or not. ... To give the Soldiers an opportunity to have their voices heard, in terms of operationalizing the equipment that they work on every day, and then to see that their voices actually were heard, is pretty significant."



HEARD AND UNDERSTOOD

Maj. Keith Jordan, assistant product manager for Network Modernization, demonstrates cable refinements to Spc. Cindy Matlock, 57th Expeditionary Signal Battalion, who had provided feedback on the system during NIE 17.2. When senior leadership collects and quickly implements feedback from events like NIE, Soldiers get better equipment as well as confidence that their suggestions are heard. (U.S. Army photo by Amy Walker, PEO C3T Public Affairs)

During the demonstration, Capt. Jermaine Wright, a company commander in the battalion who operated the line-of-sight radio at NIE 17.2, said the improvements directly addressed the feedback he had provided.

“[The program office] did an excellent job of receiving the information from the Soldiers and actually going out and executing,” Wright said. “Our Soldiers did a great thing here. We reviewed the system and put our thoughts and actions into it, and we have a better product for the Army. The sooner we get the system, the better.”

“To give the Soldiers an opportunity to have their voices heard, in terms of operationalizing the equipment that they work on every day, and then to see that their voices actually were heard, is pretty significant.”

CONCLUSION

Leveraging Soldier feedback from events such as NIEs, user injuries and pilots, and from in theater, and reaching out to industry partners will help the Army to get needed capability into the hands of Soldiers at an accelerated pace. Exercises like the NIEs enable Soldiers to push capability to the breaking point before real operational military or humanitarian deployments, when they need that capability to be most effective, said Maj. Keith Jordan, assistant product manager for Network Modernization.

“The Army understands that technology will continue to advance, and to stay ahead of our adversaries we need to continually scrutinize our tactical network capability,” Jordan said. “The best way to do that is to listen to the Soldiers who will be using the capability on the battlefield. We have to make systems easy for them to operate and maintain. Anything we can do to ease their burden in the face of the enemy is time and money well spent.”

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

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COMMAND,



TAKING THE HEAT

CERDEC's Expeditionary Command Post Capability project personnel are putting the finishing touches on the Command Post Platform – Improved demonstrator, an on-the-move capability that supports an entire brigade's server needs. Engineers collaborated with industry to design and test a novel cooling solution that would allow the servers to operate from inside the vehicle. Using a thermal imaging camera, Kyle Swisher, CERDEC engineer, measures the servers' heat output on Dec. 6 to identify hot spots and assess cooling efficiency at CERDEC's C4ISR Prototype Integration Facility, Aberdeen Proving Ground, Maryland. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

UNENCUMBERED

As CERDEC explores and tests technologies to modernize the command post, the focus is on keeping the commander close to the battle, and the warfighting information close to the commander.

by Ms. Lisa Heidelberg and Ms. Kathryn Bailey

If the path to overmatch on the modern battlefield had a Facebook status, it would undoubtedly be “it’s complicated.”

Commanders on the modern battlefield will face peer and near-peer adversaries employing a combined-arms attack to disrupt both the physical and electronic capabilities of their command posts. Their maneuver operations will span multiple, complex terrains including deserts, jungles, sub-terrains and highly populated cities. At times, these missions will include coordinating with other commanders in offensive and defensive operations across the multiple domains of air, land, sea, space, cyberspace and other contested areas such as the electromagnetic spectrum.

The counter to these complicated scenarios is an expeditionary force equipped with technologies that allow it to attain a lethal advantage, elude the enemy and rapidly execute missions whenever, from wherever. These mobile capabilities must be as robust as, or better than, those found in a traditional command post. They must free up the commander from mundane tasks such as reading process documents or locating areas of interest on an acetate map, tasks that could shift the focus away from his intent.

Most importantly, commanders must have access to these technologies quickly. Adversaries are not waiting for a fair fight, and neither are we.

The U.S. Army Materiel Command’s Communications-Electronics Research, Development and Engineering Center (CERDEC) is leading the Army’s modern command-post capability development efforts in



collaboration with the U.S. Army Training and Doctrine Command. It has developed multiple capability demonstrators that are changing the dynamics of the traditional command post by unteathering commanders and providing them with the same or better capabilities than they had with their stationary, networked mission command systems.

Large, fixed buildings and tents are giving way to flexible, intelligent and on-the-move command post capabilities. Software systems are allowing mobile collaboration across echelons. Process workflows are automating steps to help commanders make decisions. “Smart” advanced human-computer interfaces are on the horizon, such as hands-free speech, gesture and eye command technologies.

Modernizing the Army’s technologies has always been the driving force for CERDEC; every thought, design and prototype is created with tomorrow’s warrior in mind.

THE SMART APPROACH

The Army’s vision for the Command Post 2025 and Beyond aims to improve maneuverability, agility, lethality and

precision. CERDEC’s Expeditionary Command Post Capability program is helping to inform Command Post 2025 concepts while supporting the Command Post 2040 Strategy, which focuses on survivability and effectiveness.

However, innovation for innovation’s sake never reaches the Soldier; the key to successful innovation is to keep operational utility at the forefront through hands-on evaluations by Soldiers. CERDEC develops, fabricates and integrates command post technologies at its Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) Prototype Integration Facility. Through an iterative development process, each capability ends up in the hands of Soldiers for evaluation and feedback—from active and retired commanders down to infantry foot Soldiers—to ensure that the technology is relevant to the modern Soldier.

With this “build a little, test a little” approach, CERDEC’s command post prototypes and technology demonstrators are already helping the Army meet its modernization priorities by reducing the development process from years to months.

The Army’s new cross-functional teams, designed to expedite capabilities that will address near- and long-term warfighting challenges, most likely will look to an iterative development approach to rapidly deliver new technologies into Soldiers’ hands. CERDEC is providing representatives to two of the eight teams, each of the two designed to address the Army’s network command, control, communication and intelligence (C3I) priority. All cross-functional team leaders report directly to the undersecretary of the Army and the vice chief of staff.

The C3I cross-functional team is focusing on a unified network transport layer, joint and coalition interoperability, a mission command application suite, and command post mobility and survivability. CERDEC’s representative is providing input into mission command applications and command posts. The second network-related cross-functional team addresses position, navigation and timing (PNT). CERDEC’s significant contributions to the Program Manager for PNT led to its inclusion in the PNT cross-functional team, where several representatives will help to shape this critical mission command capability.

ROOM TO RUN

The Expeditionary Battalion Command Post, one of CERDEC’s Expeditionary Command Post Capability demonstrators, offers workspace for 12 to 15 command post staff. Soldiers of the 1st Squadron, 1st Cavalry Regiment Main evaluated the command post during Network Integration Evaluation/Army Warfighter Assessment 16.1, conducted in September 2015 at Fort Bliss, Texas. (U.S. Army photo by Edric Thompson, CERDEC)





FIELD TRIAL FOR TACTICAL COMPUTING

Soldiers from Fort Benning Mission Command Center of Excellence and the Army Sustainment Command – Army Reserve Element Detachment 7, supported by CERDEC engineers, evaluated CERDEC’s Tactical Computing Environment and other mission command technologies during the Expeditionary Command Post Science and Technology Field-Based Risk Reduction Exercise in July at Fort Dix, New Jersey. The Tactical Computing Environment allows users to collaborate across platforms such as tablets, laptops and other mounted and dismounted computing devices, and is network-agnostic, which allows it to operate across varying bandwidths. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

THE LITTLE COMMAND POST THAT COULD

CERDEC is designing expeditionary command posts that allow commanders to forgo their traditional “offices” and command from wherever, seamlessly and effectively, like many of today’s workers who do their jobs with a computer or handheld device and Wi-Fi.

CERDEC has delivered, or is in the process of delivering, command post demonstrators to several Army units for evaluation, including III Corps, XVIII Airborne Corps, 82nd Airborne Division, 101st Airborne Division and 1st Armored Division. Developed mostly for brigade and below, each demonstrator meets expeditionary criteria, meaning it will support forces that are task-organized and deploy on short notice to austere locations, thus allowing them to conduct operations immediately upon arrival.

The most comprehensive vehicle demonstrator, primarily designed for the battalion level, is the Light Mobile Command

Post (L-MCP). The L-MCP is a High Mobility Multipurpose Wheeled Vehicle (HMMWV) that features a quick-erect tent; a rollout, integrated standing-height table; chairs; semi-rugged large-screen displays; tactical network components; and converged voice communications and mission command systems. Together they form a tactical command post.

For infantry brigade combat team formations that specialize in initial entry operations, the Ultra-Light Command Post uses a Polaris DAGOR, a tactical off-road vehicle platform. Its base-line package supports multiple mission types and includes radios capable of voice and radio cross-banding, which allows two types of radios to send and receive communications, friendly force situational awareness, tactical messaging and full-motion imagery, all while at-the-halt.

Modern warfare is shifting the fight from deserts and heavy foliage into megacities. The newest and lightest command post



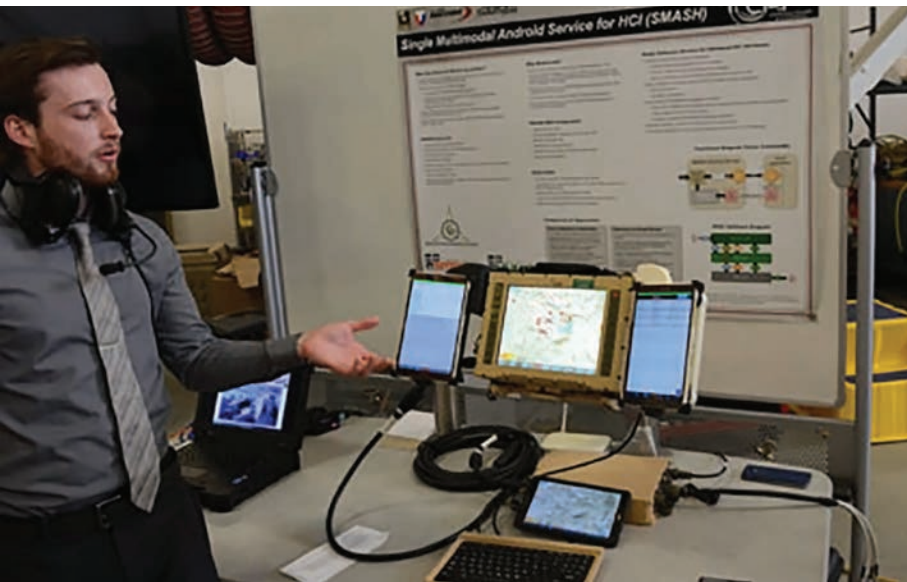
THE VEHICLE IS THE COMMAND NODE

R.J. Regars, CERDEC engineer, reviews exercise operations orders in July with Capt. Ezra McCalment, U.S. Army Reserve network engineer based at Fort Belvoir, Virginia, during the Expeditionary Command Post Science and Technology Field-Based Risk Reduction Exercise at Fort Dix. The exercise incorporated the Ultralight Command Post prototype shown here. The prototype is a fully integrated mobile command post mounted on a Polaris DAGOR vehicle that is designed to serve as a forward operating command node for specialized missions such as air assault, airborne and other initial entry operations. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

demonstrator, the Light Tactical Command Post, supports even smaller entry missions, such as special operations, in which troops may only have minutes to enter and exit.

The Light Tactical Command Post is built on top of a Polaris MRZR-4D, an even lighter utility task vehicle used by Army initial entry forces to provide increased mobility, range and command and control.

CERDEC has also delivered a shelter for evaluation. The shelter is not on wheels but can be sling-loaded to provide more mobility than a traditional command post. The Expeditionary Battalion Command Post includes worktables, projectors, laptops, mission command systems and a preconfigured interior with power and internet to establish the current operations cell.



SPEAK TO SMASH

Nick Grayson, CERDEC engineer, demonstrates CERDEC's Single Multimodal Android Service for Human-Computer Interaction, or SMASH, at Aberdeen Proving Ground. SMASH provides voice activation command capabilities in a display that Soldiers wear. This allows them to perform mission command without looking away or putting down a weapon. Hands-free mission command will reduce the Soldier's cognitive load to make them more lethal and increase their freedom of maneuver. (U.S. Army photo by David Vergun, Army News Service)

THE SOFTWARE DRIVING A MOBILE FORCE

Commanders must have the mobility to command right alongside the fight, instead of staying back in a traditional command post to gain access to the required situational awareness technologies. The Tactical Computing Environment (TCE) provides seamless mission command capability for the commander and staff across all echelons from garrison to the dismounted Soldier.

Observer coach trainers assigned to the National Training Center at Fort Irwin, California, recently evaluated the TCE as their team exercise control tool and have requested additional opportunities to use the tool based on initial positive feedback. The TCE allows Soldiers to travel on foot and in vehicles while using tablets, laptops and other mounted and dismounted computing devices to access two modes of collaboration: mirror and extend.

Mirror mode allows leaders to communicate with their geographically dispersed staff, with each user viewing the same map and any changes made to the map. The extend mode allows nearby users to place their tablets together in a grid to form one large screen as an alternative to the large video displays traditionally found in fixed command posts. The TCE device retains the map layers created in the planning session even after the Soldiers disperse.

ROLLING SERVER FARM

Nothing takes the “expeditionary” out of a command post like the slow process of setting up servers and computers.

CERDEC’s newest demonstrator is the Command Post Platform – Improved, which is a HMMWV integrated with multiple servers and a unique cooling

system designed to move with other command post elements. The Command Post Platform – Improved, which will support an entire brigade’s server needs, is ready for Soldiers’ use within five minutes of stopping versus the 30 to 60 minutes currently required to transport the HMMWV’s servers into the command post and make them operational. CERDEC plans to transition future versions to a completely wireless capability.

DISPLAY SCREENS CAN BE EXPEDITIONARY, TOO

In addition to the time required to set up command servers, hauling the heavy equipment required to run the display screens takes up valuable space. CERDEC’s Display Viewer app runs on any device in the command post and allows Soldiers to display and share workstation screens on multiple

displays. The app eliminates the need for the heavy video switch and the transit cases, which reduces the command post’s footprint by 152 pounds and 9.5 cubic feet of equipment per display space. CERDEC transitioned this technology to the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T), in part to ensure information assurance compliance. From this change, PEO C3T claims more than \$70 million in cost avoidance, the dollar amount that would have been required to replace every video switch and transit case.

CUTTING-EDGE CONCEPTS

Technologies that seemed futuristic even a decade ago are now obtainable for consumers. CERDEC’s command post modernization efforts are exploring



BRIEFING THE CROSS-FUNCTIONAL LEAD

Maj. Gen. Peter A. Gallagher, director of Architecture, Operations, Networks and Space in the Office of the Chief Information Officer/G-6 and now the network C3I cross-functional team lead under the Army’s Futures Command, discusses CERDEC’s Expeditionary Command Post Capability technologies Nov. 14 with Tyler Barton at Aberdeen Proving Ground. Gallagher also toured CERDEC’s C4ISR Prototype Integration Facility, which is responsible for rapidly developing and integrating expeditionary mission command technologies for Soldier evaluation. (U.S. Army photo by Kathryn Bailey, CERDEC CP&I Directorate)

CERDEC is designing expeditionary command posts that allow commanders to forgo their traditional “offices” and command from wherever, seamlessly and effectively.

intuitive, autonomous solutions to ensure overmatch for future combat missions.

Hands-free technologies specifically align with missions on-the-move—not just as a convenience, but for when Soldiers may be fighting for their lives.

CERDEC's Single Multimodal Android Service for Human Computer Interaction (SMASH) application is a lightweight software solution that enables voice interaction with mission command capabilities. This entirely government-owned app gives mounted and dismounted Soldiers the ability to traverse treacherous environments and speak commands such as “display overlays” or “move map to the right” without looking away or putting down a weapon.

The SMASH prototype is currently integrated into a Soldier-worn heads-up display developed within CERDEC's Night Vision organization, and is under evaluation within the PEO for Soldier as a capability integrated into the Nett Warrior device.

Planned enhancements include speech-to-text capability, which would allow the Soldier to create a text message using his or her voice, and gesture- and eye-tracking interaction for environments not suitable for traditional mouse and keyboard peripherals.

DECISION-MAKING MADE QUICK

CERDEC is also exploring predictive mission recommendations that automate the Army's military decision-making process in the same way that TurboTax automates personal income tax preparation. The Automated Planning Framework prototype features a workflow that allows commanders and staff, co-located or dispersed, to run through the decision-making process to analyze courses of action for maneuvers, logistics, fires, intelligence and other warfighting functions.

Commanders and staff can click on the steps and tasks with the process and receive graphics embedded with Army doctrinal data, a common frame of reference for military decision-making, to plan their actions. Without an automated capability, commanders must read through warning and operation orders

and manually map the information against graphics. Streamlining these steps promises to speed up the commander's decision cycle in planning the battle.

A partnership between CERDEC and PEO C3T eventually will bring the Automated Planning Framework out of the laboratory and into the field, where it will become an application that rides on the Command Post Computing Environment (CP CE) user interface. CP CE v3 will begin to provide an integrated mission command capability with a common look and feel across the command post, its platforms and echelons.

CONCLUSION

A new adage regarding expeditionary forces says that “if you are anywhere for longer than 30 minutes, you are dead.”

For this reason, the modern command post will no longer be a post, or a complex, at all. Instead, it will encompass an array of flexible and expeditionary capabilities that allow the commander to command seamlessly from anywhere and make decisions at the speed of battle.

CERDEC will continue to develop expeditionary command post technology demonstrators that are operationally relevant and can be transitioned to Soldiers quickly. Achieving overmatch on the battlefield will be complicated, but mobile and agile capabilities will help U.S. and coalition forces survive and dominate.

For more information, go to www.cerdec.army.mil.

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Large, fixed buildings and tents are giving way to flexible, intelligent and on-the-move command post capabilities.

BETWEEN YESTERDAY AND TOMORROW

USAMRMC's Combat Casualty Care Research Program
pursues evolving medicine for an evolving battlefield.

*by Col. Michael R. Davis, Lt. Col. David S. Johnston
and Mr. Ramin A. Khalili*

It wasn't that long ago when the concept of the future—this time beyond time, this collection of years on the horizon somewhere—was just that, a simple concept. But as we move from Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) onto a newer and more complex version of the battlefield, the future is beginning to look increasingly familiar—more and more like a direct reflection of the past.

Given that a more confined and condensed combat zone will likely be the norm for future conflicts, we can no longer afford to operate as a strictly reactive medical force, simply waiting to respond to geopolitical changes and technological advances. Instead, we must build upon what we know right now, refining our tools and tactics along the way.

This is how you stay ready. This is how you save lives. This is how you win.

With that mindset, it seems appropriate to explore the ways that we at the U.S. Army Medical Research and Materiel Command (USAMRMC) Combat Casualty Care Research Program (CCCRP) are continuing to modernize in the face of global instability and potential military intervention—all with a focus on sustainment of the modern warfighter.

BLOOD: THE BATTLEFIELD NECESSITY

Modernizing can mean looking to the past to revitalize highly effective—but often lost—treatments, and blood products offer the perfect example. During the recent “throwback” efforts to modernize (during OIF and OEF) via the use of whole blood instead of crystalloid and other synthetic products, new advances in blood technology have been greatly accelerated. Of these advancements, freeze-dried plasma (FDP) remains the most potent tool because it can be brought to the Soldier on the battlefield instead of requiring evacuation to a medical facility. The benefits of FDP—which is essentially a bloodlike substance minus the red blood cells—are many, but chiefly include its portability, its lengthy shelf life and the fact that it can be quickly reconstituted with sterile water at any time. While all special operations units deployed to war zones now carry FDP kits as a matter of protocol, approval for wider use by the U.S. Food and Drug Administration (FDA) is likely several months away. Full-throttle production is shortly behind that approval and dependent upon blood collection efforts.

Meanwhile, the FDA has been an important partner in likewise advancing cold-store platelet technology, a method in which platelets are removed from donor blood, stored at refrigerator temperature and then inserted back into the patient to aid clotting and to help minimize blood loss. Those efforts, which in 2015 resulted in a landmark extension of platelet shelf life



IMPROVING BATTLEFIELD OUTCOMES

Critical skills operators with U.S. Marine Corps Forces Special Operations Command simulate administering FDP to a role-playing casualty during an exercise at Camp Shelby Joint Force Training Center, Mississippi, in May 2017. All U.S. special operations forces now deploy to war zones with FDP, a crucial addition to first-aid kits that can prevent badly wounded troops from bleeding to death on the battlefield. U.S. forces used FDP in World War II, but concerns about hepatitis transmission led to its abandonment in the U.S. (U.S. Marine Corps photo by Sgt. Salvador R. Moreno, Marine Corps Forces Special Operations Command)

to up to three days with full functionality (as opposed to the previous standard of up to five days at room temperature, with gradually degrading functionality), have given way to current efforts focused on extending shelf life to more than two weeks, an impossibility just a few years ago. Coupled with research into cryopreserved platelets—a process in which platelets are stored, indefinitely, at negative 80 degrees Celsius—these advances potentially make the logistical nightmare of transporting blood to far-forward areas significantly less challenging.

We have long known the benefits of basic refrigeration for food storage and biologics. CCCRP efforts effectively harness those same principles to allow transport of these vital resuscitative

blood products to the point of injury—a requirement on future battlefields.

Beyond that, more immediate and off-the-shelf medical solutions like advanced topical hemostatic agents (items like coagulant-impregnated dressing and granulated powders that aid blood clotting) as well as acellular regenerative vascular grafts—which are grafting procedures that combine a patient's own cells with a three-dimensional collagen matrix to create an actual functioning vessel—further display an advancement of military medical capabilities over those employed in recent conflicts.

BURNS: A RISING THREAT

As the U.S. military community—and the world, too, it seems—adapts to the condensed cityscapes characteristic of the future battlefield, we will probably also be forced to contend with injuries that are far different than those witnessed in OIF and OEF. Indeed, combat operations in more densely populated metropolitan areas no doubt will come with a greater burn potential than anything we saw in OIF and OEF. Electrical hazards, uncontrolled urban fires and flame propagation in confined spaces—along with the possible use of thermobaric weapons, which by design produce more heat and pressure than traditional weapons by igniting explosive vapor in the blast zone—develop into major threats to the warfighter.

As such, the ability to quickly debride—remove dead, damaged or infected tissue—burn wounds will be key in these environments. While CCCRP-affiliated researchers already have received FDA approval of a laser-based imaging process developed to determine post-burn tissue viability, work continues in other areas, including the development of a “painted-on” debridement tool, which contains enzymes that can debride non-viable tissue automatically. Further, researchers are now using skin grafts from select animal species to cover burn wounds and provide temporary stability. So-called xenografting efforts use pig and fish skin samples and are an extension of long-used allografting efforts, which use stored human skin to cover wounds.

But perhaps one of the greatest threats on the future battlefield comes from possible chemical, biological, radiological or nuclear (CBRN) agents. In 2015, for example, the Pentagon acknowledged that insurgents in Iraq used chlorine as a weapon at least two dozen times, and had included parts of old Iraqi chemical munitions in homemade roadside bombs, according to an investigation by The New York Times. While the U.S. has made significant investments in CBRN countermeasures, treating trauma under these conditions remains difficult. Given



CARE, ELEVATED

Alaska Air National Guard troops with the 212th Rescue Squadron prepare to hoist a simulated victim to a helicopter during a mass-casualty training event at Joint Base Elmendorf-Richardson, Alaska, in November. During the exercise, the rescue operators located, treated and evacuated numerous casualties while engaging multiple attacks from opposition forces, a scenario that's widely forecast for future conflicts. (U.S. Air Force photo by Alejandro Peña, Joint Base Elmendorf-Richardson Public Affairs)

that treating contaminated casualties on the battlefield is exponentially more difficult than treating those injured via more common means, caring for the contaminated patient will be integral to maintaining health and resilience in future conflicts. To that end, the development and continued modernization of the Chemical Patient-Protective Wrap—or “chem wrap” for short—will be key.

Essentially a sealed bag with an attached air filter used for transporting a noncontaminated casualty through a contaminated environment, chem wrap was initially earmarked for development back in the 1980s. DOD later manufactured thousands of wraps in the early 1990s before they inevitably exceeded their life cycle later that same decade. Since then, however, the U.S. Army Medical Materiel Development

Activity (USAMMDA) has teamed with a variety of other federal agencies to update and improve the material used for both the chem wrap's main body and the seams used to hold the structure together. Recently, USAMMDA seeded \$8 million to a production team at Pine Bluff Arsenal, Arkansas, to produce a stockpile of chem wraps, all of which can be made available for immediate use if required.

BURGEONING TECHNOLOGIES: THE FUTURE, REALIZED

Given a little more time, it's likely that additional updated and advanced technologies will be making their debuts in far-forward areas as well. Chief among these technologies is the Extra Corporeal Life Support (ECLS) tool, which is already in use. Researchers are attempting to make the ECLS both much

smaller and more rugged to more closely fit the military's vision for coming conflicts. The desire to develop these lighter, leaner capabilities comes from the need to support forward surgical teams in providing life-sustaining care to casualties for up to 72 hours.

In practice, the ECLS can be used by surgical teams to support lung function and to operate as a vital organ substitute as well—specifically for kidney and liver function—in casualties with severe injuries. Despite their promise, current iterations of the ECLS are heavy, bulky and extremely difficult to transport effectively. However, efforts are underway to reduce the size of the machine from something currently resembling a tall filing cabinet to one resembling a small, hand-portable generator. Further, researchers are attempting to minimize the number of medical staffers required to physically operate the machine—currently five or six people—with the ultimate goal being development of an automated closed-loop organ support system.

And yet, of all these fast-emerging products, it is the development of autonomous and unmanned capabilities that captures the imagination and perhaps holds the most promise. Such technologies facilitate the synergy of the overall combat effort and allow for the kind of hand-in-glove communication critical for resupply efforts and other maneuvers that ultimately support the warfighter. Imagine, for example, the development and deployment of military-grade drones charged with carrying blood to far-forward areas. Such technology would allow for the transport of lifesaving capabilities without the potential human cost of transport. Further still, the greatest and most immediate benefit of such technology may be in delivering damage control and resuscitation



NO PILOT? NO PROBLEM.

This artist's rendering shows the ARES, under development by DARPA and designed to operate as an unmanned platform capable of transporting up to 3,000 pounds. ARES could carry a range of payload modules, including cargo and life support gear, for delivery to troops in austere battlefields. (Image courtesy of DARPA)

technologies to the combat service member at the point of injury.

To that end, and as an example, the Defense Advanced Research Projects Agency (DARPA) continues work on the Aerial Reconfigurable Embedded System (ARES), which has been under development since 2013 and is essentially a massive unmanned drone designed to carry a slew of different mission modules. Able to transport up to 3,000 pounds of supplies, the ARES could make a sizable impact in medical delivery and resupply efforts.

Here also the concept of automated vascular access comes into play. Researchers are developing miniaturized robotic units that could potentially be strapped to an injured warfighter's leg and then—using ultrasound—automatically identify and access the correct vessel in

a casualty's leg to supply fluids or deliver medication. Automating relatively simple but time-consuming medical tasks like this could save many more lives on the battlefield than before, enabling greater resilience and more fully realizing the sustainability of a smaller, leaner forward unit. Such technology is likely between one and three years away.

CONCLUSION

While no future can ever be fully and correctly forecast, we believe the path that CCCRP is charting right now—using the aforementioned technologies and others, too—reveals the blueprint by which to operate. It is a blueprint centered on trauma-based psychological demands, warfighter requirements, technology and forward-leaning excellence in scientific research. It's how we must compete in a time when the future battlefield may not be as far away as



WRAPPING UP CBRN PROTECTION

Used to protect uncontaminated or decontaminated patients from chemical agent exposure during movement through a contaminated area, the chem wrap is one component in the U.S. arsenal to combat threats from CBRN agents. An improved version of the chem wrap, first developed in the 1990s, is being produced at Pine Bluff Arsenal, Arkansas. (Image courtesy of USAMMDA Public Affairs)



DEVELOPMENT PIPELINE

Acellular regenerative vascular grafts—procedures that combine a patient's own cells with a collagen matrix to create a functioning vessel like this one—typify the advancement of military medical capabilities over those employed in recent conflicts. CCCRP is taking steps to ensure that such advancement continues as future battlefield conditions affect the types of injuries warfighters might sustain and the challenges in treating them. (Photo courtesy of Humacyte Inc.)

we think—and certainly not as far away as the words might lead you to believe. These technologies, tools and methods are indeed designed to shake up the system, because projections of coming combat realities require just such an effort.

For more information on USAMRMC, go to <http://mrmc.amedd.army.mil/> or contact Chelsea Bauckman, USAMRMC deputy public affairs officer, at chelsea.b.bauckman.civ@mail.mil. For more information on the CCCRP, go to <https://ccc.amedd.army.mil/Pages/default.aspx>.

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LT. COL. DAVID S. JOHNSTON is deputy director of the CCCRP. He holds a Ph.D. in biochemistry from Vanderbilt University, an M.S. in strategic intelligence from National Intelligence University and a B.S. in biology from Bryan College. In 2016, he transitioned to the U.S. Army Medical Materiel Development Activity to serve as the deputy commander and director of business operations. He received the Meritorious Honor Award from the U.S. Department of State and the National Intelligence Research Award from National Intelligence University.

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

FRONT-LINE SUPPORT

In addition to research that benefits all Americans, CDMRP focus on groundbreaking and innovative research that supports the readiness of warfighters and their medical needs, which go beyond injuries incurred on the battlefield. (U.S. Army photo)



INVESTING FOR **BREAKTHROUGHS**

Congressionally directed medical research in areas such as cancer, neurological disorders, traumatic injuries and rehabilitative medicine traces its roots to breast cancer advocacy work launched more than a quarter-century ago.

by Ms. Erin Bolling

The many voices echoed off the historical buildings throughout the streets of Washington, carrying a message of hope and demanding change.

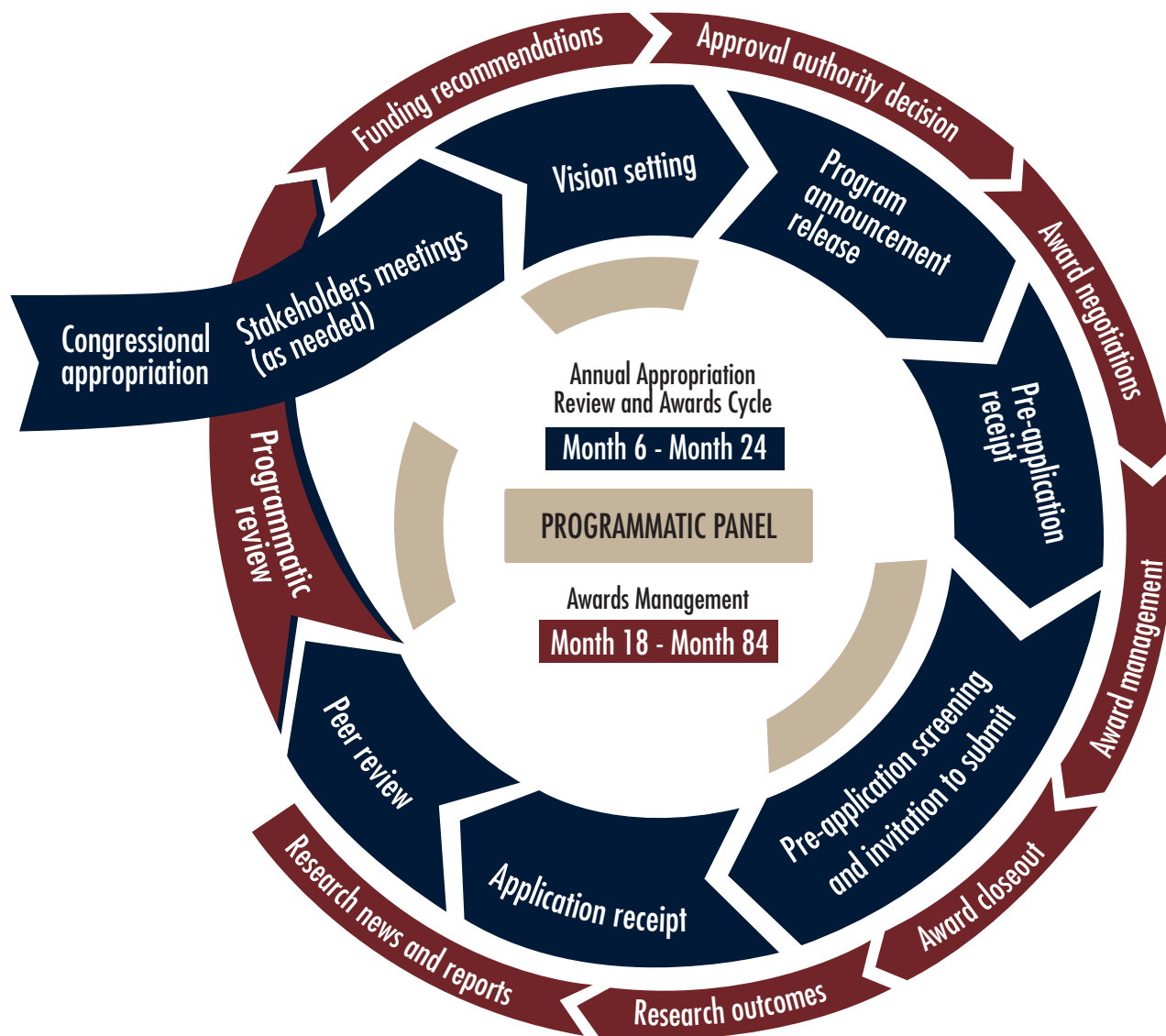
While this scene is one that resonates today, this particular event actually took place more than 25 years ago.

In 1992, the National Breast Cancer Coalition set its first priority: Increase federal appropriations for breast cancer research. Frances M. Visco, coalition president, recently recalled the beginning of the movement that eventually resulted in the formation of Congressionally Directed Medical Research Programs (CDMRP), which have since grown to support over 30 different research areas, such as epilepsy, multiple sclerosis, spinal cord injury and more.

“We launched our \$300 million-more campaign and reached out to our grass-roots coalition members across the country,” said Visco. “We did letter writing, petition signing, and held lobby days on Capitol Hill, where we brought in women to meet with their senators and representatives. We stood outside committee rooms and on the steps of the Capitol.”

In response to this movement, Congress allotted an additional \$210 million for breast cancer research. Those funds were directed to DOD, which already maintained the infrastructure with the U.S. Army Medical Command to support this research. DOD delegated the program to the U.S. Army Medical Research and Materiel Command (USAMRMC) because of its history and expertise in medical research and development. USAMRMC created CDMRP to manage breast cancer research as directed by Congress. Thus began the Breast Cancer Research Program (BCRP), the first program of the CDMRP. Nearly three decades after it was created, the latter’s focus remains the same: to foster novel approaches to biomedical research in response to the expressed needs of its stakeholders—the American public, the military and Congress.

FIGURE 1

**THE CDMRP PROCESS**

The life cycle of a Congressionally Directed Medical Research Program. There are currently 31 CDMRPs, supporting research in areas ranging from cancer to Alzheimer's disease to spinal cord injury to substance abuse. (Graphic courtesy of Leidos)

The two-tier review process includes participation by consumer advocates who have experienced the program-specific illness, disease or disorder in both reviews, as well as in the development of investment strategies and research focus areas.

“The BCRP’s strategic approach is to invest in research that addresses the overarching challenges in breast cancer and will lead to breakthroughs toward ending this disease,” said Dr. Gayle Vaday, program manager. There is no denying how far breast cancer research has come in the last quarter-century. What once was seen as a dire diagnosis has become one of the most treatable cancers, thanks to successful research.

“Over the years, the BCRP funding has been instrumental in supporting timely, state-of-the-art research that has led to clinical approaches used for patients today, including targeted therapies, like trastuzumab; imaging, such as digital mammography and breast tomosynthesis; and genetic risk assessments like OncoVue and the Breast Cancer Index,” Vaday said. The BCRP has also supported more recent trends in cancer immunotherapies and vaccines, as well as cell-cycle inhibitors, and continues to encourage innovative research ideas, she said.

INCORPORATING MANY PERSPECTIVES

Since the Breast Cancer Research Program marked the beginning of the CDMRP, research programs have been modified each year as directed by Congress; the CDMRP is responsible for determining the appropriate strategy and managing the selection process. Currently there are 31 research programs supporting dozens of topics in areas such as cancer, neurological disorders, traumatic injuries and rehabilitative medicine.

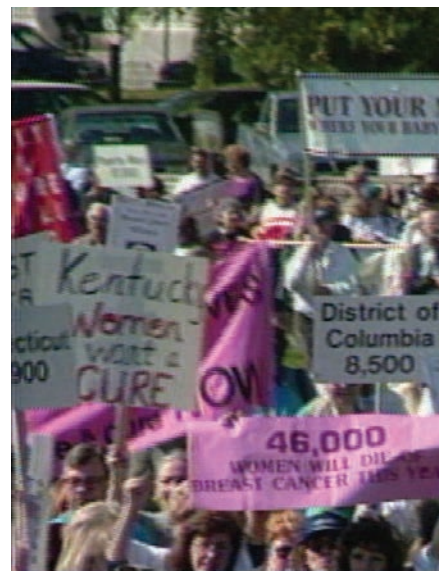
The Institute of Medicine (now called the National Academy of Medicine) provided guidance suggesting a two-tier review process. CDMRP adopted this process, which includes both peer and programmatic reviews to guide the

funding recommendations. (See Figure 1.) The two-tier process includes participation by consumer advocates who have experienced the program-specific illness, disease or disorder in both reviews, as well as in the development of investment strategies and research focus areas. This has become a hallmark of the CDMRP: developing a unique collaboration in the scientific review process among public and private stakeholders including the military, scientists, clinicians, policymakers, disease survivors, patients, family members and caregivers, providing many different facets of expertise when reviewing research.

Maxwell Ramsey, a consumer reviewer on the Peer Reviewed Orthopedic Research Program (PRORP), learned of the CDMRP through a forwarded email chain from an outreach worker at the Walter Reed National Military Medical Center. “My journey of recovery was not unlike many other amputees at Walter Reed,” said Ramsey, who was wounded in action on March 1, 2006. “I made it a point to excel in my recovery so I was [as] highly functional as possible. I remained in the Army for a couple of years after getting out of the hospital—jumping out of planes for the 101st Airborne Division’s Parachute Demonstration Team—before retiring from the Army in 2009.”

Ramsey had high marks for his experience as a consumer reviewer with the PRORP. “It was excellent. The team is very well-organized, and that makes the process, from initial review to feedback to panel discussion, very smooth,” he said. “Personally, I thrive in environments surrounded by hyper-intelligent academics and find the ideas we discuss to be very exciting.”

Consumers like Ramsey serve as voting members on nearly all CDMRP peer and programmatic review panels. Invitations



ON THE MARCH

The National Breast Cancer Coalition in 1992 sought an increase in federal appropriations for breast cancer research. Its grass-roots campaign of letter writing, petition signing, lobbying and marching led to \$210 million in additional funding and the eventual formation of CDMRP. (Photo courtesy of the National Breast Cancer Coalition)

“We did letter writing, petition signing, and held lobby days on Capitol Hill, where we brought in women to meet with their senators and representatives. We stood outside committee rooms and on the steps of the Capitol.”



FORGE AHEAD

In his spare time, Maxwell Ramsey, a consumer reviewer on the Peer Reviewed Orthopedic Research Program, is involved in large-cat conservation efforts. "My journey of recovery was not unlike many other amputees at Walter Reed," he said. "I made it a point to excel in my recovery so I was [as] highly functional as possible." (Photo courtesy of Maxwell Ramsey)



THE MILITARY FAMILY

In addition to supporting those serving in the military, CDMRP benefit the countless spouses and children of service members. (U.S. Army photo)

to participate on review panels are based on involvement in advocacy, outreach and support organizations, as well as personal experience with the disease or condition under review.

"Consumers add perspective, passion and a sense of urgency, which helps to ensure that the human elements of the disease, disorder or injury are incorporated into program policy, investment strategy and research focus," said Col. Wanda Salzer, CDMRP director.

Dr. Harold Sears is making an impact in the PRORP as well. Sears, a principal investigator, and a commercial research company, Motion Control Inc., have received funding from a PRORP Technology Development Award to work on a new powered wrist and prosthesis system.

"This project was supported by CDMRP to develop a system of practical, highly robust, highly functional prosthetic components for warfighters—and peacekeepers and others in the workforce—who suffer upper limb loss, at any level of amputation," said Sears. "Specifically, the components were intended to meet several important needs of these individuals, to allow the important goals of returning to work or returning to active duty, and expanding the capabilities of their prosthesis, allowing these permanently disabled individuals to expand their activities."

The intent of the PRORP award "was to create practical devices for the injured service member, unlike more esoteric developments which might only be considered 'research,'" he said. A major product, the ETD2 electric hook, has been released into the market successfully, Sears said. When the other projects are completed, they will be offered commercially worldwide by Motion Control.

COMMON DENOMINATOR

While the CDMRP research programs are unique in their topic areas, they all share the common goal of advancing research that will lead to health care solutions, such as disease prevention or cures, improvements in patient care and survival, and breakthrough technologies and resources for clinical benefit. However, the medical needs of the military population are not limited to injuries incurred on the battlefield. The wide range of research efforts funded by CDMRP is the key to maintaining Soldier health on and off the battlefield as well as after service. In addition to supporting those serving in the military, CDMRP also benefits spouses and children in military families. (See Figure 2.)

A recent cutting-edge clinical trial, based on preclinical results funded in part by the Amyotrophic Lateral Sclerosis (ALS) Research Program, has recently begun recruiting patients to see if a combination stem cell and gene therapy will be effective at stalling progression of ALS, also known as Lou Gehrig's disease, an incurable degenerative neurological disorder. Several studies have shown that military veterans, regardless of branch or era of service, are nearly twice as likely to develop ALS as civilians. The trial, funded by the California Institute for Regenerative Medicine, is one of the first to use genetically modified neural progenitor cells to treat a neurodegenerative disease.

CONCLUSION

Medical research is difficult to evaluate, as not every idea is going to be a cure, but each effort could lead to the next. While Visco describes the partnership with DOD as having "truly changed the world of breast cancer," no one could have imagined that the foundation built for one program would expand and evolve into what the CDMRP is today: a life-saving organization that's transforming medical research worldwide for numerous diseases, injuries and conditions.

For more information on CDMRP, go to cdmrp.army.mil or contact the Public Affairs Office at usarmy.detrick.medcom-cdmrp.mbx.cdmrp-public-affairs@mail.mil.

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FIGURE 2



WIDE-RANGING RESEARCH

CDMRP focus on transforming health care for service members—on and off the battlefield, as well as after service—and the American public as a whole through innovative and practical research. The "Breast Cancer Research Semipostal" program refers to the funds raised from stamps sold by the U.S. Postal Service to raise money for breast cancer research. (U.S. Army graphic)

UNBOXING DAY

Soldiers inventory medical materiel they receive after deployment. Battlefield medical care has changed drastically over the past few decades, and the survival rate for injured warfighters is higher than it has ever been. To ensure that the trend continues, USAMMA reorganized its personnel to develop a new office focused solely on equipment modernization. (U.S. Army photos by Ellen Crown, USAMMA)



PROGNOSIS: *ENHANCED* SOLDIER SURVIVAL

| Army medicine stands up Medical
Devices Modernization Directorate.

by Mr. Doug Wright

The Army's modernization strategy has one focus: Make Soldiers and units more lethal to win our nation's wars and come home safely. Lethality is important, but so is survival. That's why medical equipment modernization is just as critical as the modernization of other Army resources.

WHAT CHANGED?

The way the Army delivers medical care on the battlefield is dramatically different than it was 100 years ago, or even 10 years ago. Every war or conflict offers lessons that improve lifesaving medical care on the front lines, which is why the survival rate for injured warfighters is higher than it has ever been.

At the U.S. Army Medical Materiel Agency (USAMMA), a subordinate organization of the U.S. Army Medical Research and Materiel Command (USAMRMC), we work to design, develop, deliver and

sustain new medical capabilities to further strengthen Soldier survivability.

But what about the capabilities we already have? As an organization we knew that we needed to make sure we were providing the most up-to-date medical materiel solutions. So, in November 2017, USAMMA stood up the Medical Devices Modernization Directorate, a new program management office solely focused on medical device modernization. It is a small but robust office of product managers, maintenance experts and logisticians who, in collaboration with the rest of USAMMA, chart the "life expectancy" of our fielded medical devices and create strategies to replace and modernize them. While medical materiel modernization was not a new mission for USAMMA, reorganizing to create a new team focused entirely on this effort will allow us to provide better life cycle management of our inventory of fielded medical devices within the Army.





THIS WON'T HURT A BIT

Diego Gomez-Morales, a USAMMA equipment specialist, demonstrates the new PDRS, which will replace two aging devices: an X-ray generator and an accompanying computerized reader system. Combining the legacy system into a single lightweight unit saves money and makes equipment transport easier—part of USAMMA's goal to develop materiel that advances Soldier readiness and lethality.

WHY MODERNIZE?

Army clinicians and medics often see or hear about a new medical device or capability available to civilian medical personnel and wonder: Why don't we have that? The answer to this question isn't simple. Frankly, there are often many reasons why a medical device used in a hospital stateside will not work in a field environment.

However, in some cases, the answer is that we don't have it—yet. We are continually watching the market, too, and completing regular analysis to identify commercial off-the-shelf products that improve medical capabilities and reduce our logistical footprint. These items may be more easily maintained on the unit level, or they could be more cost-effective. Our aim is to buy and field medical devices that are smaller and lighter than

current versions, in order to ease the shipping and transportation burden.

Other critical reasons for modernization include changes to current practice or modification to clinical practice guidelines. When we identify that fielded medical equipment no longer meets current standards of care, we modernize. An example of this is the video-assisted laryngoscope, a tool that helps health care providers intubate patients to re-establish breathing. When we have evidence of technology that could significantly improve the standard of care—while being practical for use in deployed settings—we modernize.

Technical refresh is another primary driver of medical materiel modernization. When we find that we have items in our inventory that we can't procure, maintain

or sustain anymore, or are nearing obsolescence, we must replace the existing capability. This is actually one of the more complicated parts of modernization of medical equipment, because medical technology is very fast-moving.

If we procure a specific device from a company, there is no guarantee that the same make and model will be procurable five years later, which has second- and third-order effects on maintenance and purchase of repair parts. When this happens, we often must modernize that fielded capability by competitively procuring a comparable device that meets all of the essential characteristics of the requirement.

Where possible, we also seek to find a joint solution when we modernize that can be used by not only the Army but also the

Air Force, Navy and Marine Corps. Part of our process is to form joint working groups with the other services. Together, we conduct market research and identify essential characteristics that will meet the medical needs of all our care providers. In this process, we reduce potential solutions to a few devices and then conduct rigorous testing to ensure that the final device will work in an austere environment, in the field, onboard a ship or on an aircraft, depending on the mission. We prefer joint products because they enable us to save on procurement costs and overall life cycle sustainment costs. Joint products also ensure that our care providers train and practice on the same devices—which is extremely important on the battlefield because the first responder may not necessarily be from the same service as the patient.

We also determine our modernization priorities based on mission requirements and operational threats. Changes to the mission, such as a need for improved en-route care capabilities because of longer medical evacuations, may mean we need a new or different piece of equipment.

One recent example of modernization done right is the Portable Digital Radiography System (PDRS), which we began purchasing and fielding in 2017. The PDRS is smaller, lighter, less expensive and more cybersecure than previously fielded systems.

The PDRS replaces two aging devices, an X-ray generator and an accompanying computerized reader system. It combines these capabilities into a single, lightweight X-ray unit intended for use by deployed medical, special operations and mortuary affairs units. The two older devices cost a total of \$126,000. However, by combining these systems into the PDRS, which costs about \$69,000, the Army realizes

a savings of roughly \$57,000 for each replaced set. The PDRS weighs less than half of the systems it's replacing—174 pounds, including shipping container weight, versus 437 pounds, making it easier to transport. To date, the Army has procured 106 of these units and, as it is a joint solution, the Navy and Marine Corps have procured 46.

Modernizing medical devices also means ensuring that they meet the most current DOD cybersecurity requirements. Many modern medical devices need to connect to military computer networks to operate properly. To ensure that medical devices purchased by the government do not introduce security vulnerabilities, each must pass a series of security certification checks.

The PDRS was the first Army medical device to receive the Defense Health Agency's authority to operate under the new Risk Management Framework, a process that took more than a year to complete. The Risk Management Framework integrates security and risk management activities into the system development life cycle. The risk-based approach to security control considers effectiveness, efficiency and constraints because of applicable laws, directives, executive orders, policies, standards or regulations. Achieving an authority to operate under the Risk Management Framework demonstrates that this device complies with all of the current cybersecurity requirements, so users know that the device we are fielding is secure.

FASTER, FASTER

One way we try to deliver the best solutions in the most time-efficient—and cost-efficient—way is to leverage private industry. If the private sector already has spent research and development dollars to design a solution that may meet Army

needs, we may be able to work with the company to modify the product and field a capability faster and for less money than if we had to start from scratch. This also helps USAMRMC invest its development dollars toward solutions that are specific or unique to the warfighter, such as a vaccine to protect military trainees from the adenovirus, a common cause of respiratory illness. There is no adenovirus vaccine available to the general public, but the military offers one to recruits, saving roughly 150,000 training days that would have been lost to illness.

To field solutions to the force more quickly, we also consider the best way to efficiently navigate U.S. Food and Drug Administration (FDA) regulations. In some cases, if the FDA agrees that a new piece of medical equipment is substantially equivalent to medical equipment already on the market, a manufacturer may not be required to submit premarket approval to the FDA and can market its equipment immediately. If that new equipment is not equivalent, the company must submit a premarket approval to the FDA, a process that can take several months or even years, depending on the complexity of the product under review. Fortunately, USAMRMC provides regulatory support to help Army medicine as well as our corporate partners navigate FDA clearance or approval.

CONCLUSION

While USAMMA's Medical Devices Modernization Directorate is still relatively new, our vision is to ensure that we provide today's and tomorrow's warfighters with the updated medical equipment they need to save lives and rapidly return troops to the mission. To that end, we have identified more than a dozen pieces of equipment that we plan to modernize within the next two years, including, in alphabetical order:



EMPHASIZING MODERNIZATION

In October 2015, USAMMA began fielding the modernized P2131 Automated Field Steam Sterilizer for combat support hospitals. The new system uses only 10 gallons of water to process up to 100 loads of sterilized medical instruments, greatly saving water compared with the previously fielded steam sterilizer. USAMMA plans to modernize more than a dozen other systems over the next two years, outfitting medical personnel with gear that will keep warfighters in the mission.

- Chromatographic Gas Mass Spectrometer
- CT Scanner for Field Use
- Field Portable Suction Apparatus
- High Capacity, Radiographic and Fluoroscopic X-Ray Apparatus
- Human Ultrasound Diagnostic System
- Infusion Pump Analyzer
- Medical Oxygen Generation System
- Ophthalmic Diathermy Apparatus/Vitreotomy System
- Pneumatic Tourniquet System
- Programmable Surgical Suction Apparatus
- Surgical Binocular Microscope
- Ultrasonic Ocular Scanner
- Veterinary Ultrasound Diagnostic System
- Video Assist Laryngoscope Set

Superior weapons are important. But we can't win without lethal manpower, and that means keeping Soldiers alive to fight another day.

For more information, contact USAMMA at usarmy.detrick.medcom-usamma.mbx.customer-relations-mgt@mail.mil.

MR. DOUG WRIGHT is director of the Medical Devices Modernization Directorate and is responsible for the modernization and life cycle management of medical devices in support of deployable medical operations worldwide. A Navy submarine veteran, he has more than 30 years of professional experience in leading, managing, training and coordinating personnel in the design, development, testing, acquisition and deployment of military medical equipment, undersea defensive warfare systems and submarine acoustic sensor systems. He has an MBA in technology management from University of Phoenix and a B.S. in industrial technology from Middle Tennessee State University. He is Level III certified in program management and Level II certified in financial management, systems engineering and information technology. He is a member of the Army Acquisition Corps. His specialties include program management, change management, financial management, process improvement, systems engineering, acoustic sensor technology and development, and medical device acquisition and sustainment.

TAKING AGILE ALL THE WAY

Reserve Component Automation Systems' Agile Solution Factory derives maximum benefit from software development methodology to modernize effectively, fast and securely.

by Mr. Stephen P. O'Brian and Ms. Angela D. Green-Mack

The term agile in software development has become another information technology buzzword, like cloud. Many programs say they are doing Agile, but are they? What does it mean to be Agile enough to realize all the targeted benefits?

Agile is a software development methodology and culture designed to anticipate the need for flexibility and apply a degree of practicality to delivery of the finished product. It focuses on delivering discrete pieces or parts of the software rather than an all-or-nothing solution, in much the same way that software giants deliver updates continually rather than making customers wait for them to release a whole new version of their software suites. For instance, Apple releases multiple small updates that support security and functionality for its iPhone iOS operating system, rather than one or two updates per year. Agile allows for fast and efficient delivery of user capability, enabling access to what the user considers their “minimally viable solution.”

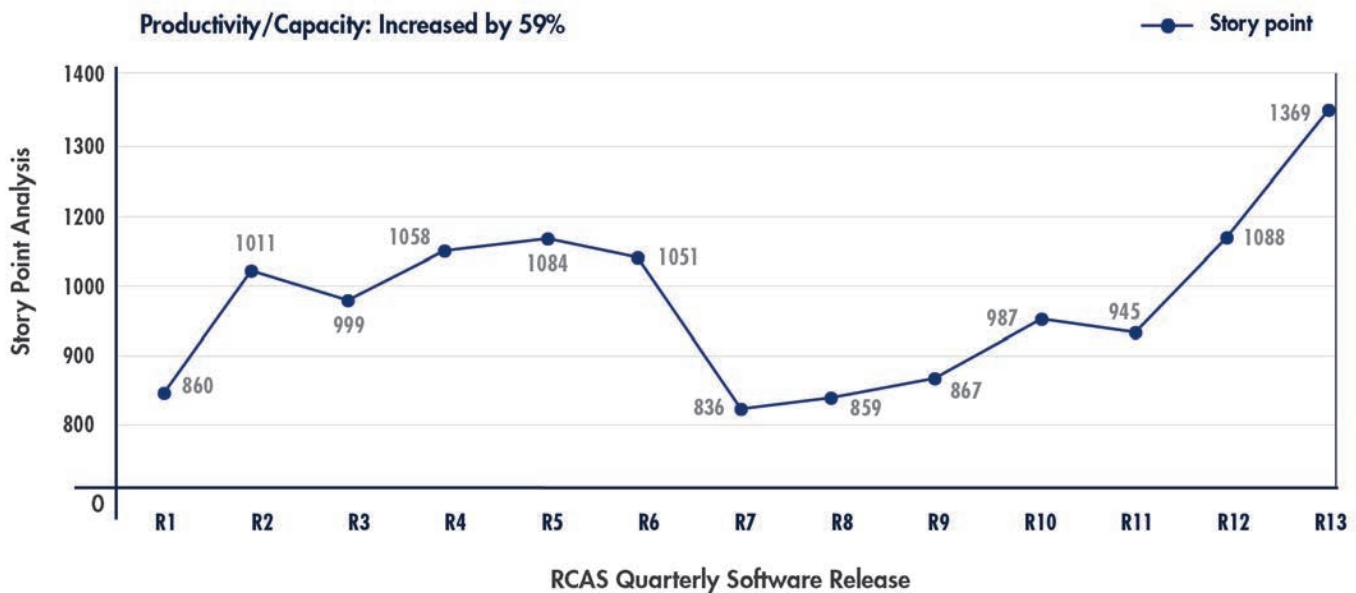
For the Reserve Component Automation Systems (RCAS), which is part of the Program Executive Office for Enterprise Information Systems (PEO EIS), it wasn't enough to simply transition to Agile. Rather, the focus has been on optimizing the performance of Agile software development at an enterprise scale by applying a production factory mentality. In September 2013, RCAS made a headlong leap into Agile, executing a

monumental transition from waterfall software development.

From this leap came the Agile Solution Factory, the operative word in the name being “factory”—a term that can be defined as “any place producing a uniform product without concern for individuality.” In developing the concept of the Agile Solution Factory, consistency of approach remained a driving factor for all RCAS software development processes, tools and products. In a close partnership with the prime integrator, the Agile Solution Factory established itself as a case study of a large government program successfully transforming to Agile and then optimizing performance at an enterprise scale. For the Agile Solution Factory, that journey has never stopped.

The result? The Agile Solution Factory significantly improved the speed at which the user receives software that addresses their missions. As the software became markedly more extensible, modular and secure, RCAS saw customer satisfaction go up dramatically. The Agile Solution Factory's use of advanced automation frameworks like development, security and operations—using the method known as DevSecOps—drives efficiencies and performance gains. Since 2013, RCAS has increased software development productivity by almost 60 percent, reduced implementation costs by more than 50 percent and reduced time to market by more than 70 percent. Software quality has averaged 99 percent defect-free releases. RCAS

FIGURE 1



BREAKING DOWN THE DATA POINTS

A story-point analysis encompassing 13 RCAS quarterly releases over 43 months illustrates that the Agile Solution Factory achieved a 59 percent increase in productivity, or story points per release, along with a 51 percent reduction in cost per story point implemented. Story points are one of the fundamental metrics used by an Agile development team. They enable a quick assessment of the relative size, complexity and risk of a user story, or requirement; a higher number of story points indicates that implementation will be more difficult or complex. (Graphic courtesy of CACI International Inc.)

measures productivity through an assessment of each product team's throughput—the amount of material passing through a system or process—which uses a metric known as story-pointing, discussed in detail below.

More than 80 government programs have participated in technical exchanges and tours of the Agile Solution Factory in Ashburn, Virginia. The purpose of these exchanges includes sharing lessons learned and best practices as they pertain to transforming, optimizing, scaling and holistically integrating Agile across a large government program. During one such tour with the Office of the Undersecretary of Defense for Acquisition, Technology and Logistics in April 2017, a representative commented that it was nice to see what “right” looked like in optimized Agile implementation.

The potential exists to replicate this process and success for other programs. As Robert Pirsig, the author of “Zen and the Art of

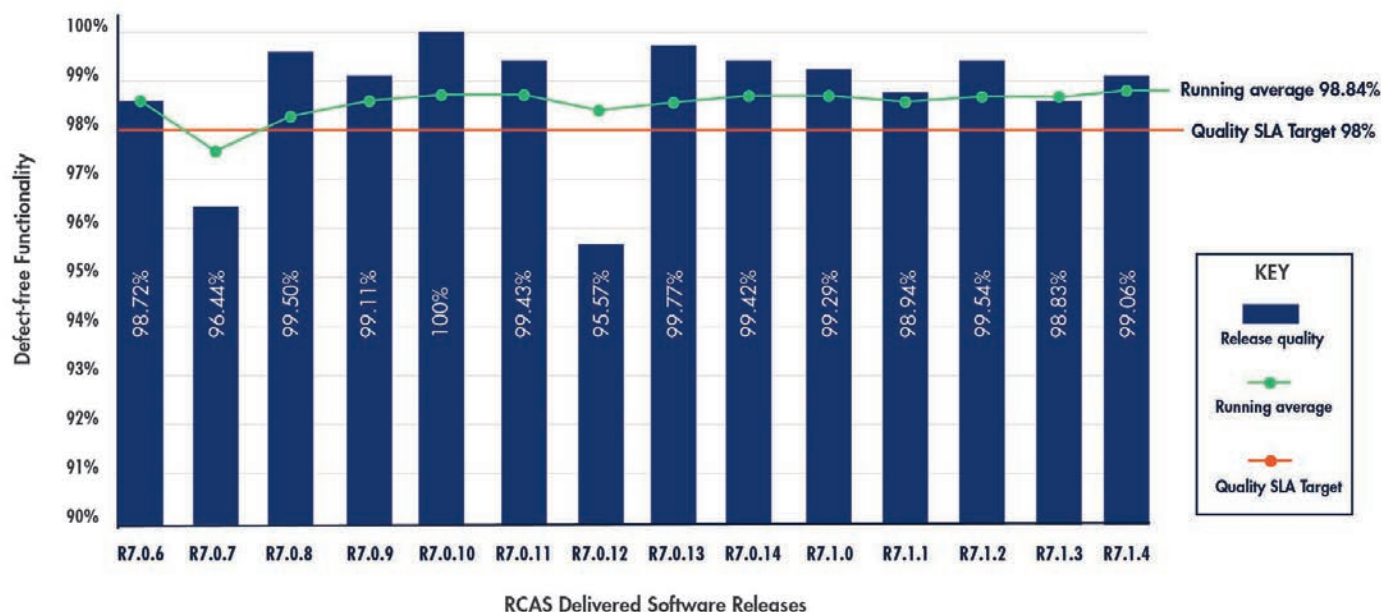
Motorcycle Maintenance” and a philosopher, wrote: “If a factory is torn down, but the rationality which produced it is left standing, then that rationality will simply produce another factory.” So, the question remains, how can the government learn from this example?

THE IMPORTANCE OF CULTURE

Moving away from a traditional software development life cycle approach toward more nimble methodologies such as Agile requires a clear vision and an unwavering commitment to continuous improvement. It requires an organization to evaluate processes, tools, performance metrics and expectations, internally and externally. Perhaps most importantly, it requires a complete culture shift.

Consider for a moment the breadth and scope of the RCAS program. It provides integrated web-based software solutions and support services that enable the U.S. Army Reserve and Army

FIGURE 2



AIMING HIGH, ACHIEVING HIGH

Another key measure of success for the Agile Solution Factory is the release quality metric (RQM), which assesses the amount of defect-free story points delivered in a release under a service-level agreement (SLA). Since the Agile Solution Factory's inception, RCAS has achieved 99 percent defect-free releases, on average. (Graphic courtesy of CACI International Inc.)

National Guard to manage mobilization, safety, personnel and force authorization activities more efficiently. RCAS provides a standardized, integrated solution that links approximately 10,500 Guard and Reserve units at roughly 4,000 sites in 54 U.S. states and territories.

More than 50 percent of the Army's force structure is in the Guard and Reserve component. To support such a broad swath of stakeholders and their associated requirements, RCAS must react quickly to change and make careful use of available resources. Experience has proven that traditional software methodologies like waterfall were not able to keep pace with a dynamic mission set and the need to adapt quickly to evolving capability gaps.

In 2013, RCAS leadership saw burgeoning demand from end users to receive high-quality software that addresses business value but focuses on decreased time to market. The waterfall model is a development process that flows sequentially through

a predetermined series of phases, each requiring extensive documentation before the next can begin: requirements, design, implementation, verification and maintenance. Therefore, the customer must define and document the totality of requirements before the design phase.

This is in stark contrast to Agile, which focuses on prioritizing high-value requirements and prototyping solutions with a focus on speed to market. Agile involves the customer more regularly to provide guidance on the development process. Using waterfall, a contractor could spend months, if not years, in the requirements phase but still end up developing a product that doesn't satisfy the customer's expectations. Agile resolves this.

The product lead for RCAS reached out to industry, and the resulting feedback led to the decision that not only would an Agile framework be necessary, but there would need to be an "all in" approach to the transition. Once RCAS leadership made the decision to "go Agile," successful implementation began with

open dialogue and trust between the government and the prime integrator, CACI International Inc.

MULTIPLE MEASURES OF LONG-TERM SUCCESS

The Agile Solution Factory introduced many objective performance measurements and analytic practices to provide RCAS leadership with the tools to assess factory performance, including:

Story-point analysis: A story point is an estimation metric that an agile development team (scrum team) uses to quickly assess the relative size, complexity and risk associated with a particular user story (or requirement). The higher the number of story points, the more difficult or complex the story will be to implement. In the story-point analysis covering 13 RCAS quarterly software releases over a 43-month period, the Agile Solution Factory measured a 59 percent increase in productivity (defined as story points per release), while reducing costs by 51 percent (cost per story point implemented). (See Figure 1, Page 110.) The Agile Solution Factory accomplished this despite a simultaneous staff reduction of 14 percent, thus supporting the driving need to deliver more with less.

Release quality metric (RQM): The RCAS Agile Solution Factory measures software quality by assessing the amount of defect-free story points delivered in a release. For instance, if a development team completes 100 story points' worth of work, but one particular piece of functionality worth five points is shipped to the field with a defect, then the RQM reveals a 95 percent defect-free solution. RCAS delivered software releases that have averaged 99 percent defect-free functionality over a 46-month period. (See Figure 2, Page 111.)



SCRUM TIME WELL SPENT

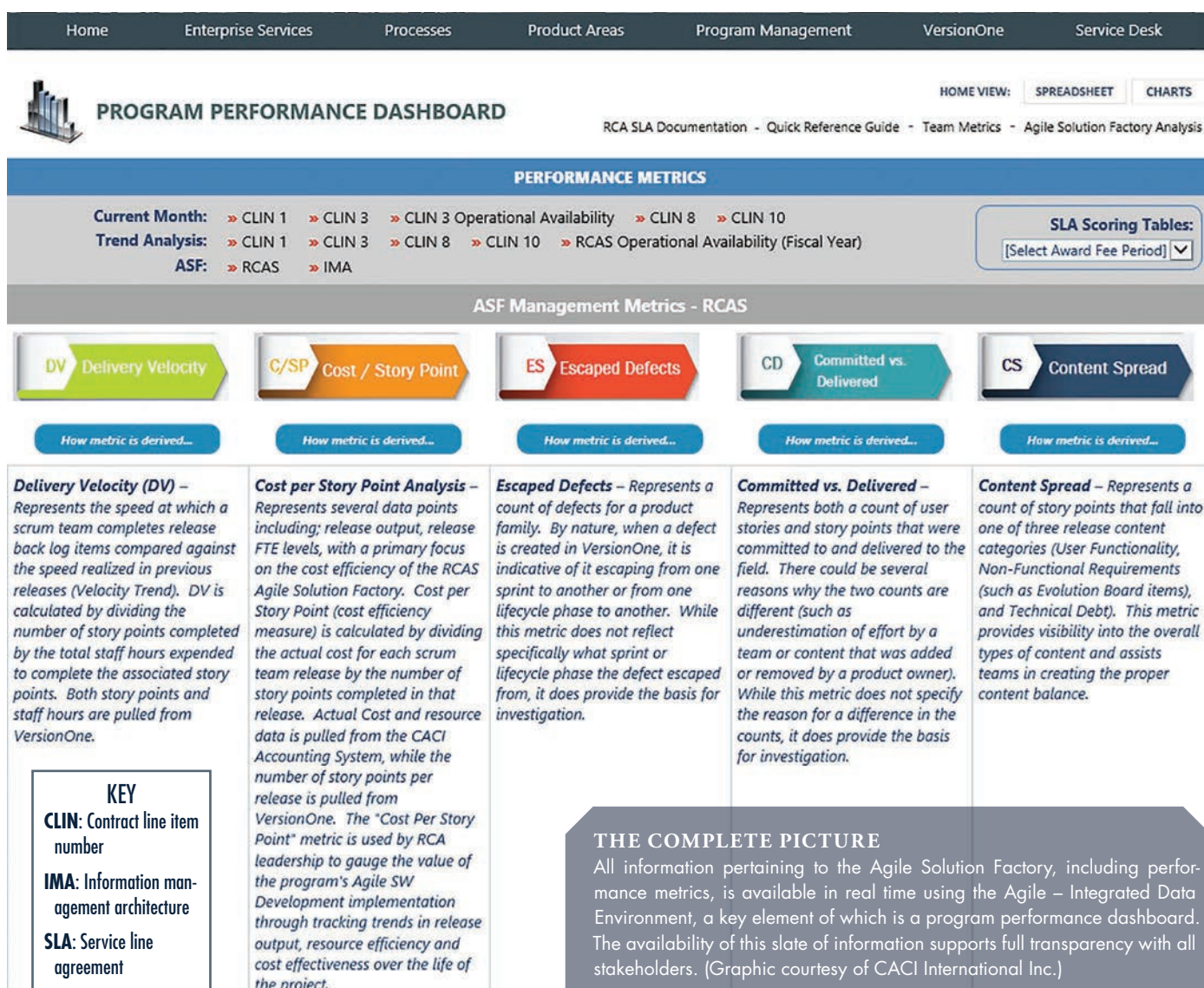
CACI's Drew Lewis, application trainer, and EVM analyst Tania Hassan manage an ad hoc Agile scrum board to determine task priorities and status. (Photo by Chris Ham, CACI International Inc.)



THE INSIDE STORY

Stephen Laurence of CACI International Inc., the RCAS prime integrator, is the Agile Solution Factory's lead methodologist. Here he leads a technical exchange of the Agile Solution Factory using story-point analysis. (Photo by Chris Ham, CACI International Inc.)

FIGURE 3



Agile Earned Value Management (EVM): EVM is a program management tool used to assess cost and schedule performance, as well as technical progress on projects. EVM provides a set of metrics and insight to support proactive decision-making at a fast pace. By integrating story-point analysis and EVM tools and techniques, Agile EVM delivers objective measures of cost and schedule performance dynamically for current and cumulative periods.

CYBERSECURITY LIFE CYCLE

Rather than waiting to find potential vulnerabilities right before deploying software to the field, the RCAS Agile Solution Factory uses cybersecurity checkpoints throughout the Agile

software development life cycle. The factory leverages concepts such as threat modeling, code reviews, enterprise architecture depictions and integrated security tools such as HP Fortify for the end-to-end automation frameworks. For example, by combining HP Fortify with the continuous integration pipeline, developers are notified of potential threats automatically if code contains a known security vulnerability after it has been checked in. This simple validation process ensures that corrective actions are taken before the software release.

When HP Fortify was introduced within the Agile Solution Factory, the team identified all legacy vulnerabilities, added them to the backlog and prioritized them for remediation. As a result,

the RCAS Agile Solution Factory gained the ability to continuously enhance system security and avoid the introduction of new vulnerabilities during development. Other automation security capabilities include automated Security Technical Implementation Guide (STIG) assessments within the DevSecOps pipeline to ensure that the baseline operating system, web service and database STIG settings comply with Defense Information Systems Agency requirements during the Agile development life cycle, not afterward.

In addition, this integrated security approach assists in implementing the Risk Management Framework for DOD Information Technology. Many controls within that framework require support for automated static code analysis, threat modeling, configuration management, high-level data flow diagramming and other requirements of the RCAS Agile Solution Factory software development life cycle.

COMPLETE TRANSPARENCY

The RCAS Agile Solution Factory uses an open book concept for full transparency with all stakeholders, continuously building on a foundation of trust. All information pertaining to the Agile Solution Factory, including performance metrics like story-point analysis and RQM, is available in real-time using the Agile – Integrated Data Environment. (See Figure 3, Page 113.)

This customizable portal houses all artifacts created in support of the mission and includes dashboards, automated workflows and tools used by all team members, the government and the contractor. Culturally, this transparency improves decision-making for RCAS and enables an environment that cultivates, expects and rewards open

discussions on current status and performance—good or bad—from multiple perspectives.

CONCLUSION

The Agile Solution Factory looks at the creation of software from a holistic point of view. It is not enough, for instance, to simply construct software without also paying careful attention to the repeatability of the process.

As such, successful implementation of an Agile Solution Factory must account for optimizing the efficiency of delivering and installing applications through automation. It must incorporate a level of predictability that mimics what one might expect from any other “factory.” It must establish an unabating trust between government and contractor and offer full and complete transparency into the process. In all of this, it also must take note of the inherently evolutionary nature of an iterative software development process.

The promise of Agile is achievable with the right vision, culture and partnership. Today the Agile Solution Factory hosts four different government program application portfolios. The RCAS Agile Solution Factory is constantly evolving and adapting to change across multiple perspectives, objectively measuring and optimizing performance of software and product development, and realizing the benefits of a government and contractor partnership built on trust through total transparency. It faces the challenge of adapting and evolving at ever-increasing speeds as it continues to optimize performance across areas such as productivity, cost efficiency, enhanced cyber posture, product quality and velocity of delivery.

While every government program transitioning to Agile will address unique

challenges, the blueprint for transformation can leverage many of the lessons learned, best practices and methodologies of the RCAS Agile Solution Factory and other DOD programs that have transitioned successfully to Agile. These transformation blueprints, in turn, are transferable and repeatable.

RCAS is interested in sharing lessons learned and best practices in transforming to Agile at an enterprise scale and optimizing performance for large government programs. For more information or to tour the RCAS Agile Solution Factory, contact Steve O'Brian at 703-806-3303 or stephen.p.obrian.civ@mail.mil; or Angela Green-Mack at 703-806-3089 or angela.d.green-mack.civ@mail.mil.

MR. STEPHEN P. O'BRIAN is the deputy product lead for Force Management and Readiness Systems at PEO EIS, Fort Belvoir, Virginia. He is a former Air Force officer with more than 20 years of acquisition experience serving in numerous major acquisition programs and with the assistant secretary of the Air Force for acquisition. He holds an M.S. in management from Troy State University and a master of military art and science from the Air Command and Staff College. He is a graduate of the Defense Acquisition University Program Manager's Course and is Level III certified in program management.

MS. ANGELA D. GREEN-MACK is chief of RCAS' Technical Management Division and its chief technical officer. She holds an M.S. in information management from The George Washington University and a B.S. in computer information systems from Alabama State University. She is Level III certified in both program management and information technology.





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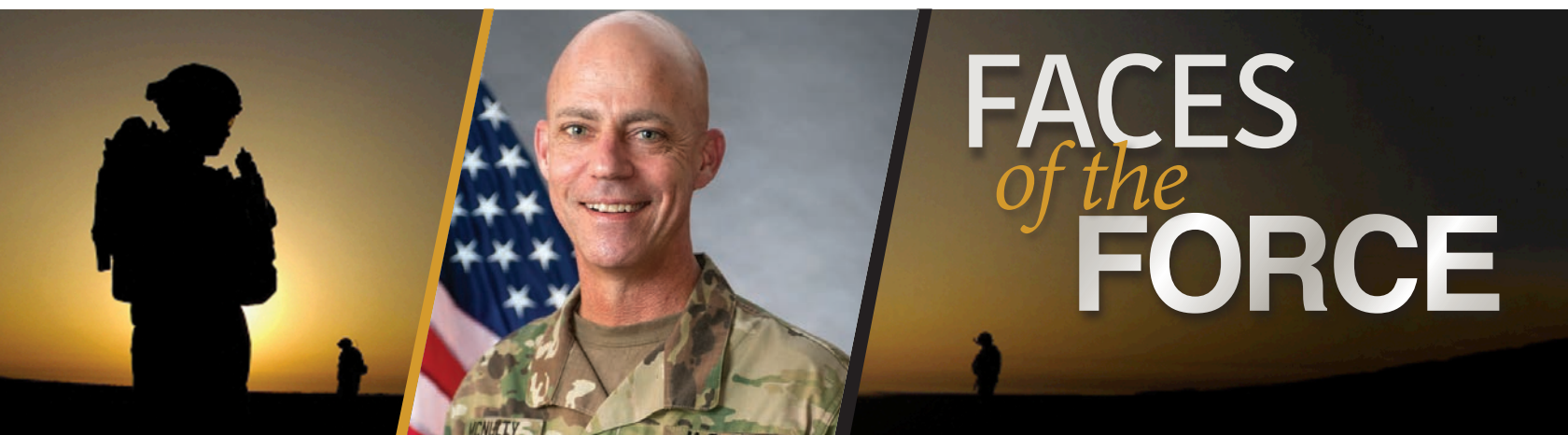
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COL. JAMES "DARBY" MCNULTY

COMMAND/ORGANIZATION: Integrated Personnel and Pay System – Army, Program Executive Office for Enterprise Information Systems

TITLE: Project manager

YEARS OF SERVICE IN WORKFORCE:
15

YEARS OF MILITARY SERVICE: 28

DAWIA CERTIFICATIONS: Level III in program management

EDUCATION: M.S., Purdue University's Krannert School of Management; B.S. in operations research, United States Military Academy at West Point

AWARDS: Legion of Merit, Defense Meritorious Service Medal, Meritorious Service Medal (four oak leaf clusters (OLCs)), Army Commendation Medal (four OLCs), Army Achievement Medal (three OLCs), Joint Meritorious Unit Award, two National Defense Service Medals, two Southwest Asia Service Medals, Global War on Terror Service Medal, Korea Defense Service Medal, Army Service Ribbon, Overseas Service Ribbon, Kuwait Liberation Medal (Kingdom of Saudi Arabia) and Kuwait Liberation Medal (Government of Kuwait)

The art and science of getting people paid

You've probably never thought of a payroll system as deeply personal. But it is, said Col. James "Darby" McNulty, project manager for several key human resources and financial software systems within the Program Executive Office for Enterprise Information Systems.

"It's a very iterative, people-centric process," he said. "We bring technical experts and end users together, and from their experience, draw out their ideas on how the world ought to be. Then we collectively figure out how to get there."

"The product is deeply personal because it's designed and built by and for people eager to improve our inefficient and outdated systems."

McNulty is project manager for the Integrated Personnel and Pay System – Army (IPPS-A), an online human resources system that will enable the Army to fill a capability gap in personnel, pay and talent management. Currently, there are approximately 200 human resources and pay systems and more than 650 interfaces among internal and external systems. IPPS-A will replace more than 30 systems and eliminate nearly half of those interfaces, and will provide essential information on total force visibility, talent management and auditability, enhancing readiness and improving the lives of Soldiers and their families.

McNulty manages several programs within the IPPS-A portfolio, including the Distributed Learning System, Army Human Resource Systems, the Medical Communications for Combat Casualty Care, the Reserve

Component Automation System and the Force Management System. While a lot of his work seems pretty technical, he's quick to point out that "it's both an art and a science. We begin with words on paper, and as we explore and flesh out concepts, those words evolve into a strategic vision for the future." He explained, "After we sketch out the road map and acquisition strategy, next comes the hard science of creating and delivering a working product designed to transform an industrial-age personnel system into an online and mobile 21st-century talent management tool."

For McNulty, agility is the biggest challenge. "We are executing an extremely large agile software development. It is very natural for software developers to be agile, but is very unnatural for the rest of the organization—particularly for a DOD or government organization. So we work really hard at constantly evaluating our command and control, our processes and our people to make sure we can improve quality, velocity and capability," he said.

McNulty got his start in acquisition 15 years ago. After nine years as a field artillery officer, earning an M.S. from Purdue University's Krannert School of Management and serving on the staff and faculty at the U.S. Military Academy at West Point, he was eager for a new challenge and another opportunity to make a long-term, positive contribution to the Army. His first acquisition assignment was in Minneapolis, developing and building the Non-Line-of-Sight Cannon and Mortar at the Future Combat Systems program.

"Working alongside engineers and testers was a humbling experience," he admitted. "I thought I was both tactically and technically proficient, but how wrong I was. I learned more about systems engineering, physics, program management, contract negotiations, testing, human systems engineering, business management, ballistics and ammunition design than I could have imagined—everything that set the stage for me to be a lieutenant colonel, a colonel and a program manager."

His early assignments also taught him the importance of building relationships. "My first program manager called me his smoke jumper, and I took great pride in that," he said. "By jumping headlong into challenging environments throughout my career, I've developed a large network of mentors and technical and functional experts that I can reach out to for advice and guidance." Those relationships are key to program success, he added. "Delivering capability becomes far easier by nurturing relationships and a team approach to problem-solving."

McNulty recommends that boldness for those looking to advance their acquisition careers. "Jump right in, and learn to solve problems with all types of people," he said. "We have an awesome and diverse workforce; everyone looks at life through a different lens and brings value to the team. Open your aperture by signing up for short-term assignments—source selections, tiger teams or developmental assignments." If possible, he added, "try to get yourself on a program that's in development. Sustaining something is hard work, but building, testing and delivering a product is the hardest thing we do as acquisition professionals."

It's not all spreadsheets and whiteboards for McNulty, who recently received FCW's Federal 100 Award for 2018. His priorities include making time to meet with senior leaders across the Acquisition Corps and reading something "short, new and powerful every single day across a multitude of disciplines." And, like all of us, he tries to find the sweet spot between working and stepping away. "As program managers and members of the acquisition workforce, we could work every moment of every day forever and never be done. That's why it's important to balance people and mission. After 28 years in the military, I've learned it's crucial to take care of yourself, your family, your friends and your teammates at all levels. I hope to be remembered not only for my work, but for my relationships with others."

—MS. SUSAN L. FOLLETT



TRACKING ALL THE PIECES

McNulty manages the consolidation of the Army's 200 human resources and pay systems. (Photo by Mike Danko, IPPS-A)



DIG THE DETAILS

Though the NTC had estimated the most probable cost for one contract, it was only after digging into the information that supported the original estimate that the Acquisition Command realized the estimate was inaccurate. Part of the problem was that the team needed information from various organizations to make a cost estimate, but those organizations weren't accountable to the acquisition team for the accuracy of the information they provided. (Image courtesy of Ilyaf/Getty Images)



AN UNEXPECTED *ANGLE* ON COST CONTROL

How a relatively little-known cost-estimating tool can help prevent and correct contract overruns when other methods have fallen short.

by Mr. Anthony J. Nicolella

When a contractor regularly overruns the estimated cost of a contract, the solution may lie in a tool that the Federal Acquisition Regulation (FAR) does not require but, when properly implemented, can make all the difference: the most probable cost estimate, known as MPC.

If you needed to buy a new heating, ventilation and air conditioning system for your house, you would get prices on several, then look at future costs in terms of energy and repairs, filters, etc. Should you go for the cheapest model and keep your fingers crossed? Or should you go for a more expensive one that will actually cost less over several years because of lower additional costs? In much the same way, the government has to understand whether costs in a contractor's cost proposal are realistic for the work to be performed.

The FAR requires the government, before awarding a cost-reimbursement contract, to perform cost realism analysis and develop a probable cost estimate for each offeror. However, neither the FAR nor the Contract Pricing

Reference Guide mentions anything about using a probable cost estimate as a contract administration tool or funding baseline.

The MPC is not a cost-control panacea. It requires the proper staff, with the right training and clear lines of accountability, to achieve the desired benefits. Applied with the necessary support processes in place, however, the MPC can succeed in bringing ongoing costs under control, even in a post-award environment.

CASE IN POINT

I saw the difference the MPC can make when I was the commander of the National Training Center (NTC) Acquisition Command at Fort Irwin, California, from June 2002 to May 2005. Faced with spiraling cost overruns on our multimillion-dollar, multiyear, cost-reimbursement base operations contract, we used the MPC and the process of developing it as a contract administration tool and funding baseline and brought the contract costs under control. The experience was a case study of sorts in making the most of the MPC.

The contract in question covered everything from minor construction to crossing guards at the installation. Approximately 80 percent of the work performed on this installation was done by the contractor who held this contract.

Now, instead of the CORs explaining cost overruns to the contracting officer at the Acquisition Command organization, they and their directors would have to explain them to the chief of staff (who in many cases was the directors' senior rater), in the presence of the garrison commander (who in many cases was the directors' rater).

The contractor at the time regularly overran the estimated cost of our cost-plus-award-fee contract for base operations and hit the contract price ceiling by the fourth quarter, when fiscal constraints take hold and additional funding is limited. The money for base operations contracts normally comes from operations and maintenance (O&M) funds. DOD's Financial Management Regulation says that O&M appropriations are considered expenses that cannot cross accounting periods or fiscal years. Thus, O&M funds used to pay for services under a base operations contract are good for one fiscal year, or through Sept. 30. After this date, these funds expire and are no longer available for new awards or new contract actions.

The question was whether the contractor couldn't manage its costs, or whether there was a problem in the MPC that the command had developed and used as a funding baseline. Even though the FAR and Contract Pricing Reference Guide did not require using the MPC process to create a probable cost estimate after the contract award, doing so was an avenue that we had found worthy of exploration.

If using the MPC before the contract award could help the government determine whether the offeror's cost proposal was realistic, why not use the MPC after the award to determine if the contractor's actual cost was still in line with what was proposed? If not, then the government would investigate the circumstances and take the appropriate actions.

We needed to take into consideration the characteristics of the contract, as well as the context surrounding it, when determining how best to address cost overruns.

The FAR calls for the government to "ensure timely notification by the contractor of any anticipated overrun or underrun of the estimated cost under cost-reimbursement contracts." Depending on whether the contract is funded in a lump sum or paid out in increments, the FAR requires the contractor to notify the government when there's reason to believe that costs will exceed 75 percent of the estimated cost of the contract. The regulation further says that under cost-reimbursement contracts, the government is not obligated to reimburse the contractor for costs incurred in excess of the estimated cost specified in the schedule.

Unfortunately, the contractor was not notifying us of overruns in a timely fashion, nor were we proactively monitoring the situation to determine the root cause of the overruns. The NTC director of resource management was funding the contract at the MPC amount, as opposed to the estimated contract



COST PILE-UP

The NTC at Fort Irwin, California, faced a serious problem: The contractor on the base operations contract, who performed 80 percent of the work on the installation, regularly overran the cost estimates on the contract and did not inform the government in a timely fashion. The Acquisition Command used a cost-estimating tool known as most probable cost to rein in the spending. (Image courtesy of Monsitj/Monty Rakusen/Getty Images)

cost. Since the government awards cost-reimbursement contracts based on an estimated cost with a ceiling (or a not-to-exceed price), the contractor receives reimbursement for its actual, allowable and auditable costs. This difference between the MPC amount and the estimated cost awarded can be significant,

and the apparent lack of understanding of this exacerbated an already complex situation.

RETOOLING THE PROCESS

Our first step in rectifying the situation was to examine our MPC process—both the elements internal to Acquisition

Command and external information received from our customers, the NTC directorates. The command saw room for improvement in the MPC development process. Namely, it lacked trained cost and price analysts; the MPC was developed by one individual with little or no collaboration.

This soon changed for the better when we did the following:

- Filled our vacant cost and price analyst positions with motivated, detail oriented and highly trainable contract specialists.
- Made the internal MPC process more of a collaborative effort. Having the right people (chief, contract administration personnel, procurement analyst, deputy and commander) participate in the contract review added value by providing much-needed leadership, direction, technical expertise and a wealth of contracting knowledge and experience.

Externally, each directorate (Information Management, Provost Marshal, Public Works, etc.) had a contracting officer's representative (COR), who provided their cost estimate (or directorate's MPC) to Acquisition Command. The command then used these MPCs and other data, such as technical reviews and evaluations, wage determinations and results from cost estimating reviews, to develop a single comprehensive MPC.

We soon discovered that some of the directorates' MPCs were of poor quality, including, for example, undocumented, additional costs not in the original MPC. As with many large contracts, ours was experiencing changes that were expanding the actual costs. Another factor that contributed to the poor quality of the directorates' MPCs was the fact that the

The question was whether the contractor couldn't manage its costs, or whether there was a problem in the MPC that the command had developed and used as a funding baseline.

CORs developing them faced minimal quality checks. They worked for and reported to either the commanding general, the chief of staff or the garrison commander, not the contracting officer.

Of particular note, the chief of staff was responsible for acquisitions and funding for the NTC and Fort Irwin. This served as a platform by which Acquisition Command leadership could partner with the chief of staff to achieve a desired end state that motivated all parties involved. This teaming resulted in a recommendation for a revised version of the MPC process, which included quarterly reviews with all key stakeholders (chief of staff, garrison commander, directors, CORs, Acquisition Command personnel and contracting officer). Now, instead of the CORs explaining cost overruns to the contracting officer at the Acquisition Command organization, they and their directors would have to explain them to the chief of staff (who in many cases was the directors' senior rater), in the presence of the garrison commander (who in many cases was the directors' rater), in a headquarters conference room. We determined that if we could minimize mission creep and implement this revised MPC process, the quality of our MPC would improve.

Once we put the plan into action, this transformation yielded significant benefits. The chief of staff, the Acquisition Command, the director of resource management and the contracting officer compared the original directorates' MPCs with current actual costs, and the directors were asked to explain any overruns in detail. We discovered that in some cases, the directorates were asking the contractor to exceed the scope of the contract, resulting in changes, mission creep and overruns.

After the first session, some one-time adjustments to contract funding were made, and the chief of staff and the garrison

commander told the directors that they would be responsible for any future cost overruns for their respective organizations. The end result was a tighter MPC process, a higher-quality MPC and significantly fewer cost overruns.

CONCLUSION

The experience at NTC Acquisition Command yielded a number of valuable lessons in how to apply the MPC for maximum benefit:

- When using the MPC as a post-award tool and funding baseline, ensure that your MPC process is robust and flexible enough to incorporate changes that impact contract costs.
- Contractors must notify the contracting officer in a timely manner when they anticipate overrunning their cost on a cost-reimbursement contract.
- Leadership at all levels, not just in the Acquisition Command, needs to be involved in the MPC process. Everyone who contributes to the MPC and its process is a stakeholder.
- Government leaders and the contractor need to be held accountable for controlling their organizations' respective costs.
- Keep lines of communication open within the government and between the government and the contractor.
- Ensure that MPC quarterly reviews are rigorous, fair and transparent.
- Finally, continually educate acquisition team members on the MPC and its process.

Taken together, these principles can determine whether and how the MPC can help an organization get a grip on its contract costs.

For more information, contact the author at anthony.j.nicolella.civ@mail.mil.

MR. ANTHONY J. NICOLELLA, a retired U.S. Army officer who held numerous pre- and post-award contracting positions, is a professor of contract management at Defense Acquisition University (DAU) – South in Huntsville, Alabama. He holds an M.S.A. in general administration from Central Michigan University and a B.S. in logistics management from Penn State. Nicolella is Level III certified in contracting and is a member of the Army Acquisition Corps. Before joining DAU, he was a senior buyer and planner for NV Energy Inc. and a supervisory contract administrator for the University of Nevada, Las Vegas.



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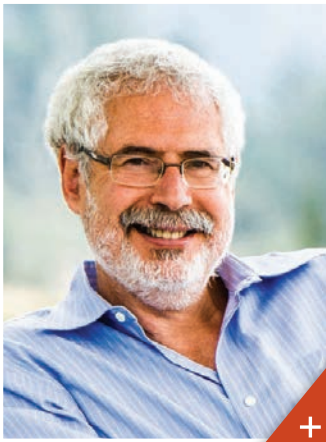


THE POWER OF 'OUT'

Getting out and talking to potential customers and stakeholders is one of the three tenets of Blank's Lean Startup method. Talking to at least 100 people about your hypotheses is essential to determine if the problem is identified correctly and the hypotheses are valid. The other two steps are, first, to articulate the hypotheses and finally, to build a minimum viable product, get customer feedback and, based on that, refine and improve the product or change direction. (Image by istocksdaily/Getty Images)



GET OUT



Steve Blank

Steve Blank enrolled in the wrong college, joined the Air Force, dropped out of the right college and found success in Silicon Valley. Now he's back in the classroom as a sought-after teacher and, on the side, is trying to help DOD get acquisition right through Hacking for Defense, I-Corps and other efforts. His advice to the Army: Get out of the building.

by Mr. Michael Bold

In 2017, *Worth* magazine compiled a list of “The 25 Most Important Entrepreneurs of the Past 25 Years.” Among those listed were tech giants like Amazon’s Jeff Bezos, Microsoft’s Bill Gates, Apple’s Steve Jobs, Bloomberg LP founder Michael Bloomberg, SpaceX and Tesla’s Elon Musk and entertainer-entrepreneurs such as Oprah Winfrey, rapper Jay Z and Martha Stewart.

Also on the list was a not-so-familiar name: Steve Blank.

After a successful 21-year career as a “serial entrepreneur” in California’s Silicon Valley, where he started or worked on eight startups, Blank retired in 1999 at age 45. He had stepped down as CEO of E.piphany—a software company he started in his living room—just before it went public. But it was after he retired that Blank’s career really took off.

An interview with Blank is a sometimes laugh-out-loud funny roller coaster of anecdotes, ideas, insights, self-deprecation and occasional profanities. Amid his cheerful and easy camaraderie, it’s easy to lose sight of the fact that you’re speaking with one of the smartest people you’ve ever talked to, someone who radically changed the trajectory and culture of Silicon Valley.

Blank grew up in a lower-middle-class neighborhood in New York City. He first enrolled at Michigan State University (he’d seen the Michigan Wolverines play

football on TV but applied to the wrong college) and then, after dropping out of school, enlisted in the Air Force. After receiving combat training, he deployed to Thailand in 1974, where he repaired electronic warfare equipment for the Wild Weasels—aircraft equipped with radar-seeking missiles. “You get deployed overseas, you had to go through combat training,” Blank related in a Jan. 31 interview with Army AL&T. “And I thought it was funny because I was going to be in an air base doing electronics. And the guy training me said, ‘You know, the base you are going to has been attacked a couple of times. I sure hope the guy attacking you also laughed through his training.’ But yes, it was mostly screwdrivers and electronics.”

He thrived in the war zone atmosphere, where the assignment was to fix broken equipment, and fast, with minimum direction and few rules. “I didn’t understand until decades later: In a war zone, we were incredibly innovative, at least on my level—anything it required to get the mission done.”

“It’s not just an acquisition problem, it’s understanding that the nature of the threat and the speed that we need to respond have changed dramatically.”



SHOWING THE WAY

Steve Blank talks with students in Stanford’s first Hacking for Defense class, in spring 2016. H4D, as it is called, gives teams of students unclassified, real-world DOD problems to solve. H4D has given rise to Hacking for Diplomacy, Hacking for Energy and other sister classes, now collectively known as H4X; the X can be any subject. (Photo by Rod Searcey, Stanford News Service)

INNOVATION VS. NO DEVIATION

After Thailand he was assigned to a Strategic Air Command (SAC) base in Michigan, with nuclear-armed B-52 bombers, “where there was no deviation from the technical orders and technical manuals at all, for all the right reasons. So here was an example of agile in a war zone, and an example of executing known missions with no deviation on a SAC base.” When people ask why the military can’t be as agile as startups, “I remind them that on the battlefield, the military historically has been more agile than startups. But when the military comes back to peacetime, it collapses into the world’s largest bureaucracy. But on the battlefield, it’s find, fix and finish. ... Given what [the U.S. military] was trying to achieve, it was incredibly

innovative. It used all kinds of people who typically never worked together and did incredibly amazing stuff. ... It’s not that we don’t come up with this stuff, it’s that the bureaucracy tends to win when we get back home.”

Blank left the Air Force and went back to college, this time to the right Michigan, the University of Michigan in Ann Arbor. But the emphasis on theory over practice led Blank to drop out again. He wouldn’t set foot in a college classroom again for 25 years, when he began teaching entrepreneurship at Stanford University and the University of California, Berkeley.

In 1978, while installing process-control networks in automobile assembly plants and steel mills for one of the few startups in Ann Arbor, Blank and a colleague were

sent to San Jose, California, to install a system in a Ford Motor plant. He was surprised to hear radio ads from a company called Intel Corp. seeking scientists, engineers and technicians. He was stunned when he picked up a copy of the local newspaper and found a 48-page classified ad section that was almost all want ads seeking scientists, engineers and technicians. After they finished their work at Ford, his colleague flew back to Michigan and Blank stayed in San Jose. He quickly got his first job in Silicon Valley—coincidentally for a startup founded by William Perry, who would go on to help revolutionize satellite reconnaissance and later become secretary of defense.

STARTING ANEW WITH LEAN

Twenty-one years and eight startups later, Blank retired. He began teaching entrepreneurship classes at Stanford and Berkeley (he also teaches now at Columbia University, where he is a senior fellow for entrepreneurship).

He had time to think about why some startups succeeded and others failed. He “realized—heretically, at the time—that we were just missing something really big,” he told Army AL&T in an October 2016 interview. Entrepreneurs were focused on turning a technology into a product, building a company and then hoping to get to an initial public offering. Instead, most failed because they forgot to discover whether anyone wanted or needed their product.

What was missing, Blank realized, was the understanding that startups had almost nothing in common with large, successful companies. Large companies know their customers, what

products those customers will pay for, their pricing and their competitors. Startups know none of that.

His “Lean Startup” method boiled down to three basic steps:

- **Articulate your hypotheses.** What problem are you trying to solve? Who’s your customer? What solution do customers want to grab out of your hands? “Hypothesis is a fancy word for ‘we’re just guessing,’” Blank said. “I use the word ‘hypothesis’ at Stanford because students pay to be there and nobody wants to learn how to guess for \$50,000 a year.”
- **Get out of the building.** Talk to at least 100 potential customers and stakeholders about your hypotheses. Have you identified the problem correctly? Can you validate your hypotheses? “Some hypotheses could be verified within 10 minutes, or it might take months,” Blank said.
- **Build a minimum viable product (MVP)**—the smallest thing that will get you the most learning at that point in time. It can be a wireframe, a PowerPoint, hardware, etc. Get customer feedback. If the feedback is good, refine and improve your MVP until it’s ready to roll out as a finished product. If it’s bad, figure out where you went wrong and change direction (called a pivot). This way, if you’ve failed, you’ve failed early and inexpensively.

In 2005 Blank wrote “The Four Steps to the Epiphany,” which launched the Lean Startup movement. One of his students, Eric Ries, followed up in 2011 with “The Lean Startup.” Also in 2011,



A FORCE FOR CHANGE

Steve Blank testifies before the House Science Subcommittee on Research and Technology on Dec. 6 about expanding the National Science Foundation’s I-Corps. Blank developed the I-Corps into the federal standard for science commercialization in the United States, mirroring the Lean Startup approach. (Photo courtesy of Steve Blank)

Blank was contacted by the National Science Foundation, which was looking for a way for its scientists to turn their research into viable commercial products. He developed the Innovation Corps (I-Corps), which is now considered the standard for science commercialization in the U.S. and has been adopted by other government agencies including the National Institutes of Health. In 2012, Blank and Bob Dorf, a fellow serial entrepreneur, released “The Startup Owner’s Manual,” a step-by-step guide to building a successful startup. In May 2013, Blank’s article “Why the Lean Start-Up Changes Everything” was on the cover of the Harvard Business Review, one of the nation’s most respected business publications. The Lean movement had gone mainstream.

Now, as the 2018 U.S. National Defense Strategy seeks to change DOD’s culture and policies to drive innovation at speed, exploring “streamlined, non-traditional pathways to bring critical skills into service, expanding access to outside expertise, and devising new public-private partnerships to work with small companies, startups, and universities,” Blank has brought his ideas and expertise on innovation to DOD, where they are gaining traction.

Blank’s introduction to defense acquisition came in 2011, when he met Peter

Newell. (See “Emergency Insurgency,” Page 27.) Newell is a retired Army colonel; his last command was the Rapid Equipping Force, where he sped off-the-shelf solutions to Soldiers on the ground in Afghanistan. After retiring, he joined a former Army Special Forces colonel, Joe Felter, in starting a consulting company in Palo Alto called BMNT. (Felter is now the deputy assistant secretary of defense for South and Southeast Asia.)

“I teach a set of classes at Stanford, and one of my students was an ex-Delta Force operator who said, ‘Hey, your methodology sounds a lot like the Army’s Rapid Equipping Force and Pete Newell.’ And I said, ‘Who the heck is Pete?’” Blank said.

At what the two men thought would be a quick meet-and-greet, “Pete described what he did with the Rapid Equipping Force, and I described what we did with the Lean Startup methodology and turning the federal research agencies on to I-Corps. And as he’s drawing his diagram and I’m drawing mine, we discovered we basically came up with the same methodology, one that actually works from the battlefield to the boardroom. It’s a big idea. Same methodology—we were just using different diagrams. His actually got deployed where lives were dependent, and mine got deployed on the cover of the Harvard Business Review.”

Blank, Newell and Felter developed and taught Hacking for Defense (H4D) at Stanford, a class that unleashed teams of students on unclassified, real-world problems from DOD. As of 2018, the class has been taught at Stanford and 10 other universities nationwide. Twenty-four government agencies, including DOD, the U.S. Department of Homeland Security, the U.S. Department of State, the U.S. Department of Energy, NASA and the intelligence community, participated by providing students with real challenges to solve. A sister class, Hacking for Diplomacy, was launched at Stanford in fall 2016. A series of other classes, including Hacking for Energy and Hacking for Impact, also have been developed. Today the trio just label the program H4X, where X can mean any subject. The classes, Blank explained, create a new platform for national service, a way to expose students to parts of the U.S. government where a traditional academic path or business career would never take them.

INNOVATIONS IN THINKING

The more he delved into DOD problems, the more Blank realized that innovation is vastly different in business versus government. “In a startup, innovation creates new products or services that people want to buy that never existed before. In an existing company, innovation can be new or more likely can improve existing products,” he said. “But I’ll contend innovation in government is quite different.”

For DOD and intelligence agencies, innovation needs to be continuous, as DOD and intelligence agencies face what Blank calls “the Red Queen problem.”

“In ‘Alice in Wonderland,’ they remind Alice that she has to run twice as fast just to stay in place. ... So innovation

“Most military organizations make it incredibly difficult to work with civilians not just on the contracting side, but on the security side — almost impossible.”



IT ALL BEGINS WITH IDEAS

Ideas drive innovation, and innovation drives the development of ideas into products. Establishing a methodology for this process is the driving force behind Blank's Lean Startup. (Image by z_wei/Getty Images)

in an intelligence community has two components. Think of one as replenishment. Just like we replenish ammunition, we need to replenish innovation." That, Blank said, gets DOD and the intelligence community on an even footing with potential adversaries. "The second reason is why you do innovation: To get ahead of your adversaries."

Hasn't this always been the case? Hasn't the U.S. constantly had to adapt to emerging threats? "In the 21st century, the rate of disruption is now exponential,"

Blank said. "In the 20th century, we had a single adversary—the Soviet Union—which was kind of innovating at our speed. Every once in a while we would do an offset strategy and they would do something else that was offset, but the clock speed was relatively simple. Yet in the 21st century we don't have one adversary; you need a scorecard just to figure it out. You just can't physically hire enough people and deploy enough weapon systems, because there are a variety of threats, everything from IEDs [improved explosive devices] in Afghanistan

to anti-access and area-denial stuff in the western Pacific for carriers. And so the question is, is this an equipment problem or is it something else? Is the third offset machine intelligence and robotics or is it something else? ... **It's not just an acquisition problem, it's understanding that the nature of the threat and the speed that we need to respond have changed dramatically.**"

Understanding the nature of the threat—knowing exactly the problem that you're trying to solve—is the foundation of Blank's Lean Startup method. "Lean methodology is not just rapid," he said. "It is not just cheap. It is not just fast. It requires deep understanding of, 'What problem are we solving? And are we actually fixing a problem or a symptom of a problem?'"

Newell, Blank said, uses the example of the difficulty of providing energy and water to remote forward operating bases in Afghanistan, which in many cases required C-17 cargo planes to airdrop fuel and water, or running convoys to the outposts amid the constant threat of ambush or IED attack. "How many men were dying to provide fuel for the equipment generators and other stuff we needed at these outposts? How much human capital and military assets were consumed trying to protect them in the first place?" Blank asked.

"I would have looked at this as a forward operating base fuel problem," Blank said. "But Pete said, 'No, no, no. It's a long-tail supply problem. Do you know how many tens of thousands of gallons of gas and other things we are using just recharging batteries and running radios?' He said if you don't understand a problem and its consequences, you end up building the wrong solution."

The first solution was, ‘Oh, why don’t we use remote drones to drop fuel to these bases?’ Yes, but once you understand the deeper problems, well, can we eliminate most of the fuel we need and just do away with half of the resupply requirements? Oh, well, gee, I was kind of excited about the drones, because that is a neat thing for a prime to build.

“Once you really understood the problem, you realized, ‘Oh, what we ought to have is remote power sources run by solar cells and more efficient generators while also finding ways to recycle water.’ Because everything you could save out there actually saves part of that whole supply chain.”

Not everything, Blank acknowledges, needs to be lean. “I am not an expert in government requirements and acquisition, but it is even clear to me that there are some things that can be specified and contracted, just like we’re doing. Not everything needs to be agile. We need to ask ourselves: ‘Are we going for the 100 percent quality and perfection, and time and cost are not issues?’ If so, let’s use standard contracts. We know what a new pistol looks like—I need a pistol that spits out bullets. That is not an unknown thing. For God’s sake, let’s just spec this thing. And by the way, it shouldn’t take 300 pages just to say give me more of the last stuff I just had. That’s fine. And there are a ton of things that works on.”

But the current defense acquisition model is broken, Blank said, “which people have been talking about, I think, since Washington got his boats on the Delaware.” The problem lies at the beginning, with requirements that stifle innovation, and at the end, with prime contractors, he said.

“What is really broken is requirements. ... The methodology for problem understanding is just fundamentally flawed. DOD is over-optimized for perfect performance at the expense of providing timely capabilities to the warfighter.”

“And that’s the part that we [Lean Startup] have gotten right: There are no facts inside the building, so get outside, and do that with speed and urgency. ... And that changes our 20th-century philosophy ... that we’ll build things with every possible feature and we’ll spend a decade doing it because our primes want to make the most money. And that runs into the prime problem.”

PRIMED FOR CHANGE

The bulk of the current acquisition system, Blank said, is built around a waterfall requirements and acquisition process—a

sequential process, with little iteration or learning. Instead, development flows steadily downward (like a waterfall)—rather than an agile system that promotes innovation.

“So how do things get built when they get built by contractors? ... The word ‘contract’ implicitly or explicitly says we will specify all the features up front because we are going to do a great job on requirements, and you will develop it in a waterfall process and you will deliver the product,” he said.

Under such a system, “it is in the contractor’s interest to make the contract last as long as possible,” Blank said. “... That is the antithesis of lean. It’s as far from lean as you could get. Lean says no, no, no. We have a series of hypotheses on day one, but when we get out of the building ... it’s the notion of, we don’t really know what problem we’re solving. We think we do, so let’s get started. But we can’t spec every possible feature. So instead of waterfall engineering, we need to learn how to write contracts for agile engineering.”

Until something happens to encourage defense prime contractors to focus on speed of delivery, continuous adaptation and frequent modular upgrades, Blank said, “you are not going to fix the problem.”

DOD’s innovation pipeline—the process from which an idea is turned into a battlefield capability—has been shrinking for decades, Blank said, while tech innovation in the private sector has grown exponentially. “Venture capital is funding AI [artificial intelligence], robotics, drones and the startup ecosystem at \$70 billion a year. And very little of it is pointed to the DOD. So the question is, how can you build a wider innovation funnel that captures more than just the primes? (See “Innovation Pipeline for Success,” Page 133) And most military organizations make it incredibly difficult to work with civilians not just on the contracting side, but on the security side—almost impossible.

“In the 20th century, DOD used to own all of the innovation technology. Everything that was important was owned by DOD and the intel community. So the biggest thing that’s happened to the military is that all of these technologies that used to be owned and controlled and budgeted by DOD and the primes got away. For example, NSA [the National Security Agency] used to own crypto hardware. It turns out not only did crypto go commercial, you don’t need hardware anymore. You can do crypto in software. Well, we built this entire expertise about hardware. Oops.



PROBLEM SOLVED, RAPIDLY

Joseph Amadee, Rapid Equipping Force (REF) operational lead, shows Capt. Steven Caldwell how to adjust the solar panels powering the Rapid Aerostat Initial Deployment tower in this September 2014 photo. The tower, on a mountain peak overlooking Kabul International Airport, allows visibility for more than a mile, enhancing surveillance and security capabilities for the Afghan National Security Forces. Using methodology very similar to that of Blank's Lean Startup, the REF developed the solar panel solution to reduce the need to send troops to the mountaintop, which exposed them to enemy attack, to replenish a generator that ran constantly to fuel the tower. (Photo by Sgt. William White, International Security Assistance Force Joint Command)

"So our problems should have been easier, but in fact we made them harder because we still acted like, not only did we own it, but we were incapable of figuring out how to work with these people and encouraging them to build dual-use products. And again, because our primes had no interest in doing that."

Blank sees the Small Business Innovation Research (SBIR) program as a possible model for changing the way prime contractors do business. SBIR, which began in 1982, provides funding for small companies to do research and development (R&D) on U.S. government priorities. It's funded by allocating about 3 percent of the R&D budgets of 11 federal agencies.

"The problem is, for 30 years we were essentially giving out cars without requiring driver's ed, meaning most of these things would fail as commercialized technology. People didn't know

how to start companies," Blank said. The I-Corps program he co-created for the National Science Foundation in 2011 has changed that. "It's taught in 81 universities. If you want to get an SBIR grant, it's kind of mandatory."

Could something similar work for defense acquisition? "Today, the DOD version of the SBIR is simply a 'set-aside' program. At DOD, awards are managed as contracts. This means that deliverables are negotiated up front before the award is made. Imagine if there were a way to make the prime the 'innovation conduit' to help translate a new capability 'through the wall.' That would be cool. 'Lockheed, your job is to fully deploy 10 new capabilities per year in this arena, but they must be externally sourced and you can own no more than 10 percent of any single firm whose solution you deploy.' "



AT HOME WITH INNOVATION

Retiring after a 21-year career as a successful entrepreneur in Silicon Valley gave Blank time to think about why some startups succeeded and others failed. Teaching entrepreneurship classes, he realized “that we were just missing something really big,” with entrepreneurs focused first on developing a technology and building a company and then hoping to make money. The focus, he found, should be on first finding out if anyone wanted or needed their product, then on starting small and becoming sustainable. (Photo by Eric Millette)

CONCLUSION

There are no easy fixes, Blank said. “One of the biggest observations over the last couple of years—and I hope the [Army futures command] doesn’t fall prey to this—is that DOD looked at startups and said, ‘Oh, let’s adopt a good number of the things they do. They have incubators, let’s have incubators. They have accelerators, let’s do that. They have hackathons, so let’s do that.’ ... What they have created is a whole set of activities that essentially mimicked the activities of startups. But what they didn’t realize is that they have created disconnected activities, none of which resulted in deployable things to the battlefield. They didn’t build an

innovation pipeline; they’ve built disconnected activities. And by the way, it’s the same problem that corporate innovation is facing.

“What we lack is an innovation pipeline that is parallel to our requirements and acquisition pipeline, with data, rigor and evidence. Instead, what we mostly have are lanyards and coffee cups. We really weren’t and haven’t been getting much out the other end.”

It’s vital to remember where innovation comes from, Blank said. “Innovation tends to occur at the edges first. ... All of this innovation stuff rarely happens from

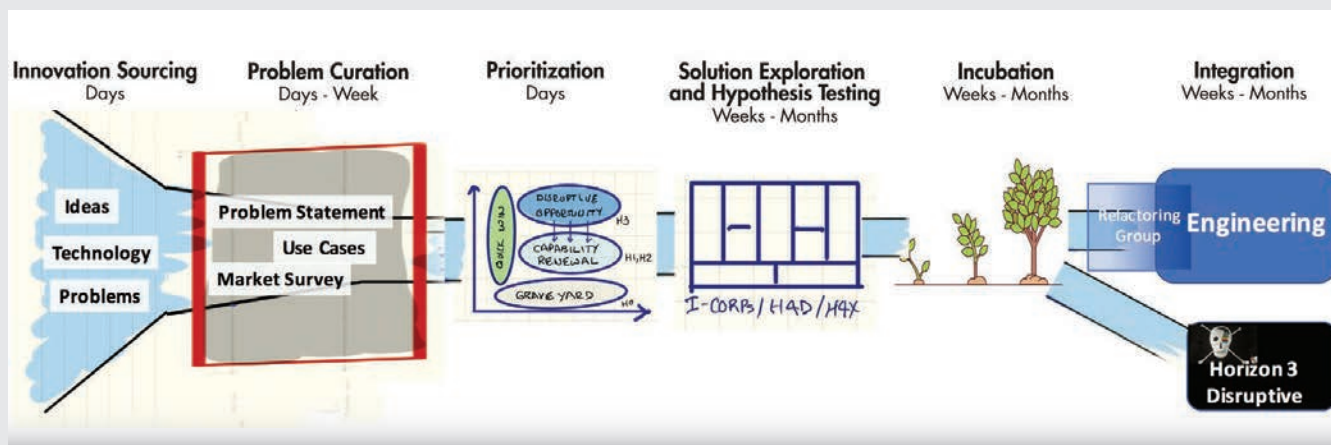
the center. It happens by crazy people, by outliers, and eventually gets adopted and becomes doctrine.”

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“If you don’t understand a problem and its consequences, you end up building the wrong solution.”

INNOVATION PIPELINE FOR SUCCESS



To have a reliable, accountable system of defense innovation that turns ideas into solutions with speed and urgency, DOD needs to establish an innovation pipeline, Blank says. What it has now are single activities, with most innovation going into R&D elsewhere—hence the exponential growth in private-sector innovation over the past 20 years.

The pipeline begins with **innovation sourcing**, that is, developing a list of problems and challenges, ideas and technologies that might be worth investing in.

During **problem curation**, innovators talk to colleagues and potential customers, looking for other places in DOD where a problem or challenge might exist in a slightly different form, related internal projects already in existence and commercially available solutions to problems. This phase also seeks to identify legal, security and support issues and helps identify who the customers and internal stakeholders for possible solutions would be. Here the building of initial minimum viable products (MVPs) begins. Some ideas drop out when the team recognizes that they may be technically, financially or legally unfeasible or discovers that other groups have already built a similar product.

Prioritization entails categorizing the list of innovation ideas using the three horizons model of McKinsey & Co. Horizon 1 ideas provide continuous innovation to a company's existing mission model and core capabilities. Horizon 2 ideas extend a company's existing mission model

and core capabilities to new stakeholders, customers or targets. Horizon 3 marks the creation of new capabilities to take advantage of or respond to disruptive technologies and opportunities or to counter disruption. Once projects have been classified, the team prioritizes them, starting by asking: Is this project worth pursuing for another few months full time? The innovation teams themselves set the priorities—not a committee of executives.

In **solution exploration and hypothesis testing**, the ideas that pass through the prioritization filter enter an incubation process like Hacking for Defense or I-Corps, the system adopted by all U.S. government federal research agencies to turn ideas into products. This six- to 10-week process delivers evidence for defensible, data-based decisions.

Once hypothesis testing is complete, many projects will still need a period of **incubation** as the teams championing the projects gather additional data, refine the MVP and get used to working together.

At the culminating point of **integration**, if the innovation is Horizon 1 or 2, it's time to integrate it into the existing organization. Horizon 3 innovations are more likely to be set up as their own entities or at least divisions. Trying to integrate these new, unbudgeted and unscheduled innovation projects into an engineering organization that has line-item budgets for people and resources results in chaos and frustration. (Graphic courtesy of Steve Blank)



SHOULDERING THE LOAD

Paratroopers assigned to the 1st Battalion, 503rd Infantry Regiment (Airborne), 173rd Airborne Brigade move through a training event during Exercise Baree, conducted Jan. 18 at Monte Romano Training Area in Italy. As technology advances and Soldiers carry more gear, the acquisition community must address the challenge of reducing the weight of that equipment. (Photo by Elena Baladelli, Training Support Activity Europe)



BEEN THERE, DONE THAT THE WEIGHT THING

| Those ugly extra pounds—or even grams—
can derail your program or product.

by John T. Dillard, Col., USA (Ret.)

I can honestly say that just about everyone wants to lose weight. A multimillion-dollar weight loss industry attests to this. It's no different in the armed forces. All defense products typically have that one thing in common: They're too heavy. From missiles to radios, satellites to submarines, aircraft to land vehicles, heavy weapons to small arms—not just the man-portable items—they all need to weigh less.

Over the decades, I've seen many system development efforts struggle to attain their weight goals. Often they have weight as a key performance parameter (KPP), among their many other technical performance requirements.

WEIGHT IS A REQUIREMENT THING

As a young acquisition officer, I wanted to carry that perspective forward into whatever programs I became involved with that developed Soldier-carried items. I was thrilled to be able to work on the M-4 carbine initiative at Picatinny Arsenal, New Jersey, back in the 1980s—shortening the M-16 A2 rifle—along with more exotic technology base efforts involving mini-grenades and even caseless ammunition.

In 1987, we contributed our concepts and early prototypes, along with the other Army research, development and engineering centers, to an advanced technology demonstration at U.S. Army Natick Soldier Research, Development and Engineering Center to show what the “Soldier of the Future” would look like. But on demonstration day, we were horrified when we all suddenly realized that everything Army labs were doing was collectively adding weight to the basic Soldier load—whether giving the Soldiers increased ballistic protection, new rations (which required water to hydrate), optical rifle sights, night vision, computerized radios and even a new bayonet (with sharpening stone). There was no doubt that Soldiers needed these new capabilities, but darned if we weren’t all adding weight to our warfighters with our individual high-tech advancements.

Upon entering a major program management office with a portfolio of close combat munitions, I saw firsthand an early “bunker buster” munition development program that was canceled before it could even get off the ground—because no prospective contractor could honestly bid on our request for a 10-pound solution. The requirements community had stood firm on that one. It would cost them time. It was years later that they eventually had to accept several solutions in the 15- to 17-pound range (the FGM-172 Short-Range Assault Weapon and the Mk 153 Shoulder-Launched Multipurpose Assault Weapon).

Yep, when it comes to weight as a system or program requirement, it can be a real biggie for you to consider. Is it a measure of your product or program success?

WEIGHT AS DESIGN CONSTRAINT

Of course, our materiel development team derives our users’ requirements and translates them into design specifications. So it’s especially important for you to know this: While weight is one of many possible technical performance parameters, it’s one that affects others to perhaps a unique degree.

Just think about the trade-offs among performance parameters of range, payload, speed, mobility, fuel economy, survivability, lethality, transportability and even reliability (if stress-over-strength comes into play with various components). It might

also factor into durability or robustness—not-so-often-used terms intermingled with reliability and utility. Weight can ripple through your system design like water, as second- and third-order effects are realized when things grow out of hand.

Remember that complexity is defined basically as the known and unknown interactions of many different connected pieces, and our business is the business of managing complexity. People want us to do things fast, but it’s more important to do things right. The following examples illustrate some of the implications of being overweight.

‘I ONCE HAD A WEIGHT PROBLEM ...’

The highly successful Javelin anti-tank missile was a deeply troubled development program in the 1990s—and was almost canceled over its weight problem. Entering this program management office (PMO) in the middle of the engineering and manufacturing development (EMD) phase, I learned weight was one of our four KPPs. We had known it was a risky goal right up front, along with several others. But at milestone B, we said, “We can do it.” It was a much-needed capability to replace the legacy 72-pound (and highly unreliable) Dragon missile.

We had conducted a 27-month technology maturation phase and had selected one prototype from three to take into advanced development. But we were a long way from anything that looked like a true configuration of the finished product. As EMD began, our preliminary design review had only been sufficient to map out the basic design and componentry to be “invented.”

About 18 months into our 36-month EMD phase, approaching critical design review (and before actually building a representative engineering design model), we realized we were not going to be able to make the 35-pound desired (objective) or even 45-pound required (threshold) weight required by the user in the requirement document.

During a typical system development, functionality, weight, cubic dimensions, interfaces and a host of other specifications are allocated to various producers. It may be quite some time before designs evolve, progress is realized and forecasting



Realizing that weight is an important parameter up front and early is important, but not nearly enough alone to alleviate weight’s programmatic perils.

FIGURE 1

ADVANCED ANTI-TANK WEAPON SYSTEM - MEDIUM

Preproduction qualification firm weight breakdown

SYSTEM TOTAL: 22,419.1 GRAMS / 49.43 POUNDS**Missile**

(grams / pounds)

Seeker with fuze

1,156.0 / 2.55

Guidance and

power elect

1,965.2 / 4.33

Precursor

667.0 / 1.47

Warhead, midbody

3,156.0 / 6.96

Safe, arm, fire

270.0 / 0.60

Wing set

229.0 / 0.50

Propulsion

2,447.0 / 5.46

Battery

340.0 / 0.75

Control

1,578.0 / 3.48

Miscellaneous

181.0 / 0.40

MISSILE TOTAL

12,019.2 / 26.50

Launcher

(grams / pounds)

Launch tube

assembly

25,855.0 / 5.70

Coolant unit

(without battery)

452.0 / 1.00

Pylon

114.0 / 0.25

Battery coolant unit

480.0 / 1.06

Umbilical cable

85.0 / 0.19

Amp-resistive

internal cable

107.0 / 0.24

Latch kit

200.0 / 0.44

LAUNCHER TOTAL

4,023.0 / 8.87

Command Launch Unit

(grams / pounds)

System assembly

3,293.3 / 7.26

Housing assembly

1,740.6 / 3.84

Battery pack

981.0 / 2.16

Carry bag

262.0 / 0.58

Lens cleaning kit

100.0 / 0.22

COMMAND LAUNCH**UNIT TOTAL**

6,376.9 / 14.06

**LOOKING FOR A THINNER JAVELIN**

As part of an effort to comply with KPPs for the Javelin system, program officials looked for every opportunity to reduce the weight—down to the gram—of the system's components. The hunt for lighter parts doubled the advanced-development cost for the missile and slowed the schedule. (Table courtesy of the author)

actual system weight is even possible. No excuses, though: We bit off more than we could chew.

STATISTICS ADD UP

Also, there is an additional weight “stack-up” issue to deal with consisting of even the tiniest of screws, fasteners and other components. With the Javelin, we realized that there could be a statistically possible (though highly improbable) 2-pound difference between the lightest and heaviest possible assembled systems within the same production lot—assembled, of course, from many parts from many respective production lots.

Makes sense, right?

So, consider this: Before the design was complete—before the parts were assembled, with computerized data coming in from our subcomponent suppliers—we knew well in advance that we could not deliver, and that we would likely be in the range of 47 to 50 pounds. (See Figure 1.) So we went all the way up to the Joint Requirements Oversight Council to request a KPP requirement threshold increase to 49.5 pounds. Fortunately, our user friends supported us all the way.

Trouble was, nothing on the Javelin weighed 5 pounds that we could do without—the reduction had to be accomplished by “salami-slicing” the weight “budget” for individual components—changing materials and redesigning to reduce weight without sacrificing durability or reliability for such environments as rough handling, loose cargo transport, water immersion and vehicle storage rack mounting.

It actually took all of us in the PMO a while to fully realize that to get weight out of our system, practically every component would have to be redesigned.



HOW TO TACKLE A WEIGHTY ISSUE

By keeping an eye on weight requirements early in a program, acquisition professionals can ensure that Soldier load remains bearable and program requirements stay on track, financially and schedule-wise. (Image courtesy of the author)

We went into “gram management mode” to monitor the technical performance measurement of the weight in each sub-component. (Yes, there are 454 of those little grams in a single pound.) We spent millions of dollars in component redesign.

Our little Javelin project slipped 50 percent in its advanced-development schedule and more than doubled its advanced-development costs—in large part because of weight-reduction redesigns throughout the entire system (though we did indeed have other technical challenges to contend with). (See Figure 2.) Naturally, that threw off all of the funding allocations tied to the program objective memorandum- and future years defense program schedule funding, and necessitated formal program re-baselining with congressional assistance to “re-color” the money.

Eventually, redesigned components arrived for assembly. So along the way, as development moved to completion, we had a mixed bag of about seven different Javelin configurations with substantial differences among them—a complication for testing and evaluation, reliability analysis and scoring, etc. These all settled down to one final configuration by the time operational testing rolled around. We used the extra schedule to fully test these subcomponents as they came in, to be sure we hadn’t sacrificed other important properties when we shaved off the weight. As a result, system-level testing went off without a hitch. And we came in just under the 49.5-pound threshold.

WHAT – AGAIN ... ?

Later, as product manager of the Joint Advanced Special Operations Radio System, I inherited a radio program that also had weight as a KPP. And I once again found it to be a challenge.

During the technology maturation phase, while receiving a briefing on a completed and functional 21-pound multiband transceiver prototype that was supposed to get down to 10 pounds in coming months, our prime contractor indicated that it was going to lose weight by making things more compact inside.

The radio largely consisted of five densely populated Standard Electronic Module, Format E cards with a planned reduction to only two. Having the benefit of the Javelin experience behind me, I knew what question to ask: “How much do the three cards being eliminated weigh?” The answer was 2 pounds each—not at all adding up to the 11 pounds we had to lose—and eyes in the audience began to widen. “Great, now how are we going to lose the other 5 pounds?” I asked. For a moment—just a very brief one—I was the smartest soul in the

FIGURE 2

	ORIGINAL BUDGET	CURRENT <i>latest revised estimate</i>	DIFFERENCE
1. ROUND AND MISSILE	\$11,733	\$20,048	\$8,315
2. PROPULSION	\$2,327	\$8,386	\$6,059
3. WARHEAD AND CONTACT FUZE	\$9,720	\$13,661	\$3,941
4. ELECTRONIC SAFE AND FIRE	\$1,459	\$6,926	\$5,467
5. GUIDANCE SECTION	\$16,092	\$35,662	\$19,570
6. SEEKER	\$24,227	\$47,905	\$23,678
(INCLUDES FOCAL PLANE ARRAY)	[\$14,000]	[\$33,000]	[\$19,000]
7. CONTROL ACTUATION SYSTEM	\$2,046	\$5,180	\$3,134
8. TELEMETRY	\$2,405	\$4,085	\$1,680
9. LAUNCH TUBE ASSEMBLY	\$2,036	\$6,583	\$4,547
10. BATTERY COOLANT UNIT	\$1,155	\$4,849	\$3,694
11. ROUND SHIPPING CONTAINER	\$107	\$2,420	\$2,313
12. COMMAND LAUNCH UNIT	\$18,976	\$53,812	\$34,836
(INCLUDES DETECTOR DEWAR COOLER)	[\$2,600]	[\$15,100]	[\$12,500]
13. TRAINING DEVICES	\$7,755	\$9,636	\$1,881
14. TEST AND EVALUATION	\$11,260	\$12,510	\$1,250
15. SYSTEM ENGINEERING	\$9,362	\$21,606	\$12,244
16. PROJECT MANAGEMENT	\$35,298	\$64,596	\$29,298
17. INTEGRATED LOGISTICS SUPPORT	\$3,949	\$6,070	\$2,121
18. DATA	\$4,026	\$4,505	\$479
19. JOINT VENTURE GENERAL AND ADMINISTRATIVE	\$11,591	\$20,247	\$3,656
ALL OTHER	\$4,559	\$13,465	\$8,906
TOTAL	\$180,083	\$362,152	\$182,069

HALF THE WEIGHT, DOUBLE THE COST

In an effort to reduce system weight, Javelin PMs redesigned system components. However, that reduction came at a cost: Estimates grew across the board, with the total estimate at twice the cost of the original. (Image courtesy of the author)

room. It didn't help much, though. We were already on our way.

TIMING IS EVERYTHING, AND A WORD TO THE WISE

For program managers, realizing that weight is an important parameter up front and early is important, but not nearly

enough alone to alleviate weight's programmatic perils. Even though contract incentives can be put in place for weight goals, the cost-reimbursable contract environment typical of most development efforts puts the government at significant risk if weight concerns are not fully identified and addressed before EMD.

Stringent controls must be issued to sub-component suppliers that will severely constrain their individual weight allocations if preliminary design reviews should reveal an issue. A weight problem may at first appear to be like many other technical performance shortfalls where specifications have simply not yet been met. And a program can often proceed with sub-spec prototype testing until the final configuration test articles eventually emerge. But as I've explained here, the implications can be significant.

Since 2001, when technology readiness levels (TRLs) and assessment methodologies came more fully into use, I have found it curious and troubling that nowhere in the listing of levels 1 through 9, which range from glimmer-in-the-eye to fully ready to go, did the word "weight" appear in the descriptions of tactical maturity or readiness.

Even today, we seldom find mention of this important parameter of near-final design configuration. (However, descriptions including this parameter later become more specific and are now found in references like the Technology Readiness Assessment Deskbook, 2009, specifically in supporting information for consideration of TRL Level 6.) Corporately, we are finally beginning to learn the lessons.

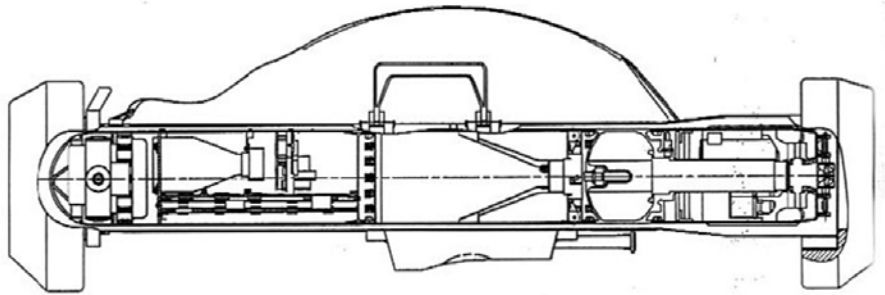
While it is easy not to expect early prototype hardware to be fully of "form, fit and function," we do ourselves a disservice if we dismiss the challenges of weight and the many technical and financial implications it can have on a program.

CONCLUSION

Program managers would do well to heed the advice of those who have gone through the pain of weight reduction programs. Hopefully, those of us who

THOSE LINES ARE TOO HEAVY

A line drawing of an early Javelin anti-tank missile. Halfway through the program's EMD phase, program leaders realized it would not be able to make either the objective or threshold weight required by the user in the requirement document. The weight issue nearly canceled production of the Javelin, which was needed to replace the legacy Dragon missile. (Image courtesy of the author)



have been there have touched upon implications of design costs versus programmed funding, configuration management, diligence in measurement, testing and the managing of requirements:

- PMs must watch out for over-optimism in the area of weight.
- Realize the cost and schedule implications of extensive component redesigns necessitated by weight constraints, along with their attendant configuration and reliability risks.
- Discover your weight situation early.
- Revisit the requirement if you must. Consider the following, for example:
 - Does it have to be one-man-portable or could it be crew-served?
 - Does it really have to be C-130 transportable, or would a C-117 be sufficient?
 - Does it really have to fly a round-trip sortie of 400 miles?

Users might not appreciate your questioning, but they'll like even less your failing to deliver what was promised. We simply cannot promise to deliver things that violate the laws of physics, like a light tank, for instance, that is armed to a caliber required for lethality but with a chassis so light it cannot possibly sustain the recoil forces of mass times acceleration.

Extensive modeling and simulation may curtail an imprudent investment and allow developers to "just say no" to the

impossible. Early testing and evaluation is another real way of understanding things fully a bit later on, but that involves hardware investment up to the point of engineering design models and test article manufacture.

Be cognizant of the stack-up phenomenon, and manage to the gram if necessary.

Above all, whenever weight is mentioned in a development effort you are involved with, perk up your ears and look for the red flag. You might become the smartest soul in the room, if ever so briefly.

JOHN T. DILLARD, COL., USA (RET.), managed major weapons development efforts for most of his 26-year career in the U.S. Army. He is now a senior lecturer in systems acquisition management at the Graduate School of Business and Public Policy, U.S. Naval Postgraduate School in Monterey, California. He has also served on the faculty of the U.S. Army War College and as an adjunct professor of project management for the University of California, Santa Cruz. He holds an M.S. in systems management from the University of Southern California and is a distinguished military graduate of the University of Tennessee at Chattanooga with a B.A. in biological sciences.



Weight can ripple through your system design like water, as second- and third-order effects become realized when things grow out of hand.

Weight kills programs, too

In the famous Boeing 777 development program of the 1990s, United Airlines was contractually permitted to penalize Boeing at \$500 per pound, per airplane, per year for the revenue-producing life of the airliner if Boeing exceeded its weight goal of about 297,000 pounds.

For the 777, almost 0.25 of 1 percent of a 297,000-pound airplane can be the “stack-up variance”—caused by the randomness of small weight differences across 3 million or so parts in the airplane (over 740 pounds!).

In 1999, the U.S. Army’s Crusader advanced field artillery program’s design-to-weight requirement was halved by then-Chief of Staff Gen. Eric Shinseki as the program was readying for passage of milestone B. The multibillion-dollar program was terminated soon after, before it could get very far into advanced development. Its weight requirement as a KPP was an outgrowth of force deployability concerns during the Army’s recent operations in Kosovo, driven by the intra-theater airlift restrictions of the C-130 Hercules cargo plane. (These same concerns gave rise to an “interim armored vehicle,” the Stryker combat vehicle, which would have to face the same C-130 payload limitations of weight and size before the invasion of Iraq.)

On the heels of Crusader’s cancellation, the Future Combat Systems program could also blame at least some of its horrific cost growth and ultimate failure on striving to make its weight goals. Some of us saw it coming.

Early in Operations Enduring Freedom and Iraqi Freedom, our High Mobility Multipurpose Wheeled Vehicles that were hastily “up-armored” experienced parts failure when using non-designed solutions for ballistic protection. Adding armor without changing drivetrain and suspension components increased weight and reduced mobility, speed, reliability and fuel economy. Later, when requirements grew for survivability against even greater threats from improvised explosive devices, we rapidly procured multiconfiguration Mine Resistant Ambush Protected vehicles



COMING IN UNDER THE LIMIT

A Boeing 777 aircraft approaches the landing strip at Los Angeles International Airport. Requirements were incorporated into Boeing’s contract to produce the aircraft to ensure that weight issues were resolved, and similar issues affected several U.S. military programs, including the Crusader and the Joint Strike Fighter. (Photo courtesy of Wikimedia Commons)

that were designed to better operate with the additional armored weight that was necessary for force protection.

Perhaps one of the most recent and highest-visibility programs that long suffered from being overweight was the Joint Strike Fighter. Often criticized for trying to advance immature technologies during its engineering and manufacturing development phase, it was the somewhat mundane but far-reaching impact of weight that contributed to this program’s cost and schedule growth back in 2004-2006. The U.S. Government Accountability Office said it added almost \$5 billion to lose 2,000 pounds in the developing aircraft that degraded its key performance capabilities.

—JOHN T. DILLARD, COL., USA (RET)



HOME STATION TO DROP ZONE

The skies are filled with Soldiers from the 173rd Airborne Brigade as hundreds of paratroopers conduct a tactical airborne insertion onto Juliet Drop Zone, Pordenone, Italy. The case of EMC, which turns aircraft into flying command posts on the way to the paratroopers' objectives, shows that acquisition can move fast—it took only two years to go from idea to complete fielding. (U.S. Army photo by Lt. Col. John Hall, 173rd Airborne Brigade)

From Idea TO FRONT LINE In Record Time

| How to speed acquisition timelines through the power of innovative thinking.

by Lt. Col. Mark P. Henderson

Through innovative thinking and process improvement, the Army Acquisition Corps successfully transformed airborne operations in just two short years, culminating on Sept. 30, 2017, with the fielding completion of the full Ku-band operational capability of Enroute Mission Command (EMC). Mounted on Air Force C-17s, this revolutionary capability turns aircraft into flying command posts, enabling the Global Response Force to conduct real-time continuous mission command from home station to the drop zone.

Other network communications solutions making rapid debuts in 2017 included low-rate initial production for terrestrial radios that provide information superhighways; coalition enclaves to support the growing needs of our allied partners; secure Wi-Fi, making command posts significantly more survivable, agile and lethal; intelligence enclaves reduced to the size of a suitcase; and the first instances of 4G LTE enabling communications through smartphones—all delivered roughly within two years after their requirements were approved. These successes come despite news reports of long timelines

in the development and fielding of new technologies and can help to answer the question lingering in the minds of Army and acquisition professionals over the past year: What innovative procurement methods can we use to deliver capability to Soldiers more rapidly?

I have managed rapid acquisitions since I was a major, from the largest major defense acquisition programs to smaller, non-programs of record based on operational needs, at all phases of the acquisition life cycle. I have learned that all facets of acquisition can benefit from a little innovative thinking, especially in the networks and information technology realm, where technology becomes obsolete so quickly.

By looking at six separate aspects of acquisition—policy, requirements, documentation, funding, programmatic considerations and testing—I offer possible approaches that apply broadly and could help some programs, when and where applicable, thus demonstrating the speed with which we as a community can and do deliver. I am not asserting that there are no challenges in the acquisition

process or in the surrounding bureaucracy, only that we are empowered to shape our own destiny.

POLICY

We can and do move fast in the acquisition world. In fact, we are compelled to do so. DOD 5000.02 is the playbook that maps out acquisition rules and processes and contains multiple references that are consistent with the following: “Milestone decision authorities (MDAs) ... will tailor and streamline program strategies and oversight.” It goes on to say that MDAs are authorized to tailor not only acquisition procedures, but also the regulatory requirements to cut through bureaucracy as efficiently as possible and rapidly deliver capability. In other words, DOD and senior leaders expect that stakeholders will work together to streamline processes to provide the latest capability in the shortest time possible.

One creative solution to speed acquisition timelines is to brief an MDA before a milestone C or full-rate production decision on ways to reduce staffing processes, regulatory requirements, bureaucracy, schedule or anything else that may add unnecessary complexity. Gaining approval in advance to cut through these obstacles can save a great deal of time and effort up front.

To support Soldier readiness based on a Soldier and product focus, the Army acquisition community and program managers must abandon risk-averse, process-based thinking. Rapid acquisition requires leaders who can and do take prudent risks within the law in an effort to speed antiquated timelines.

REQUIREMENTS

The most recent edition of Webster’s International Dictionary contains more than 470,000 words in the English



SHOOT, MOVE, COMMUNICATE

Soldiers assigned to 2nd Brigade Combat Team, 1st Armored Division advance toward a simulated objective during Decisive Action Rotation 17-08 at the National Training Center (NTC), Fort Irwin, California, in August. During the rotation, the unit used the small-form-factor Modular Communications Node – Advanced Enclave (MCN-AE) to relay intelligence information across the network on the battlefield. MCN-AE was fielded, roughly two years after the requirements were approved. (U.S. Army photo by Spc. Gabriel Segura, NTC Operations Group)

language. This allows a great deal of flexibility to describe a capability in performance-based language, taking care not to dictate specifically what that product should be. Flexible requirements and capability-focused language are powerful tools for an innovative acquisition leader to leverage. The more prescriptive the language, the less latitude industry partners and the acquisition community have to rapidly deliver the best product. That said, in some cases new and shiny is not always better. If a requirement can leverage aspects of an existing capability, avoid the lengthy process of developing new requirements. Instead, use that underlying capability or system as a baseline and add to or modify it.

For example, modifications and upgrades to an existing system using a “mod-in-service” funding approach have enabled the product office to continually

modernize the tactical network baseline of the Warfighter Information Network – Tactical (WIN-T) Increment 1b. With a fielded, standardized and stable baseline that meets program requirements, two things can occur: The baseline can itself be modified, and new products can be rapidly added as technology advances to boost the capability even more.

Some of the network fixes involve concepts like using commercial off-the-shelf equipment, but that is only part of the answer. The view needs to be holistic. The equipment we are delivering is designed to work on all parts of the tactical network regardless of the WIN-T node so that it will be interoperable not only today within the Army, but into the future.

Another consideration is to focus requirements on procuring smaller quantities of new capability more often. This enables



COMMANDING SKIES

During a joint forcible entry training mission, the Army's Global Response Force successfully used EMC to enable real-time joint intelligence, communications and collaboration capabilities as they flew cross-country to the objective in May 2017. The Ku-band-enabled suite of capabilities supported real-time continuous mission command throughout the flight. (U.S. Army photo by 2nd Lt. Zachary Jacobson, 50th Expeditionary Signal Battalion, 35th Signal Brigade)

a large network or technology to remain nimble enough to leverage newer technology as it materializes and continuously fosters competition. The key here is to develop technology that is interoperable instead of stovepiped. The art of acquisition lies partially in avoiding the elevation of new products or systems to major defense acquisition program status whenever possible. Similarly, delegate MDA responsibility from the acquisition executive or DOD component head to the program executive officer (PEO) level for adjudication—even down to the project managers—for as many programs as practicable. That will untether Army senior leaders from the unnecessary day-to-day management of these programs.

Keep organizations postured to steer clear of large, long-term procurement models whenever possible. As technology changes or improves, procure the next iteration as a technology insertion

or modification, always keeping interoperability in mind. While an operational needs statement or directed requirement can be an effective method to rapidly implement capability, it's not the only way to get things accomplished. Think about using an integrated product team, working integrated product team or cross-functional team of representatives from appropriate functional disciplines to work together on devising innovative ways to improve processes, identify and resolve issues, and make sound and timely recommendations to facilitate decision-making. Ideally these forums will not become bureaucracies, but will enable movement through them.

Additionally, look beyond the local applicability of a baseline requirement and talk to other services like the Navy, Marine Corps, Air Force or U.S. Special Operations Command and leverage mutual needs—in other words, work together.

Doing so will naturally increase interoperability with little extra effort and drive economies of scale to reduce cost using better buying power concepts. Building relationships is as important as building things. As a final note on this topic, look at programs holistically to reduce complexity by considering redundancy, cost and interoperability.

DOCUMENTATION

Another fresh approach to speeding acquisition timelines is to gain MDA approval to tailor or streamline documentation to significantly reduce redundancy and the likelihood of errors in substantial amounts of paperwork. Even for Acquisition Category (ACAT) III programs, which are the bulk of Army programs, there can be as many as 39 information requirements, with 16 needing MDA approval and accounting for as many as 550 pages to read.

My team and I have implemented a streamlined approach for ACAT III programs in the PEO for Command, Control and Communications – Tactical that effectively trimmed 39 information requirements to eight baseline documents through consolidation or reduction. The net result was a 79 percent decrease. MDA signatures were reduced by 50 percent to eight, and total page count fell 53 percent, from 550 pages of documentation to 256. Because senior leaders do not have limitless time, the MDA received the complete package plus a new executive summary that distilled all the key information needed to make a decision in a five-page rollup—a 99 percent reduction in reading material. This enabled the MDA to make a recent full-rate production decision more easily and rapidly.

FUNDING

There are a couple of ways to increase the speed and flexibility of programs through



SUITCASE-SIZED INTELLIGENCE

The small-form-factor MCN-AE augments the existing intelligence network, enabling users to employ the Army's tactical network to connect to all of the same resources they have when using the traditional Trojan Intelligence Network. MCN-AE is part of a suite of communications capabilities fielded in 2017, all of which better enable Soldiers to share information. The capabilities offer lessons for how acquisition can move fast with innovation and tailoring. (U.S. Army photo)

funding. Some programs come with a dedicated funding line, while others do not. When managing a product without a dedicated funding line, things often move faster because there is inherently less regulation and bureaucratic oversight.

For programs with dedicated funding lines, one recommendation is to consolidate as many products from a capability production document into a single line and product management office. This creates a natural ability to flex between those products within the consolidated line from year to year, swiftly and with little effort. Adjusting the purchase plan annually is easy because no additional processes, such as above-threshold or below-threshold reprogramming, are needed to move money between products. In this way, project or product managers have maximum flexibility in executing their programs.

This approach is easiest to accomplish at the beginning of a program, though if needed it can be phased in over time. A word of caution here: Extending this approach to enable many

requirements with funding to fall on several managers out of such a line can be high-risk. The failure of one or two managers to execute their funding on time can cripple the entire line through congressional marks, rescissions or other administrative actions.

PROGRAMMATIC CONSIDERATIONS

Be bold and unafraid. Teams delivering capability rapidly can be lean or understaffed, so seek help as needed to retain momentum. Keep in mind that there are many government and industry partners to go to for help. Use technically mature, commercial off-the-shelf products that can enter the acquisition process at milestone C, a decision point that enables the initial procurement of equipment and allows the program to move forward to initial operational test and evaluation.

Actively manage and compress schedule to reduce risk by conducting as many events in parallel as possible to get things done in less time. By doing so, my team was able to get a new

The art of acquisition lies partially in avoiding the elevation of new products or systems to major defense acquisition program status whenever possible.

ACAT III radio product from a milestone C decision out to testing in two weeks. The entire process from milestone C to successful, full-rate production decision took just seven months.

Remember: Be creative in how you tailor a program. For example, to deliver capability more rapidly, if possible leverage DOD 5000.02 Enclosure 13, a provision that allows for reduced acquisition timelines based on urgent operational need. The EMC program office leveraged this approach and was able to deliver capability in two years.

Challenge convention and use nonstandard programs of record to accelerate the process where applicable. This approach gets capability into the hands of Soldiers rapidly while creatively meeting acquisition requirements and staying ahead of obsolescence. Get away from unique capabilities or designs where possible. In a previous assignment as an assistant

product manager in the PEO for Enterprise Information Systems, I led a team that standardized strategic network architecture for long-haul communications by putting the engineering up front and standardizing the product selections on the back end, the reverse of traditional approaches.

Car manufacturers know there is no sense in doing a custom design for each new vehicle. Similarly, this concept worked well for the Army in the delivery of modular network capabilities that connected countries across Southwest Asia. The concept is repeatable and can apply to any network by figuring out capability based on mission and scale and addressing it with basic configurations such as mini, small, medium or large, then working out the engineering in advance with room for à la carte, Lego-like additions. At that point, a commander simply needs to select a scalable package that best fits his or her situation.

TESTING

Though it sounds simple, think through the test strategy early in the process, well before testing begins. Ensure that testing is done in accordance with the requirements and does not extend into other factors outside of what is actually needed, adding little additional value. Make Soldiers, the end users, part of the process early and grow capability through user feedback in both laboratory and operational environments, to improve products using a test, fix, test approach. Don't be afraid to find problems.

Also, do not be afraid to use capabilities and limitations reports or operational assessments in lieu of formal testing where applicable. When a formal test is required, partner with the test community early and leverage development tests or operational assessments with

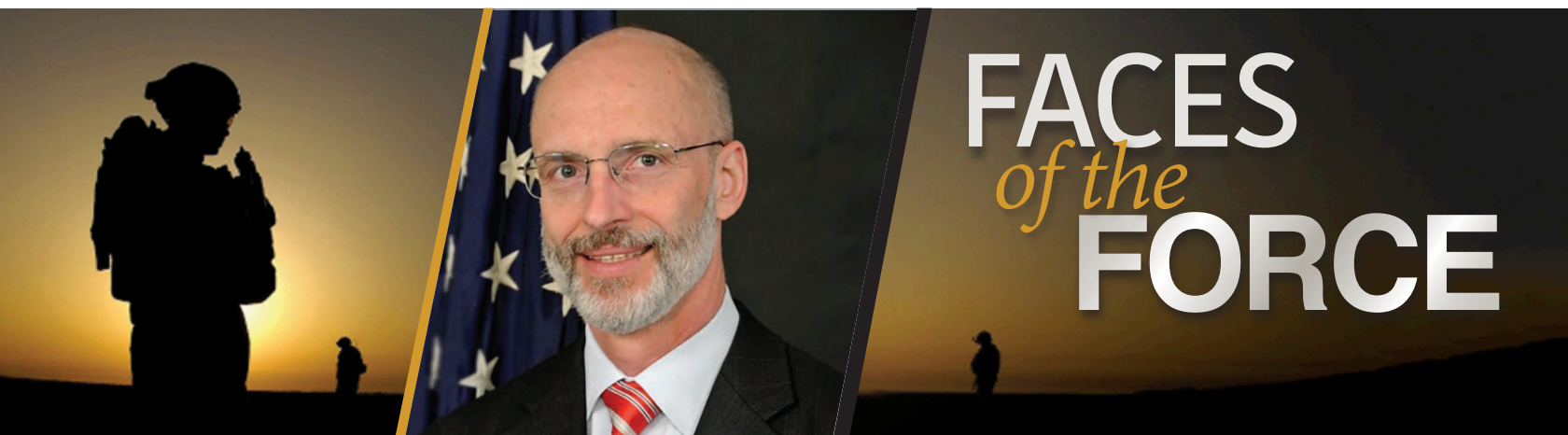
Soldiers in conjunction with the testers to eliminate surprise and reduce overall test risk. Remember to leverage teams and relationships by working closely with the requirements generators as well as the test community. Testers want to see the best capabilities get into Soldiers' hands, and are typically willing to work with a product office to help move the ball down the field.

CONCLUSION

A little creativity and innovation can speed acquisition timelines, and despite recent news headlines, we as a community have been doing just that. DOD 5000.02 provides the authority to tailor the process, cut through bureaucracy, think holistically while leveraging relationships and apply creativity to get to "yes." Rapid acquisition is real and can flourish with a little bit of innovative thinking.

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

LT. COL. MARK P. HENDERSON is the product manager for Network Modernization, assigned to PEO C3T's Project Manager for Tactical Network. He holds an executive MBA with emphasis in information systems management and a master of education with emphasis in counseling and psychology from Troy University, and a B.S. in political science and government from Kennesaw State University. He is Level III certified in program management and holds master's certificates in Lean Six Sigma, negotiations, expert selling, applied program management and advanced program management. He is a member of the Army Acquisition Corps.



DR. CHARLES A. BASS JR.

COMMAND/ORGANIZATION:

Protection and Hazard Mitigation Division,
Defense Threat Reduction Agency (DTRA)

TITLE: Chief

YEARS OF SERVICE IN WORKFORCE: 11

YEARS OF MILITARY SERVICE: 20

DAWIA CERTIFICATIONS:

Level III in program management

EDUCATION:

Ph.D. in chemical engineering, New Jersey
Institute of Technology; M.S. in chemical
engineering, Johns Hopkins University; B.S.
in engineering, UCLA; Licensed Professional
Engineer, Commonwealth of Virginia

AWARDS:

Defense Acquisition Workforce Award –
Science and Technology Management; DTRA
Research Directorate Distinguished Technical
Fellow; DTRA Meritorious Civilian Service
Medal; Army Superior Civilian Service Medal

Bridging the ‘valley of death’ to deliver S&T to Soldiers

“Besides budget battles, the hardest part of science and technology is getting new capabilities in the warfighter’s hands—[past] the famous ‘valley of death’ in acquisition,” said Dr. Charles A. Bass Jr., chief of the Protection and Hazard Mitigation Division within the Defense Threat Reduction Agency (DTRA). “The best approach to overcome this is to stay in touch with the warfighter’s needs and priorities and to be product-focused throughout science and technology [S&T].”

“New technologies are much easier to insert in a program when all ‘ilities’ are addressed before the transition. Each year I learn where I have failed and how to approach this better next time,” he said.

Bass clearly has learned a lot from his past missteps, winning the Defense Acquisition Workforce Individual Achievement Award for Science and Technology Manager last year. His contributions to the Uniform Integrated Protective Ensemble Family of Systems, the Contamination Indicator Decontamination Assurance System and the Joint Biological Agent Decontamination

System were key to making it possible for DOD to acquire three valuable capabilities within the next five years: a family of individual protective systems to address the threat of weapons of mass destruction; a spray that reduces the time and resources required to execute chemical agent decontamination; and a biological and chemical decontamination process that quickly returns sensitive equipment and aircraft to service.

“I was very pleased to receive the award. I have a great team and wonderful support staff. This award also reflects their quality and hard work,” Bass said, adding, “Success is a result of people working together, and everyone is capable of contributing.”

Bass manages an S&T portfolio to develop technologies that improve the warfighter’s physical protection against chemical and biological warfare threats. “I work closely with the acquisition manager for this commodity area, who takes these technologies into engineering and manufacturing development, production and sustainment. The important part of S&T is keeping the customer in mind and maintaining a product focus so the program yields capabilities that are effective.”



WORKFORCE



WORKFORCE

The range of capabilities in his portfolio—from fundamental university research all the way to full-scale prototypes that are ready to go into production—is something that others often find surprising. In one case, he and his team went from requirement to a limited fielding within four months. “This was the Transport Isolation System, designed to transport infected Ebola patients safely on military transport aircraft, and we were responding to an urgent requirement from the U.S. Transportation Command,” he explained. “This was a national-level crisis, so all the players—users, operational test agency, contractor, suppliers, etc.—were motivated to act.”

One factor in his team’s success was partnering with the Joint Project Manager

(JPM) for Protection within the Joint Program Executive Office for Chemical and Biological Defense. JPM Protection “worked closely with us on every step of the process,” Bass said, “negotiating a production contract before testing was completed, so we moved seamlessly from the urgent materiel release decision to production deliveries within several weeks.”

His staff is also working with universities to learn fundamental characteristics of nanomaterials with the potential to improve Soldier gear. “We are focused on materials that are good adsorbents of agents and possess catalytic activity to destroy the agents and expel the byproducts. These materials may one day be incorporated into the duty uniform to provide continuous protection with a suit that decontaminates itself.”

Bass, who served 20 years in the Army before retiring in 2000 at the rank of lieutenant colonel, noted that his greatest satisfaction “is finding technical solutions to problems that have been around since I served in the Army.” His first acquisition-related position was on an advanced development team for the M40 Protective Mask in the mid-1980s, when he was a captain. He gravitated toward acquisition after retiring from the Army. “This position gives me a great opportunity to apply my advanced degrees and experience as a warfighter.”

During his military career, Bass spent four years at what is now known as the U.S. Army Edgewood Chemical Biological Center, taught chemistry at the United States Military Academy at West Point, and served in assignments and deployments with maneuver units at the battalion, brigade and division levels. After retiring, he spent several years managing research for a small business.

“In addition to my work and active-duty experience, Defense Acquisition University training on the program management track helped me understand how to interface with the acquisition program manager,” he said. “All these experiences address various aspects of what I do on a daily basis.”

Bass sees his role in part as the bridge between the researcher and the acquisition program manager, “so it is important to gain experience and training to understand the details of the activities in both domains,” he said. He recommends developmental assignments in areas where an employee’s experience may be lacking. “For instance, I facilitated a developmental assignment for a new S&T manager to spend some time working at the bench level in the lab that performed a large portion of the projects she was going to manage,” he said.

DTRA’s Chemical and Biological Technologies Department developed the Scientist in the Foxhole program, which gives S&T managers a chance to observe tactical unit activities and get some hands-on experience so they can better understand the needs of the warfighter. Army researchers participated in exercises with the 20th Chemical, Biological, Radiological, Nuclear and Explosives Command at the National Training Center, Fort Irwin, California. Other variations have included Scientist on the Flight Line, wherein researchers work with Air Force engineers at Tyndall Air Force Base in Florida, and Scientist at Sea, wherein S&T staff observed activities at Norfolk Naval Shipyard in Virginia. “We have swapped positions with our supported acquisition program management office, and we were able to train personnel and strengthen ties as a result,” he said.

—MS. SUSAN L. FOLLETT



S&T MANAGER OF THE YEAR

Dr. Charles A. Bass Jr. receives the 2017 Acquisition Workforce Achievement and Development Innovation Award for Science and Technology Manager from the Hon. Ellen M. Lord, then-undersecretary of defense for acquisition, technology and logistics and now undersecretary of defense for acquisition and sustainment, at a Pentagon ceremony Dec. 6. At right are Patrick M. Shanahan, deputy secretary of defense, and Lt. Gen. Anthony R. Ierardi, director, Force Structure, Resources and Assessment (J8), Joint Chiefs of Staff. (U.S. Army photo by Spc. Tammy Noonan)



FROM THE DIRECTOR OF
ACQUISITION CAREER MANAGEMENT
MR. CRAIG A. SPISAK



JUST REWARDS

One of the simplest but most important ways to honor AAW achievements is through awards.

Private industry can offer more money, but it can't offer the chance to serve. It can't provide the daily work that connects our workforce to our warfighters.

In the previous issue of Army AL&T, I discussed different ways in which supervisors can motivate the Army Acquisition Workforce (AAW), and how they must use the tools available to them to recruit and retain talent. One of the motivators I mentioned was a simple one: recognition.

In the office or in the lab or in the field, you've seen their hard work, you've encouraged their successes, and you want to share those achievements with our broader acquisition community.

How do you share that recognition? One vital avenue is to nominate your employees for awards. The Army offers so many programs that it's virtually impossible not to find an award that fits the accomplishments of our hard-working personnel. For example, the Office of the Administrative Assistant to the Secretary of the Army oversees upward of 30 award programs. Some recognize outstanding performance, from leadership to innovation to public service. Others focus on diversity and equal opportunity. These programs ensure that outstanding Soldiers and civilians who exemplify Army values



receive recognition. Additionally, the Army offers awards specific to the acquisition community. The Army Acquisition Executive's Excellence in Leadership Awards, the Secretary of the Army Excellence in Contracting Awards, and the Undersecretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) Acquisition Awards are some of the most prominent.

You can also have your employees share their expertise with their peers. Accompanying this issue of Army AL&T is a supplement containing the works of the winners of the 2017 Major General Harold J. "Harry" Greene Awards for Acquisition Writing. And throughout every issue of Army AL&T are subject matter experts who have been encouraged and given the time to write articles that bring a focus to their work.

But let's take a deeper dive into awards, particularly the USD(AT&L) Acquisition Awards. There are 14 Workforce Individual Achievement Awards for which AAW members are eligible, in categories ranging from Acquisition in an Expeditionary Environment to Test and Evaluation. And each comes with the potential for a monetary award of \$5,000. Each Army acquisition unit is allowed to submit one nominee in each category. But in 2017, Army acquisition units submitted a total of only 22 nominees (and of those, only 17 were qualified to receive the award—read the submission rules!). Out of 39,000-plus members of the Army Acquisition Workforce, there were only 17 qualified nominations, just over one per category. We know that's not an accurate reflection of the AAW's talent.

Consider the David Packard Excellence in Acquisition Award, which recognizes organizations, groups and teams that have demonstrated exemplary use of innovation and best acquisition practices to achieve outstanding acquisition outcomes for the warfighter and the taxpayer. In 2006, the Army had 27 nominations for this prestigious award, rising to a high of 33 nominations in 2009 and 2010. By 2016, the number of nominations had plunged to 10 before rebounding to 18 in 2017. Again, Army acquisition leaders are dramatically underutilizing this award.

At the end of the day, nominating people for awards is about talent management. It's about finding a way to keep the right person in the right job at the right time. Recognizing people for their work and their successes is important. As a supervisor, it doesn't cost you anything more than time and effort to nominate people for awards throughout the year. Recognizing people by nominating them for an award is probably the strongest message that you can send to advocate for those people and to motivate them—that you've recognized they're working hard, you see their successes and you want to share those successes with our broader community.

A little bit of recognition is one of our best tools for garnering great performance from the talent of our workforce.

Monetary rewards are wonderful, but quite often that's not what motivates people—especially those who've chosen to work in the AAW. Private industry can offer more money, but it can't offer the chance to serve. It can't provide the daily work that connects our workforce to our warfighters, the value of being a public servant and working for DOD. As we seek to retain and recruit talent, we can't lose sight of the fact that people who come into this business do so to get an opportunity to take on more authority and responsibility than they would in private industry, and to do unique work that they couldn't do elsewhere. So let's reward them for their willingness to serve and excel.

Nominations for the USD(AT&L) awards will open in May. The U.S. Army Acquisition Support Center (USAASC) is the official collection point for Army nominations. USAASC will compile the nominations and submit them to senior leadership, who will then select and forward the Army submissions to USD(AT&L) for consideration.

Detailed information on each award and instructions for submitting nominations can be found at <http://asc.army.mil/web/acquisition-awards/>. And for tips on how to write and submit a winning package, go to "And the Award Goes To ..." at <http://usaasc.armyalt.com/?iid=149666#folio=162>.



— HONORING THE WORKFORCE —



Undersecretary of Defense for Acquisition, Technology and Logistics Acquisition Awards

- The **Defense Acquisition Workforce Individual Achievement Award**, which recognizes excellence by members of the Defense Acquisition Workforce in 17 functional categories:
 - Acquisition in an Expeditionary Environment
 - Auditing (Army ineligible)
 - Contracting and Procurement
 - Cost Estimating
 - Earned Value Management
 - Engineering
 - Financial Management
 - Industrial Property
 - Information Technology
 - Life Cycle Logistics
 - Production, Quality and Manufacturing
 - Program Management
 - Requirements Management (Army ineligible)
 - Science and Technology Manager
 - Services Acquisition (Army ineligible)
 - Small Business
 - Test and Evaluation
- The **Defense Acquisition Workforce Development Award**, which recognizes organizations that have made exemplary contributions to the careerlong development of their workforces. Awards are presented across two categories: Small Organization—those with fewer than 500 employees; and Large Organization—those with 500 or more employees. Gold, Silver and Bronze awards are given in both categories. The organizational honors carry a monetary reward of \$2,000 per member for up to five members.
- The **David Packard Excellence in Acquisition Award**, which recognizes organizations, groups and teams that have demonstrated exemplary use of innovation and best acquisition practices, including the Better

Buying Power (BBP) initiatives, to achieve outstanding acquisition outcomes for the warfighter and the taxpayer.

- The **Should Cost and Innovation Award**, which more narrowly targets organizations that have displayed outstanding commitment, innovation and results pertaining to should cost management, an enduring BBP initiative.
- The **Secretary of Defense Product Support Manager (PSM) Award** recognizes PSM accomplishments and contributions toward achieving BBP goals, including controlling cost within affordability caps, promoting industry competition and innovation, and implementing effective product support strategies. The award honors outstanding PSMs in two categories: Major Defense Acquisition Programs/Major Acquisition Information Systems, Acquisition Category (ACAT) I PSMs; and Major Weapon System/Other Weapon Systems, ACAT II and below PSMs.
- The **Secretary of Defense Performance-Based Logistics (PBL) Award** recognizes organizations responsible for outstanding achievements in PBL development, implementation and execution. The awards honor outstanding PBL performance in three team categories: system level, subsystem level and component level.



Army Acquisition Executive's Excellence in Leadership Awards

Individual Awards:

- Acquisition Support Professional of the Year
- Business Operations Professional of the Year
- Defense Exportability and Cooperation Professional of the Year
- Engineering and Systems Integration Professional of the Year
- Logistician of the Year
- Product Management/Product Director Office Professional of the Year (O-5/GS-14 or equivalent level)
- Project Management/Project Director

Office Professional of the Year (O-6/GS-15 or equivalent level)

- Science and Technology Professional of the Year

Team Awards:

- Product Management/Product Director Office Team of the Year (O-5/GS-14 or equivalent level)
- Project Management/Project Director Office Team of the Year (O-6/GS-15 or equivalent level)



Secretary of the Army Awards for Excellence in Contracting

Special Awards:

- Barbara C. Heald (Deployed Civilian)
- Exceptional Support of the AbilityOne Program
- Outstanding Contract Specialist/Procurement Analyst
- Contracting Professional of the Year
- Contracting Noncommissioned Officer of the Year

Outstanding Contracting Officer Awards:

- Installation Level Directorates of Contracting
- Systems, Research and Development (R&D), Logistics Support (Sustainment)
- Contracting Specialized Services and Construction Contracting
- Contingency Contracting

Outstanding Unit/Team Awards:

- Outstanding Unit/Team Installation Level Contracting Office Directorates of Contracting
- Outstanding Unit/Team Systems, R&D, Logistics Support (Sustainment) Contracting
- Outstanding Unit/Team Specialized Services and Construction Contracting
- Outstanding Unit/Team Contingency Contracting

For more information about award nominations and deadlines, go to <https://asc.army.mil/web/acquisition-awards/> or <https://asc.army.mil/web/contracting-awards/>.



ON THE

MOVE



1

**DEPUTY ASSISTANT SECRETARY OF THE ARMY
FOR STRATEGY AND ACQUISITION REFORM****1: NEW DASA NAMED**

Dr. Alexis Lasselle Ross has been named deputy assistant secretary of the Army for strategy and acquisition reform, responsible for the design and implementation of acquisition reform and modernization initiatives.

Ross previously served as a professional staff member on the House Armed Services Committee. She directed general acquisition policy and, as a member of the chairman's reform team, developed reforms adopted in the National Defense Authorization Acts of FY17 and FY18 in the areas of intellectual property, weapons sustainment, services contracting and government-wide procurement through e-commerce. Before joining the committee staff, Ross was deputy associate director of health benefits for the Military Compensation and Retirement Modernization Commission, an independent, temporary federal commission authorized by Congress to offer recommendations on military compensation reform. Her other positions include senior congressional strategist and principal adviser to the deputy chief of



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staff of the Army, G-4, and deputy director of the G-4's Logistics Initiatives Group.

Ross received a Ph.D. in public policy from George Mason University, an M.S. in national security and strategic studies from the U.S. Naval War College and a B.A. in international relations from Bucknell University. She is a recipient of the Army Superior Civilian Service Award.

ARMY CAPABILITIES INTEGRATION CENTER**2: LEADERSHIP CHANGES AT ARCIC**

Maj. Gen.(P) Eric J. Wesley, who has commanded the Maneuver Center of Excellence (MCOE) and Fort Benning, Georgia, since March 2016, will serve as the next director of the Army Capabilities Integration Center (ARCIC). The Senate confirmed Wesley's nomination to the rank of lieutenant general Jan. 30.

Wesley replaces **Lt. Gen. H.R. McMaster**, who served as national security adviser to the president from February 2017 until March 2018. **Maj. Gen. Robert M. "Bo" Dyess**, ARCIC deputy director and chief of staff, has been serving as acting director since McMaster's departure.



3

**U.S. ARMY RESEARCH, DEVELOPMENT
AND ENGINEERING COMMAND****3: NEW DEPUTY CG AT RDECOM**

Brig. Gen. Vincent F. Malone II, right, was sworn in as deputy commanding general of the U.S. Army Research, Development and Engineering Command (RDECOM) at a Jan. 5 change of responsibility ceremony conducted by Air Force **Maj. Gen. Dwyer L. Dennis**, center, in Natick, Massachusetts. Malone replaces **Brig. Gen. Anthony W. Potts**, left, and assumes Potts' role as senior commander for the U.S. Army Natick Soldier Research, Development and Engineering Center (NSRDEC). Potts is now the program executive officer for Soldier.

Malone is a graduate of the U.S. Military Academy at West Point and was an assistant professor there in the chemistry department. He previously served as an acquisition adviser with U.S. Army Forces Command and deployed to Afghanistan as the chief of plans and integration for U.S. Army Central Command. (Photo by David Kamm, NSRDEC)

U.S. ARMY SECURITY ASSISTANCE COMMAND

4: USASAC MARKS CHANGE OF COMMAND

Maj. Gen. Stephen E. Farnen relinquished command of the U.S. Army Security Assistance Command (USASAC) during a ceremony Jan. 30 at Redstone Arsenal, Alabama, at which **Gen. Gustave F. Perna**, commanding general of the U.S. Army Materiel Command (AMC), USASAC's parent command, officiated. **Robert L. Moore**, a member of the Senior Executive Service and deputy to the commanding general, has been given the title of executive director and will lead the command until the new commander arrives. Farnen is now the 21st commanding general of the Military Surface Deployment and Distribution Command at Scott Air Force Base, Illinois. (Photo by Sgt. 1st Class Teddy Wade, AMC)

U.S. ARMY RESEARCH LABORATORY

5: NEW VEHICLE TECHNOLOGY DIRECTOR AT ARL

The U.S. Army Research Laboratory (ARL) has named **Dr. Jaret C. Riddick** the new director for its Vehicle Technology Directorate (VTD), a 120-person operation that pursues mobility-related science and technology.

Riddick is now responsible for guiding the strategic vision and operationalization of new science that primarily supports the lab's Science for Maneuver Campaign, which seeks to establish novel technologies to enable and augment unmanned autonomous systems (UASs) and manned vehicle platforms envisioned for air and ground operations in the year 2030 and beyond.

"The expected result is to provide the future warfighter with an autonomous system that operates as a teammate and can transport materiel such as supplies and enhance situational awareness by supporting the communication, surveillance and reconnaissance mission," Riddick said.

In the coming months, the laboratory will stand up its Center for UAS Propulsion at Aberdeen Proving Ground (APG), Maryland, making ARL the only agency within the government and industry that is equipped with state-of-the-art experimental facilities for unmanned autonomous systems propulsion.

Riddick offers critical subject matter expertise for the new science to sustain future Army vehicle platforms. He joined the laboratory's Mechanics Division at the NASA-Langley Research Center in Hampton, Virginia, in 2002. In 2012, he was selected to lead the Structural Integrity and Durability Team at APG, where he directed Ph.D.-level researchers in establishing and maturing concepts for reliable, lightweight, adaptive vehicle platform technologies. Before becoming VTD director, Riddick served as acting chief of the VTD Mechanics Division, where he supervised research efforts to reduce the logistics burden, as well as operation and maintenance costs, of future Army air and ground, manned and unmanned vehicle platforms.

Riddick holds a Ph.D. in engineering mechanics from Virginia Tech, an M.S. in mechanical engineering with a concentration in mechanics of





materials from North Carolina State A&T University and a B.S. in mechanical engineering from Howard University. He has published more than 50 refereed journal articles and conference papers and delivered more than 100 conference presentations and technical briefings. In 2017, he received the Office of the Secretary of Defense Award for Excellence and the Department of the Army Commander's Award for Civilian Service. (U.S. Army photo by Jhi Scott, ARL)

JOINT PROGRAM EXECUTIVE OFFICE FOR CHEMICAL AND BIOLOGICAL DEFENSE

1: DEPUTY JPEO-CBD APPOINTED TO SES

Dr. Jason W. Roos, right, deputy joint program executive officer for Chemical and Biological Defense (JPEO-CBD), was sworn in to the Senior Executive Service during a Jan. 19 ceremony at Aberdeen Proving Ground, Maryland. Roos' daughter, Bridget, held the Bible while **Lt. Gen. Edwin S. Leland** (USA, Ret.), left, narrated the appointment and JPEO-CBD **Douglas W. Bryce**

administered the oath. Roos holds a Ph.D. in biochemistry, cellular and molecular biology from the Johns Hopkins University School of Medicine, an M.S. in national resource strategy from National Defense University's Dwight D. Eisenhower School for National Security and Resource Strategy, and a B.A. in chemistry from the College of the Holy Cross. (Photo by Brandon Leibowitz, JPEO-CBD)

PROGRAM EXECUTIVE OFFICE FOR AMMUNITION

2: NEW PEO FOR AMMUNITION

Brig. Gen. Alfred F. Abramson III became the program executive officer (PEO) for Ammunition and the commanding general for Picatinny Arsenal, New Jersey, on Dec. 29.

Abramson previously served as deputy PEO for Ammunition. His other assignments include budget team chief within the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA(ALT)); military assistant to the undersecretary of the Army; executive officer for the principal military

deputy to the ASA(ALT); and deputy joint PEO for Chemical and Biological Defense. He holds an M.S. in chemistry from Johns Hopkins University, an M.S. in national security and strategic studies from the U.S. Naval War College, an M.S. in strategic studies from the U.S. Army War College and a B.S. in chemistry from Virginia State University.

He takes over from former PEO **James Shields**, who retired in December after 35 years of government service.

PROGRAM EXECUTIVE OFFICE FOR AVIATION

3: LEADERSHIP CHANGES AT PEO AVIATION

Jimmy Downs, above right, accepted the charter of the Acting Project Manager for Aviation Systems from **Brig. Gen. Thomas H. Todd III**, program executive officer (PEO) for Aviation, during a change of charter ceremony Jan. 19 at Redstone Arsenal, Alabama.

Downs accepted responsibility from the project manager, **Col. Mathew J. Hannah**, who

retired after 25 years of service. Hannah was awarded the Legion of Merit and the Honorable Order of Saint Michael Silver Award from the Army Aviation Association of America during the ceremony. (Photo by Daniel Cunningham, PEO Aviation)

PROGRAM EXECUTIVE OFFICE FOR COMBAT SUPPORT AND COMBAT SERVICE SUPPORT

4: PEO FOR CS&CSS RETIRES

Scott J. Davis, right, PEO for Combat Support and Combat Service Support (CS&CSS), retired from federal civilian service, ending a career that spanned more than three decades. **Steffanie B. Easter**, then principal deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)), presented Davis with the Decoration for Exceptional Civilian Service at the Jan. 19 retirement ceremony, held at the Detroit Arsenal in Warren, Michigan. Davis, who was named PEO in March 2014, will be succeeded by **Ross Guckert** as acting PEO. **Michael Sprang** will serve as acting deputy PEO.

Davis, a retired U.S. Army Reserve colonel, began his Army civilian career in 1986 as a mechanical engineer supporting the Program Manager (PM) for Light Combat Vehicles. He served in numerous engineering, product and program leadership positions within the combat vehicle acquisition community before his selection to the Senior Executive Service in 2005. Subsequently he was assigned as the deputy PM for operations and then the deputy PM for platform integration supporting the PM Future Combat Systems (Brigade Combat Team), before accepting the responsibility as deputy PEO for Integration. Davis served as the PEO for Ground Combat Systems, also headquartered in Warren, from 2010 to 2013 before his selection as PEO CS&CSS.

Davis' Army Reserve career, from which he retired in May 2015, was also in acquisition. An engineer and acquisition officer, his last assignment was with ASA(ALT) as director, Department of the Army Systems Coordinator. He held a variety of operational positions from platoon leader through battalion executive officer, including deployment in support of Operation Enduring Freedom from 2013 to 2014.

Guckert, a member of the Senior Executive Service since January 2017, previously served as deputy PEO for CS&CSS and for Aviation. He also held several positions in the Office of the ASA(ALT). He holds an M.S. in engineering management from George Washington University and a B.S. in electrical engineering from the University of Pittsburgh. He is also a graduate of National Defense University's Industrial College of the Armed Forces and a member of the Army Acquisition Corps.

PEO CS&CSS has purview over diverse systems across the Army's transportation, quartermaster, ordnance and engineer portfolios. With more than 150 programs at all levels of acquisition and about 100 more monitored in sustainment, the PEO has an annual budget of about \$3.5 billion and a total portfolio budget of approximately \$30 billion across four appropriations. (Photos by Gregory Pici, Multimedia Visual Information Center, U.S. Army Garrison – Detroit Arsenal)





1: CHIEF OF STAFF CAVEDO RETIRES

Col. John R. Cavado Jr., chief of staff for PEO CS&CSS, retired from active duty with a Dec. 6 ceremony at the Detroit Arsenal, Warren, Michigan. PEO **Scott J. Davis** awarded Cavado the Legion of Merit for exceptionally meritorious service over the course of his 32-year career.

Before this assignment, Cavado served as project manager in the Joint Program Office for Joint Light Tactical Vehicles, an assignment in which he received the 2015 Army Acquisition Executive Excellence in Leadership Award for the Project Management/Product Director Office Professional of the Year at the O-6 level. Also during this assignment, the joint Army-Marine Corps team responsible for developing the JLTV received two David Packard Excellence in Acquisition Awards for their innovative approaches. Cavado's combat, operational and training deployments have taken him to 16 countries, with command assignments that included Special Forces Operational Detachment Alpha and the U.S. Army Test and Evaluation Command's Cold Regions Test Center.

Col. John F. Hall replaces Cavado. He returns to PEO CS&CSS following graduation from the U.S. Army War College, and previously served as the PEO's product manager for Allied Tactical Vehicles. (Photo by Ted Beaupre, U.S. Army Garrison – Detroit Arsenal)

PROGRAM EXECUTIVE OFFICE FOR COMMAND, CONTROL AND COMMUNICATIONS – TACTICAL

2: RETIREMENT, NEW LEADERSHIP AT C3T

Maj. Gen. David G. Bassett, top right, assumed command of the Program Executive Office for Command, Control and Communications – Tactical (PEO C3T) from outgoing PEO **Gary Martin** during a change of charter ceremony conducted Jan. 30 by **Dr. Bruce D. Jette**, above left, assistant secretary of the Army for acquisition, logistics and technology and the Army acquisition executive (AAE), at Aberdeen Proving Ground, Maryland.

Martin's retirement after 34 years of military and federal service was honored at a ceremony held one day later and hosted by **Steffanie B. Easter**, former AAE and current vice director, Navy Staff in the Office of the Chief of Naval Operations. "To be able to finish my career here has been an absolute pleasure," said Martin, above right. Easter called Martin a "difference maker," pointing to his accomplishments throughout his career. "Through his leadership, PEO C3T has enjoyed a successful run of providing our Soldiers the network equipment they need, when they need it, so that they can have dominant communications," she said.

Bassett comes to PEO C3T after leading the PEO for Ground Combat Systems at Detroit Arsenal, Michigan, and previously serving as its deputy PEO. Over his nearly 30 years of service, he has held a variety

of acquisition leadership positions, including project manager for Tactical Vehicles assigned to the PEO for Combat Support and Combat Service Support and product manager for Unit of Action Software Integration in the Program Management Office for Future Combat Systems.

He holds an M.S. in national resource strategy from National Defense University's Industrial College of the Armed Forces, and an M.S. in computer science and a B.S. in electrical engineering from the University of Virginia. His military education includes the Signal Officer Basic and Advanced Courses and the U.S. Army Command and General Staff College. (U.S. Army photos by Ryan Myers)

PROGRAM EXECUTIVE OFFICE FOR ENTERPRISE INFORMATION SYSTEMS

3: NEW ACTING PEO AT EIS

Maj. Gen. Patrick W. Burden relinquished the colors of the Program Executive Office for Enterprise Information Systems (PEO EIS) Jan. 8 in a ceremony at Fort Belvoir, Virginia, hosted by

Lt. Gen. Paul A. Ostrowski, principal military deputy to the assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and director of the Army Acquisition Corps (AAC). **Chérie A. Smith** now serves as acting PEO, and Burden as deputy commander of the Combined Security Transition Command – Afghanistan.

Smith, who had served as deputy PEO EIS since October 2017 and also served as deputy PEO for Simulation, Training and Instrumentation, has more than 30 years of government experience at all levels of information technology management and development. She began her career as an enlisted Soldier and served more than six years on active duty, developing medical scientific software applications at Walter Reed Army Medical Center and Health Care Systems Support Activity, Fort Sam Houston, Texas. She earned an M.S. in strategic studies from the U.S. Army War College and a B.S. in business from National Louis University. She is a member of the AAC and is Level III certified in information technology and program management.

4: NEW ASSISTANT PEO FOR NETWORK INTEGRATION

Reginald L. Bagby became the new assistant PEO for Networks and Communications within PEO EIS on Feb. 4, filling a position vacated by the January retirement of **Michael C. Padden**. Bagby most recently served as director, G-8, at PEO EIS. He holds an MBA from Strayer University as well as a B.S. in psychology from Park University, and is a graduate of the Government Contracting Program at The George Washington University. Bagby is a member of the AAC and is Level III certified in program management.

5: EIS NAMES ACTING DEPUTY PEO

Stanley H. Darbro became the acting deputy PEO for EIS in January and will oversee more than 60 DOD and Army acquisition programs across several mission areas. Darbro earned an M.S. in national resource strategy from National Defense University's Dwight D. Eisenhower School for National Security and Resource Strategy, a B.S. in business information systems from the University of Phoenix and an associate

degree in electronics from Cameron University. A member of the AAC, he is Level III certified in science and technology management and program management, and is Level I certified in systems engineering and in information technology.

6: NEW ACTING CHIEF OF STAFF FOR EIS

Col. William "Matt" Russell became the new acting chief of staff at PEO EIS in January. Russell, who most recently served as project manager for the General Fund Enterprise Business System within PEO EIS, is responsible for a broad range of executive leadership involving life cycle development, acquisition, testing, product improvement, fielding and sustainment. He holds an M.S. in national resource strategy from National Defense University's Dwight D. Eisenhower School for National Security and Resource Strategy, an MBA from the Florida Institute of Technology and a B.S. in finance from the University of Maryland. He is also a graduate of the U.S. Army Command and General Staff College.





PROGRAM EXECUTIVE OFFICE FOR SOLDIER

1: CHANGE OF CHARTER AT SOLDIER

Brig. Gen. Anthony W. Potts assumed the charter of the Program Executive Office (PEO) for Soldier at a ceremony Jan. 16 at Fort Belvoir, Virginia, presided over by **Dr. Bruce D. Jette**, lower left, assistant secretary of the Army for acquisition, logistics and technology (ASA(ALT)) and the Army acquisition executive. Potts assumed command from **Maj. Gen. Brian P. Cummings**, who now serves as PEO for Ground Combat Systems in Warren, Michigan. Potts received the PEO Soldier flag from **Master Sgt. Eric G. Buggeln**, upper right, senior enlisted adviser to the PEO.

Potts comes to PEO Soldier from Natick, Massachusetts, where he was deputy commanding general of the U.S. Army Research, Development and Engineering Command and senior commander of the Natick Soldier Research, Development and Engineering Center. Previously, Potts served as acting deputy for Acquisition and Systems Management, PEO Missiles and Space at Redstone Arsenal, Alabama; director, Terminal High-Altitude Area Defense and Army/Navy Transportable Radar Surveillance within the PEO's Sustainment Management Office; and deputy director for acquisition and systems management (previously director of resource integration and then director of plans, programs and resources) within ASA(ALT).

He holds a master of strategic studies from the U.S. Army War College, an MBA from the University of Kentucky and a B.S. in information systems management from Murray State University. His military schooling also includes the U.S. Army Command and General Staff College, the Rotary Wing Aviator Officer Basic Course and the Aviation Officer Advanced Course. (U.S. Army photos by Ron Lee)



OFFICE OF THE CHIEF OF STAFF, ARMY GENERAL OFFICER ASSIGNMENTS

The chief of staff, Army, announced the following officer assignments:

Maj. Gen. Leon N. Thurgood, deputy commander, Combined Security Transition Command – Afghanistan, U.S. Forces Afghanistan, Operation Freedom's Sentinel, Afghanistan, to director for test, Missile Defense Agency, Redstone Arsenal, Alabama.

Maj. Gen. John A. George, director, Force Development, G-8, Washington, to deputy director and chief of staff, Army Capabilities Integration Center, Joint Base Langley-Eustis, Virginia.

Brig. Gen. Heidi J. Hoyle, commander, Joint Munitions and Lethality Life Cycle Management Command and Joint Munitions Command, Rock Island, Illinois, to commandant, U.S. Army Ordnance School, U.S. Army Sustainment Center of Excellence, Fort Lee, Virginia.

Brig. Gen. Joel K. Tyler, commanding general, U.S. Army Joint Modernization Command, Army Capabilities Integration Center, U.S. Army Training and Doctrine Command, Fort Bliss, Texas, to commanding general, U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Maryland.

SENIOR EXECUTIVE SERVICE ANNOUNCEMENTS

The secretary of defense announced the following Senior Executive Service (SES) appointment and assignment:

Burke E. "Ed" Wilson, Maj. Gen., USA (Ret.), for appointment to the SES and assignment as the deputy assistant secretary of defense for cyber policy. Wilson most recently served as the deputy principal cyber adviser and senior military adviser for cyber policy. He is a graduate of the U.S. Air Force Academy, Northeastern University, the School of Advanced Airpower Studies, the University of Virginia and the Joint Forces Staff College.

WRITING AWARDS CONTINUE GREENE'S LEGACY

Now in their fourth year, the Major General Harold J. "Harry" Greene Awards for Acquisition Writing recognize essays, articles and opinion pieces that influence the ongoing dialogue about Army acquisition and honor the legacy of a Soldier who championed acquisition and the acquisition workforce. The winners and those earning honorable mention across four categories—Acquisition Reform, Future Operations, Innovation and Lessons Learned—are below. The full text of their work appears in a special supplement to this issue that's also available online.

CATEGORY: ACQUISITION REFORM

Winner: **Capt. Christopher W. Piercy**, Air Force Installation Contracting Agency

Honorable Mention: **Stephen F. Conley**, U.S. Army Communications-Electronics Research, Development and Engineering Center (CERDEC); and **Dr. Craig M. Arndt**, Defense Acquisition University

CATEGORY: FUTURE OPERATIONS

Winner: **John M. Spiller, Lt. Col., USA (Ret.)**, PEO for Combat Support and Combat Service Support

Honorable Mention: **Lt. Col. Kecia Troy** and **Carla Miller**, PEO for Intelligence, Electronic Warfare, and Sensors; **Joshua Erlien**,

Naval Surface Warfare Center, Crane Division; and **Dr. Christina Bates**, CERDEC Night Vision and Electronic Sensors Directorate

CATEGORY: INNOVATION

Winner: **Paul Manz**, PEO for Ammunition

Honorable Mention: **Kristy Pottol** and **John Getz**, U.S. Army Medical Materiel Development Activity

CATEGORY: LESSONS LEARNED

Winner: **Col. Richard Haggerty**, PEO for Simulation, Training and Instrumentation

Honorable Mention: **Lt. Col. Rachael Hoagland**, HQDA Chief Information Officer/G-6

AAE AWARDS HONOR RANGE OF ACHIEVEMENT

The U.S. Army Acquisition Executive's (AAE) Excellence in Leadership Awards were announced in January, with this year's honorees representing excellence across such fields as missile defense, workforce development, rapid fielding, logistics and Soldier equipment. Among the multiple award winners were the Program Executive Office for Missiles and Space (PEO MS), which received three individual awards, and the PEO for Aviation, which received an individual award and a group award.

The complete list of winners is as follows:

Acquisition Support Professional of the Year: **William A. Breffeilh**, PEO MS

Thomas E. "Tom" Mullins Business Operations Professional of the Year: **Daniel S. Hemeyer**, PEO MS

Defense Exportability and Cooperation Professional of the Year: **Thomas N. Doss**, PEO MS

Logistician of the Year: **Billy R. McCain**, PEO for Enterprise Information Systems

Science and Technology Professional of the Year: **Thomas J. Coradeschi**, PEO for Ammunition

Hon. Dr. Claude Bolton Jr. Engineering and Systems Integration Professional of the Year: **Nickee L. Abbott**, Army Rapid Capabilities Office

The Barbara C. Heald (Deployed Civilian) Special Award: **Steven B. Piggott**, Army Contracting Command – New Jersey

Product Management/Product Director Office Professional of the Year at the O-5 Level: **Lt. Col. Calvin J. Lane**, PEO for Aviation

Project Management/Project Director Office Professional of the Year at the O-6 Level: **Col. James W. Schirmer**, PEO for Ground Combat Systems

Product Management/Product Director Office Team of the Year for the O-5 Level: PEO Aviation and PEO for Intelligence, Electronic Warfare and Sensors

Project Management/Project Director Office Team of the Year for the O-6 Level: Project Manager for Soldier Protection and Individual Equipment within the PEO for Soldier



THIS AWARD GOES TO YOU. AND RAMBO.

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



This year was a banner year for voting, with more than 5,000 votes cast. Below are this year's winners—a select group that features a new category, Reader's Choice, to recognize the story that garnered the most views over the past year. The inaugural honor goes to Seung kook “Sunny” Burns and James Zunino: their piece on a Rapid Additively Manufactured Ballistics Ordnance—RAMBO—received nearly 6,400 hits. Congratulations to all the winners. Once again, you've set the editorial bar pretty high, and we're looking forward to another year of award-winning material.

READER'S CHOICE



Winner: “Rambo's Premiere,” **Seung kook “Sunny” Burns** and **James Zunino**, U.S. Army Armament Research, Development and Engineering Center, April – June 2017

BEST ARTICLE



Winner: “Technical Manuals That Work,” **Lt. Col. Mark Henderson**, Program Executive Office (PEO) for Command, Control and Communications – Tactical (C3T), July – September 2017
Runner-Up: “Give More, Get More,” **Sandra Lindecamp, Elizabeth A. Keele** and **Dan Lafontaine**, PEO C3T, October – December 2017

BEST COMMENTARY



Winner: “Communications Readiness: Can You Hear Me Now?” **James Christopherson**, PEO for Enterprise Information Systems, October – December 2017

Runner-Up: “Urgent Need: Sensible Requirements,” **Dr. Donald Schlomer, Lt. Col., USA (Ret.)**, KTC Consulting and U.S. Special Operations Command, October – December 2017

BEST GRAPHIC

Winner: Mission and Vision, PEO for Intelligence, Electronic Warfare and Sensors, April – June 2017, Page 31

Runner-Up: Staying on Course, **Shannon Kirkpatrick**, PEO for Aviation, October – December 2017, Page 32



BEST PHOTO

Winner: Heady Possibilities, **David Kamm**, U.S. Army Research, Development and Engineering Command, April – June 2017, Page 6

Runner-Up: Feedback Straight from the Field, **Vanessa Flores**, Assistant Secretary of the Army for Acquisition, Logistics and Technology System of Systems Engineering and Integration Directorate, April – June 2017, Page 49



LONG-RANGE FOR THE MODERN AGE



With ATACMS having been surpassed by Russia and China, the U.S. doesn't just want to catch up, it wants to dominate.

Restoring the United States' dominance in long-range precision fires tops the list of six modernization priorities released by Army Chief of Staff Gen. Mark A. Milley and then-acting Secretary Ryan D. McCarthy in October. If you could go back in time and tell readers of this magazine's predecessor in the early 1990s that this would be the case—that, 20 years later, the Army had lost its edge in long-range missiles, and to Russia, no less—they probably would have been surprised.

Then, the United States was the last superpower left standing, and the precise missiles that let it strike important targets far behind enemy lines were a crucial part of establishing its military superiority in the post-Cold War order. Now, as Maj. Gen. Cedric T. Wins acknowledged at the 2017 Association of the United States Army (AUSA) annual meeting, the United States could be "outranged and outgunned" by adversaries.

The Army Tactical Missile System, or ATACMS, was the Army's first long-range tactical missile. It debuted in 1986 to attack high-value targets like airfields, artillery and missile forces, supply areas and command groups. ATACMS helped the United States and its allies to quick victory in Operations Desert Shield and Desert Storm.

Then-Army Acquisition Executive Stephen K. Conver described ATACMS' performance in Operation Desert Storm in the May-June 1991 issue of Army RD&A Bulletin (this magazine's predecessor): "The system was used against surface-to-air missile sites, logistics sites, Scud [missile] positions, howitzer and rocket batteries, and tactical bridges" and was viewed as a "precious asset." "Indications are that ATACMS destroyed, or rendered inoperable, all of its targets."

The first iteration of ATACMS could hit stationary surface targets up to 100 miles away. The second generation, Block 1A, added GPS



POINTING IN A NEW DIRECTION

The M57A1 Army Tactical Missile System missile is fired over the cab of an M142 High Mobility Artillery Rocket System launcher. New battle conditions call for the Army to have precision lethal and nonlethal fires that can be fired from land to produce effects in all domains, as joint, multidomain operations are expected to be increasingly common. (U.S. Army photo)

guidance for more precision and had a range of 165 to 185 miles. Ground commanders of land-based units didn't have access to that kind of range before ATACMS; the Lance missile that ATACMS replaced had a maximum range of 46 miles when fitted with a conventional warhead, but it had been intended primarily to deliver nuclear warheads.

The program was canceled in the 1980s. Later, defense analysts would recognize the technological developments that ATACMS capitalized on as the “second offset,” when precision guidance, coupled with stealth technology, set the U.S. military far out of any competitors' reach.

Then, after a decade of unquestioned military superiority, the United States and its allies got involved in two wars and eventually two counterinsurgencies in which artillery was less important and consequently received less attention and money. During that time, Russia and China, in the course of becoming the near-peer adversaries the Army has since refocused on, both developed long-range weapons that, coupled with their electronic warfare and intelligence capabilities, shift the battlefield advantage in their favor. ATACMS is now 30 years old, bulky and not as modular as current requirements demand, and the technologies that were breakthroughs 30 years ago have proliferated widely. Thus, Milley and McCarthy's call for “a long-range precision fires capability that restores U.S. Army dominance in range, munitions and target acquisition.”

In other words, the U.S. doesn't want to just catch up, it wants to leap ahead.

The future demands it. The new paradigm of multidomain battle calls for the Army to broaden its focus from just land warfare, “to have both lethal and nonlethal fires that are delivered from the land domain to produce effects in all domains,” Gen. David G. Perkins wrote in the November-December 2017 issue of *Military Review*. (Perkins has been commanding general of the U.S. Army Training and Doctrine Command since March 2014, and in that role was instrumental in shaping the multidomain battle concept.) Operating jointly across

air, land and sea, the Army may need to be able to help another service maintain control of its traditional domain—so the possibility of a long-range missile fired from land by an Army unit downing a ship is, if not a central requirement, nevertheless part of the conversation.

The present calls for better long-range fires, too. No longer can the Army assume that air power can destroy key targets, given the robust air defenses developed by Russia and China and the web of technological and military improvements that allow adversaries to deny access to territory they claim. In any conflict with a near-peer, the Army needs to be able to strike from farther away—out of range of the adversaries' own long-range fires.

What will it take to develop a long-range weapon that not only replaces ATACMS but does better? The wish list includes:

- **Much greater range.** “This will not be the artillery of yesteryear; this will be an artillery where capabilities strike with land-based precision fires at very extended ranges that our enemies will never expect, well beyond what we have now,” said Milley at the October 2017 AUSA meeting.
- **The ability to swap in new components as they improve.** Open architecture—so that individual components or subsystems can be upgraded piece by piece and by suppliers other than the original manufacturer if needed—is also on the Army's list of requirements for the next long-range missile. Better guidance technology is one such swap, as navigation improves. Another might be a new motor that could fly the missile even farther. The range of ATACMS' replacement is capped by the United States' obligations under the 1987



TARGET ACQUIRED

An M270 Multiple Launch Rocket System fires during an exercise in September at Rocket Valley, South Korea, conducted by the 2nd Infantry Division/ROK-U.S. Combined Division to train in field artillery operations. The Army's long-range missile system will need to be sleeker and more modular, with greater range, if the U.S. is to regain its dominance in long-range precision fires. (U.S. Army photo by Sgt. Michelle U. Blesam, 210th Field Artillery Brigade Public Affairs)

Intermediate-Range Nuclear Forces Treaty, in which the United States and Russia forswore ballistic missiles with ranges above 500 kilometers, or 310 miles. The U.S. Department of State, however, protested in 2014, 2015 and 2016 that Russia had tested new missiles that violate the 500-kilometer limit. The ability to add a more powerful flight motor suggests the U.S. could match Russia if needed.

- **Compatibility with current launch platforms.** ATACMS is fired from the Multiple Launch Rocket System family of launchers, and the truck-mounted High Mobility Artillery Rocket System (HIMARS).

- **A slimmer profile.** Depending on the munitions it's loaded with, each ATACMS missile can weigh between 3,000 and 3,600 pounds. Each is 13 feet long and roughly 2 feet in diameter. All told, it's large enough that only two missiles can fit on a Multiple Launch Rocket System, and only one can fit on the more mobile HIMARS. The Army wants to fit more missiles on each platform and get more firepower in the air faster.

Current prototype designs can fit twice the number of missiles on each launcher and hit targets up to 309 miles away, versus the 185-mile maximum range and one missile per pod of ATACMS. Raytheon Co. and Lockheed Martin Corp. are both developing prototype missiles under 36-month contracts awarded in 2017 to move prototypes through the technology maturation and risk reduction phase. The contracts are expected to conclude with several guided flight tests in 2019, followed by selection of a single contractor to field the missile by the late 2020s.

Meanwhile, to keep ATACMS viable until a new long-range precision weapon is ready, Lockheed is adding new guidance technology and replacing cluster-munition warheads with single warheads under a maintenance and sustainment contract. (Lockheed acquired the smaller producer that fielded the original missile in the 1990s.)

In contrast to modernization efforts in the past—like the Future Combat Systems program, canceled after DOD decided \$18 billion had not bought enough progress—where some technical components in the design were not yet

mature, much of the technology to achieve the Army's goals for long-range precision fires is already viable. J.R. Smith, director of advanced land warfare systems for Raytheon, told Jane's in a June 2017 interview, "We are not trying to invent anything new. When you start looking at everything that is involved here—GPS receivers and guidance electronics, the control actuation system, warhead design—all this is well understood."

The challenge, now, is not only to recapture the technical superiority that the United States had then, but to do so while walking the fine line between taking too much risk with untested technologies and not taking enough but instead settling for incremental improvements.

For more information, go to <https://www.army.mil/standto/2018-01-17>.

For a historical tour of Army AL&T over the past 56 years, go to the Army AL&T magazine archives at <http://asc.army.mil/web/magazine/alt-magazine-archive/>.

—MS. MARY KATE AYLWARD



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