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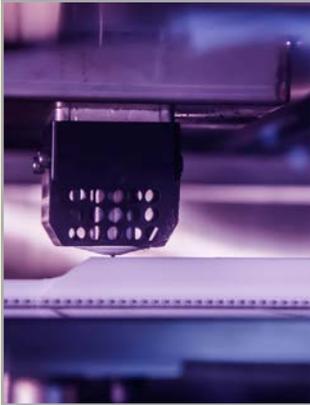
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Innovation and Modernization

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Inside a massive 3-D printer at Aberdeen Proving Ground, Md., a delicate print head moves at lightning speed to precisely deposit heated plastic layer by layer to create a hardened part. (Photo by David McNally)

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Proficiency First, Innovation Follows

Logistics modernization requires us to plan early, update systems and processes, and overcome resistance to change.

■ By Gen. Gustave “Gus” Perna



Because of this complex and unstable world, our Army requires technological advances far beyond what it has today to ensure warfighters outmatch any contending force. Innovation and modernization—the theme of this edition—remain the action words across the Army as the force implements the future-focused National Defense Strategy. As logisticians, we must be fully embedded within every modernization effort and initiative to resolve sustainment issues in lock-step with planned improvements and upgrades to equipment and processes.

In order to innovate, we must first do the basics well. That foundation is built through training, experience, and continued self-assessment with an honest picture of our current competencies and capabilities.

Professional logisticians must be able to forecast the second- and third-order effects that new systems, equipment, and processes will have on movement, maintenance, supply availability, and life-cycle sustainment. Only through a strong foundation in logistics can we effectively contribute to the modern-

ization effort and provide beneficial information to shape the innovation and modernization process. As a materiel enterprise, we must ensure we get it right.

With proficiency in our basic skill sets, modernization from the logistics point of view calls for three main efforts. First is planning for sustainment requirements early in the new equipment development process. Second is modernizing and updating our own logistics systems and processes. Finally, we must counter and overcome the natural resistance to change.

Sustainers must be embedded in the development of new programs, equipment, and systems across the Army's six modernization priorities early in the acquisition phase. From defining reliability requirements to providing input and expertise on reducing the sustainment tail, we provide critical information that affects the entire life cycle of systems.

We sustainers are the subject matter experts, and it is our responsibility to ensure engineers and developers consider how each piece of equipment operates on the battlefield—from fuel and battery use to maintenance and global supply chain requirements. Today's logisticians must advocate for innovative ideas that drive supply chain and sustainment efficiencies.

Practical initiatives like using similar components across systems can ease the supply chain burden. Additive and advanced manufacturing can speed repair parts to the field. Making sound recommendations early on intellectual property rights and technical data ensures our Soldiers have the information they need to maintain our critical systems on the battlefield.

We also need to look internally at

ways to improve our own logistics processes and systems. Advanced technology has given us predictive analytics and more data at our fingertips than ever before. We must know, understand, and use that data to get better, faster, and more efficient at supplying the warfighter.

From dispersing equipment to the right unit at the right place to diagnosing faulty equipment early, predictive analysis can get logisticians ahead of the decision cycle. But it will require leaders at all levels to learn and then teach, mentor, and coach the field.

When logisticians are technically competent on the systems and know how to read and understand the resulting data, they can make informed decisions to increase materiel readiness across the force. We must capitalize on technology to innovate and modernize the way we, as logisticians, support the warfighter.

Organizational cultures inevitably struggle with sweeping transformation, and the Army logistics enterprise is no different. As logisticians, we must embrace new thinking and methods and be active participants in the process of modernization and innovation.

Logistics has always given our military the strategic advantage. With a solid foundation and proficiency in our basic logistics tasks and skills, modernization is how we will remain relevant. Innovative logistics that keeps pace with the Army's modernization efforts will enable the lethality and success of our force.

Gen. Gustave “Gus” Perna is the commander of the Army Materiel Command at Redstone Arsenal, Alabama.

The Army's New Start-Up

The Army Futures Command will bring emerging technologies to Soldiers, allow the Army to keep pace with commercial industries, and prepare the nation to fight future adversaries.

■ By Lt. Gen. Aundre F. Piggee

If I were 22 years old again, just graduating from college and newly commissioned as a second lieutenant, I would be very excited to be entering our Army because of a game-changing step we took this summer: the activation of the Army Futures Command.

The New Command's Purpose

The activation of the Futures Command is the most significant reorganization of the Army since 1973, when the Army established both the Training and Doctrine Command and Forces Command after the Vietnam War. I was in middle school at the time, but when I entered the Army a decade later, I was very much a beneficiary.

That reorganization drove the modernization of the Army's big five weapon systems: the Abrams tank, Bradley fighting vehicle, Apache helicopter, Black Hawk helicopter, and Patriot missile system.

The Futures Command is aimed at reawakening that innovative spirit to deliver technologies to warfighters faster than ever, at a time when the speed of technological developments in our civilian sector is startling. Of the nation's 10 largest technology companies today, seven were not even around in 1973: Apple, Microsoft, Alphabet, Cisco, Oracle, Facebook, and Qualcomm.

That being said, the Army did not cease to innovate after developing the big five weapon systems. In the case of sustainers, we would not have been as successful in Iraq and Afghanistan were it not for many innovations.

Mine-resistant ambush-protected vehicles and improved personal

body armor aided in Soldier protection. Very small aperture terminals connected us to networks. Aerial GPS-guided delivery systems were used to drop supplies in remote locations. Explosive ordnance disposal enablers helped us hunt for roadside bombs. Movement tracking systems let us communicate with convoys and monitor materiel and equipment throughout the supply chain.

The Global Combat Support System—Army, now used by more than 150,000 logisticians, has drastically improved our materiel readiness. As proud as we are of our new logistics information system, it took 20 years to develop. We cannot wait another 20 years for our next success story.

That is where the Futures Command comes in. This “start-up” is designed to operate not in the industrial age but in the information age. Its 500 personnel will be located in Austin, Texas, near high-tech industries and research universities in order to harness the best talent possible and bring emerging technologies to Soldiers.

Its focus will be on six modernization priorities: long-range precision fires, next-generation combat vehicles, future vertical lift, an Army network, air and missile defense, and Soldier lethality.

Leading the efforts to stand up the command are Under Secretary of the Army Ryan McCarthy and Vice Chief of Staff of the Army Gen. James McConville. As they explain in interviews in this edition of *Army Sustainment*, logisticians will play an important role as the Army experiments with technologies that 10



years ago may have seemed better fit for the Star Wars movies. What they have to say is important because the equipment we supply, how we get it there, how we manufacture it, how we communicate, and our state of readiness will be much improved.

Five Transforming Areas

Here are what I consider to be five of the most promising areas that will transform Army logistics: autonomous resupply, additive manufacturing, advanced power generation and distribution, condition-based maintenance plus (CBM+), and big data decision-making.

Autonomous resupply. In the future, sustainment Soldiers will not be required to man vehicles if we can instead deliver materials by autonomous or semi-autonomous ground vehicles, aerial vehicles, and watercraft. These vehicles could take Soldiers out of harm's way and provide responsive sustainment to widely dispersed units when conditions pose unsuitable risk. They could provide more options for commanders and



ARMY FUTURES COMMAND

WHAT IS IT?

The establishment of the Army Futures Command is the most significant Army reorganization effort since 1973. The Army Futures Command will be the fourth Army command and will be tasked with driving the Army into the future to achieve clear overmatch in future conflicts. The other Army Commands (ACOMs) include:

ARMY FORCES COMMAND:

Force provider of the Army; trains, prepares a combat ready, globally responsive Total Army Force of U.S. Army Soldiers to build and sustain Army readiness to meet combatant command requirements.

ARMY TRAINING AND DOCTRINE COMMAND:

Architect of the Army; recruits, trains designs, acquires, and builds the Army.

ARMY MATERIEL COMMAND:

Sustainer of the Army; provides materiel readiness by equipping and sustaining the force.

ARMY FUTURES COMMAND:

Modernizes the Army for the future; will integrate the future operational environment, threat, and technologies to develop and deliver future force requirements, designing future force organizations, and delivering materiel capabilities.

ORGANIZATION

Army Futures Command will have three subordinate organizations:

Futures and Concepts will identify and prioritize capability development needs and opportunities.
Combat Development will conceptualize and develop solutions for identified needs and opportunities.
Combat Systems will refine, engineer, and produce developed solutions.

CHARACTERISTICS

- Links operational concepts, requirements, acquisition, and fielding.
- Brings concepts and requirements together with engineering and acquisition functions into one team.
- Small, agile headquarters focused on flexibility, collaboration, and speed. Focus on faster innovation, experimentation, and demonstration.
- Enable rapid prototyping—fail early and cheaply, and then increase learning with operational inputs.

STRUCTURE

- Each Army Futures Command subordinate organization exists within TRADOC, AMC, ASA(ALT), or Army Test and Evaluation Command.
- Army Futures Command's subordinate organizations will remain at their current locations but will be realigned to ensure all Army major commands remain closely linked.
- Cross-functional teams (CFTs) will report to the Army Futures Command. Program managers will remain under control of ASA(ALT) but will be teamed with the CFTs.
- Command headquarters will be located near industrial and academic institutions and develop the culture of innovation and synergy required to lead the Army's modernization effort.



1 LONG-RANGE PRECISION FIRES:

Long-range precision fires provide the Army with long-range and deep-strike capability. They are the Army's number one modernization priority and critical to winning in a fight against a peer adversary.

2 NEXT GENERATION OF COMBAT VEHICLES:

Manned, unmanned, and optionally-manned vehicles will ensure our combat formations can fight and win against any foe. They will deliver the most modern firepower, protection, mobility, and power generation capabilities.

3 FUTURE VERTICAL LIFT PLATFORMS:

The Army is leading a multi-service initiative focused on enhancing vertical lift dominance with manned, unmanned, and optionally-manned variants that can survive the modern and future battlefield.

4 ARMY NETWORK:

The Army is building a network with sufficiently mobile and expeditionary hardware, software, and infrastructure that can be used to fight cohesively in any environment where the electromagnetic spectrum is denied or degraded.

5 AIR AND MISSILE DEFENSE CAPABILITIES:

These systems will defeat missile threats against the United States and ensure our future combat formations are protected from advanced air and missile delivered fires, including drones. They are critical to winning a fight against a near-power adversary.

6 SOLDIER LETHALITY:

Soldier lethality spans all fundamentals—shooting, moving, communicating, protecting, and sustaining. The Army will field individual and combat weapons as well as improved body armor, sensors, radios, and load-bearing exoskeletons.

Eight cross-functional teams were created to address the six modernization priorities.

The Army's Cross-Functional Teams:

- Long-Range Precision Fires • Future Vertical Lift • Assured Positioning, Navigation, and Timing • Next Generation Combat Vehicles
- Army Network • Air and Missile Defense Capabilities • Soldier Lethality • Synthetic Training Environment

create multiple dilemmas for our adversaries.

Additive manufacturing. If we can print parts or special tools on the battlefield, we will not need to manufacture them 8,000 miles from where Soldiers fight. Additive manufacturing processes help us meet demand at the point of need, allow inoperable vehicles to be fixed faster, and will reduce distribution requirements, increase operational readiness, and improve materiel development.

Advanced power generation and distribution. We will not need to transport fuel if warfighters can instead have their own organic power sources. Advanced power generation may provide greater energy output with increased fuel efficiency and management. It will enable expeditionary sustainment of forces in remote areas and self-sufficient power generation so that Soldiers can operate away from existing power grids. This could reduce our logistics footprint and extend operational reach, making Soldiers more effective and units less logistically dependent.

CBM+. The CBM+ technology gives us a way to conduct information-enabled, fleetwide management at the tactical level through national level. It is great for commanders; they get actionable information to ensure their systems are ready. This will increase reliability and reduce the cost of sustaining equipment.

Big data decision-making. The Army is working hard to improve our information management processes by maximizing the usefulness of the massive amounts of data we get through our enterprise resource planning systems like the Global Combat Support System—Army. This will result in improved data-driven decision-making for all Army leaders and managers.

During the past few years, I have made it a priority to visit or learn from leaders at companies like Amazon, Walmart, Home Depot, and Starbucks and to visit leading research universities, including Penn State, the



Pfc. Jimmy Roe fixes a 3-D printer that is part of an expeditionary system called the Rapid Fabrication via Additive Manufacturing on the Battlefield at Amberg Training Area in Amberg, Germany, on May 4, 2018. (Photo by Spc. Elliott Page)

University of Southern California, and the University of Texas El Paso.

What struck me is both how disruptive technologies can be and how much is commercially available for us to use today. If there are innovations that allow us to do our jobs better on a multi-domain battlefield, we need to employ them.

Key to our modernization is a good understanding of our current capabilities, the operational environment, and the threat. We need technologies and processes that can solve real issues, not technological wizardry that does not meet our basic, practical needs.

New technologies can be expensive to develop. We have only a finite amount of resources, so we must use them wisely and not waste them on

things we do not need. We also have to do a good job of maintaining what we have because it must serve until we field the next breakthrough technology or equipment.

Just as I benefited from the last big modernization of the Army, so too will our future Soldiers. They must be enabled with the latest technology. And we must keep pace with our commercial industrial base to fight adversaries we may face in the future. Our nation expects—and our Soldiers deserve—the very best; they continue to be our greatest asset.

Lt. Gen. Aundre F. Piggee is the Army Deputy Chief of Staff, G-4. He oversees policies and procedures used by all Army logisticians throughout the world.

Accelerating Army Force Projection and Theater Opening Operations to Match the Speed of War

■ By Maj. Gen. Paul C. Hurley Jr.

In an interview earlier this year, Gen. Joseph Dunford, the chairman of the Joint Chiefs of Staff, said that the “accelerated pace of change is inextricably linked to the speed of war today. Proliferation of advanced technologies that transcend geographic boundaries and span multiple domains makes the character of conflict extraordinarily dynamic. Information operations, space and cyber capabilities, and ballistic missile technology have accelerated the speed of war, making conflict today faster and more complex than at any point in history.”

In an environment that is changing at an ever-increasing pace, the Army’s innovation has to accelerate to maintain the technological superiority and overmatch required to win on the modern battlefield.

New Generation Warfare

In 2014, Russian forces moved into Eastern Ukraine using many of the typical weapon systems and tactics seen on battlefields of the past. Armored infantry fighting vehicles and main battle tanks operated in concert with artillery and multiple launch rocket system fires.

Attack aviation was supported by a mobile air defense network that quickly crippled critical Ukrainian air and ground assets. The Russians aggressively used special purpose forces to interdict and disable critical nodes.

The Russians used all these tactics while capitalizing on interior lines to maintain multiple, robust supply, and support nodes. If that were the

whole story, it would have looked like something out of the 1984 version of Field Manual (FM) 100-2-1, *The Soviet Army: Operations and Tactics*. But, with what has been called “new generation warfare,” Russian soldiers brought new systems, tactics, and capabilities to the battlefield that gave them a significant advantage.

Unmanned aerial systems conducted reconnaissance and targeting, even to the point of becoming “minibombers” that carried incendiary explosives to cripple ammunition and fuel supply points with no risk to Russian soldiers. Battalion tactical groups, comprising armor, infantry, self-propelled artillery, multiple launch rocket systems, and air defense assets, conducted dispersed and decentralized operations over a typical brigade-sized battlespace. Centralized control at higher echelons allowed battalion tactical groups to quickly aggregate to exploit opportunities and, just as quickly, disaggregate back to dispersed operations.

Most devastating were the electronic and cyber capabilities that exploited Ukrainian dependence on digital systems and technology to create significant vulnerabilities. The Russians attacked military forces, crippled critical infrastructure, disabled communication networks, and even hacked Ukrainian unmanned aerial systems, using the feeds to target Ukrainian command and control nodes with artillery and rocket fires.

The Emerging Environment

These examples of Russian operations in Ukraine are indicative of



The Combined Arms Support Command is driving innovation to make sustainment more responsive to maneuver commander requirements.



Pfc. Brian Fitzgerald, 508th Transportation Company, 266th Quartermaster Battalion, assembles an M240B machine gun during the assemble/disassemble portion of the Ultimate Warrior Competition on May 22, 2018, at Fort Lee, Va. Fitzgerald was competing in the Soldier of the year category. (Photo by Terrance Bell)

the capabilities a near-peer or peer adversary will bring to the modern battlefield.

The 2018 National Defense Strategy cites the “reemergence of long-term, strategic competition” by “revisionist powers” as the central challenge to U.S. prosperity and security. Each of the powers discussed brings varying levels of those capabilities, including the following:

- The ability to reach forward-based forces, and in many cases the United States, with ballistic missiles and strategic strike air and sea forces.
- The robust capability to fight a protracted ground conflict and to inflict heavy casualties on friendly forces, especially during force projection and theater opening operations.
- Multiple standoff systems that create an anti-access/area-denial environment.

- Extensive cyber capability to attack increasingly interconnected networks from the relative safety of any internet-enabled terminal around the world.

The emerging environment is challenging for logisticians planning to support large-scale combat operations in a forward theater. Force projection and theater opening operations will be particularly challenging because the requirements to project a credible level of force, establish a theater, and sustain those forces will stress Army logistics more than ever before.

The Army must be able to see, understand, and innovate faster and more effectively than the enemy. The speed of thinking, speed of adapting, speed of sensing and understanding changes in the operational environment, speed of assembly, and most importantly, speed of decision-making will be critical tasks.

Challenges to Innovation

Innovation and modernization alone are not enough to meet the needs of the current and future Army. Race car driver Mario Andretti said, “If things seem under control, you are just not going fast enough.”

As something of an expert on the importance of speed, Andretti was saying that you win a race by out-accelerating your opponents while they try to out-accelerate you.

The Army has spent more than 14 years optimizing its systems and processes to support a small-scale, unconventional fight. Reorienting the Army, its logistics in particular, to fight large-scale combat operations (as envisioned in the 3-0 series of Army publications) requires rethinking the way it does operations and, at every opportunity, injecting new, out-of-the-box thinking.

It is critical that the Army recognizes and mitigates these challenges:

- Many people in the Army community resist change and want to remain comfortable with the status quo.
- True innovation, especially large-scale, is rarely cheap and competes for a finite resource pool.
- Army-wide systems are not optimized to support rapid innovation at the speed of war.
- True systemic innovation takes time and can be viewed as wasted effort.
- Some leaders may not be developing or leveraging their talent; Soldiers and leaders are change agents.

Overcoming the Challenges

On the modern battlefield, either you are driving innovation to achieve the ends you desire or the environment is forcing you to react to changes that you do not desire. As we reconsider how to think on the battlefield, we will have to shed the typical, linear thinking of the past and adopt a culture that values initiative and improvisation within the commander's intent.

Characteristics of the new battlefield thinking may include the following:

- Decision authority at the lowest levels.
- Fairly horizontal or flat hierarchy.
- Fully vested and invested Soldiers and leaders.
- Optimized resource utilization.
- Failure as a driver of innovation, not a deterrent.
- Hyperawareness of the operational environment.

In the past, the Army had the benefit of time—time to marshal resources and support, time to build combat power near the battlefield, and time to recover from early missteps. That time will not be available on the modern battlefield.

Successful logistics leaders must understand two things: you have to innovate faster than the enemy to survive and thrive, and you have to

squeeze every ounce of value out of every available resource.

Innovation Efforts

In its force projection and theater opening portfolios, the Combined Arms Support Command (CASCOM) is aggressively pursuing innovation across doctrine, organization, training, materiel, leadership and education, personnel, facilities, policy, and culture to ensure logistics Soldiers, leaders, formations, equipment, and processes are fully optimized to support any mission or change to a mission at the speed of war.

We are redesigning doctrine, re-vamping sustainment education and training, pursuing demand reduction initiatives, leveraging technology in new and innovative ways, and ensuring we are fully interoperable with our sister services and multinational partners. The following is a sampling of the work underway at CASCOM.

Doctrine. The new 3-0 series of publications changes the way we think about the battlefield. FM 3-94, Theater Army, Corps, and Division Operations, envisions a theater Army with uniquely tailored theater armies, versatile and agile corps as the linchpin of echelons above brigade, tactically focused divisions to dominate and win the close fight, and hybrid modularity at all echelons above brigade.

All Army sustainment doctrine is undergoing rapid revision, and a new FM 4-0, Sustainment Operations, is under development and due out later this year. FM 4-0 will include separate chapters across the range of operations to include large-scale combat, reconstitution, and shaping, preventing, and consolidating gains.

Training and education. CASCOM is revising training and education programs to include more rigor in combat tasks and battle drills. It is rebalancing the force mix among the three components and reducing timelines for critical sustainment capabilities, particularly in the first 30 days of force projection and theater opening operations. CASCOM is

also putting a greater emphasis on interoperability with other services and multinational partners.

Cutting-edge solutions. The enemy is unlikely to give the Army time in the early stages of an operation to receive forces and build sustainment stocks. CASCOM is exploring options that allow a force to flow faster, to increase flexibility and responsiveness, and to overcome habitually challenging issues such as supplying liquids on the battlefield.

These options include demand reduction across all classes of supply and additive manufacturing production at or near point of need, fully or semiautonomous ground and aerial resupply, and an enterprise approach designed for a brigade-centric force to optimize tactical sustainment.

Early-entry capabilities. Robust early-entry capabilities play a vital role in ensuring success in the early stages of a conflict. CASCOM's ongoing developments include the maneuver support vessel (light), which will provide maritime maneuver and a mobile mission command platform to increase flexibility and decrease predictability. The logistics support vessel modernization will expand maritime options and increase points of entry into a theater. Combat configuring of Army afloat and ground-based pre-positioned stocks will increase flexibility and speed of assembly in theater.

CASCOM is driving change to make sustainment more responsive and supportive of maneuver commander requirements. Every sustainment system, process, and publication is fair game for revision or elimination if it does not increase the speed of sustainment. Our ultimate goal is to ensure that our Army never has to fight a fair fight!

Maj. Gen. Paul C. Hurley Jr. is the commanding general of the Combined Arms Support Command and the Sustainment Center of Excellence at Fort Lee, Virginia.



Under Secretary of the Army Ryan D. McCarthy discusses the role sustainment will have in the new Army Futures Command.



Modernizing at the Speed of Relevance:

An Interview With Under Secretary of the Army Ryan McCarthy

■ By Arpi Dilanian and Matthew Howard

As the 33rd Under Secretary of the Army, Ryan D. McCarthy is leading the way in building readiness for the future. Between his experiences as a proven industry leader and his proud service as an Army Ranger, McCarthy is now transforming the way the Army does business. We sat down with him to discuss the new Army Futures Command and the role sustainment will play in the Army's modernization efforts.

Why is it time for the Army Futures Command?

If you look at the past 17 years of conflict, in large measure the Army invested against irregular warfare and counterinsurgency-type combat operations. We've focused on this significant national security challenge

that our country faces, and these asymmetric threats will probably be ongoing for the rest of my life. But during that same time period, near-peer competitors have made significant strides in the growth of their economies and their military modernization. When you look at it from that standpoint, there's a balance we need to achieve to deal with different threats.

Considering the speed at which technology is moving in the world today, we have an industrial age model of how we do business. We're slow, and we have a lot of people weighing in on decisions. Our authorities and responsibilities are spread out across all of our major commands, and we don't have formalized relationships. This leads to incremental growth, and it's hard to get business done. With the speed of innovation in the

Under Secretary of
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McCarthy discusses
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play in the Army's
modernization efforts.

world, we can't keep pace with vendors and then scale a concept to an institution the size of a country. We have to get faster.

How do you get business done? You know people. You know what their equities are, what's important to them, and how to get things moving. If you look at the way we've organized the Futures Command, a lot of it is fusing people together so they have formal relationships and greater collaboration and can move information faster to get an outcome quicker.

It's all about better rigor, better relationships, better ideas, and getting them faster. From this macro standpoint of where the world is shifting, we recognize that a change in the Army's business model is essential to continuing to evolve with threats the same way we have for 243 years.

What is the end goal for the Army Futures Command?

If you look at the way we do materiel development design, bringing all of those capabilities under one roof is the ultimate end state. We want signature systems to be designed according to the Chief's [Chief of Staff of the Army's] priorities in a relevant time frame. So bringing these capabilities together to have the maximum utility of every investment and simplification in the interpretation of requirements is the outcome we're looking for.

How are we doing from that standpoint? The foundational elements of the command will be the Army Capabilities Integration Center and the Research, Development and Engineering Command. We're in the process of developing the policy guidance and execution order to start moving those organizations together.

We've also announced the key sub-command elements of the Futures Command: Futures and Concepts, Combat Development, and Combat Systems. The cross-functional teams (CFTs) that we stood up last fall fold in underneath these three command elements, and the combat systems

and program managers are already assigned to those CFTs.

We picked Austin as the location for the command group of the Futures Command headquarters. All these pieces will be coming to a head as we reach initial operational capability.

How are the secretariat and the Department of the Army staff working together on this effort?

I've been blessed to have a wonderful partner in Gen. James McConville. It's kind of like the heavens parted that I get him as my wingman given the unique characteristics of the operational roles he's had. He's had six years on the Army staff, and he's the longest serving division commander in the history of the Army. He did more than three years with the 101st [Airborne Division].

Because he and I talk so many times every day—he's one of the last people I talk to before I go to bed at night—we are linked shoulder to shoulder in bringing the strength of the secretariat and Army staff together.

Whether we are at investment meetings with CFTs or working on procurement decisions, having both of us there brings the strength of this Headquarters, Department of the Army, together. It moves decisions faster and provides succinct guidance that is heard at one place and time, as well as moves the delegations of authorities and resources more quickly.

Can you discuss the importance of partnering with industry to leverage private-sector innovation?

That's one of the foundational elements of what Futures Command will do for us. We look to industry to solve problems and bring us solutions. I try to meet with industry leaders as much as possible so I understand where technologies are going.

The Secretary of the Army Dr. Mark Esper, in particular, has a program where we bring in senior industry officials every week to meet with

the Army's senior leaders, and we're starting to see the dividends of those investments.

For companies that are vendors for us, managing those relationships helps them understand what we want out of a product or a service. Henry Stimson, Secretary of War during World War II, once said, "If you are going to try to go to war, in a capitalist country, you have to let business make money out of the process or business won't work."

Clearly we want them to be successful, but we have to communicate to them what exactly we want. And we have to be consistent so they can invest in their products and services, allow them to evolve, and bring the cost down.

As my old boss, [former] Secretary of Defense Robert Gates, used to say, relationships are the grease that runs our government. It is a relationship of push and pull with industry. When you have a problem with a system, you work through that issue together. If you don't have those relationships, you can't get through the hard times together.

How important is sustainment to the Army's modernization efforts?

Sustainment is a key performance parameter with every investment we make. You go into a death spiral with a weapon system if you can't sustain its performance and absorb the cost in the out-years. For every decision we make, I make sure the sustainment is addressed. It's a variable you have to solve or you won't get an investment dollar out of me.

One of the things that has been unique in standing up the Futures Command is the major commands (the Training and Doctrine Command, the Forces Command, and the Army Materiel Command) have played instrumental roles in mentoring CFTs. Gen. Gus Perna's leadership, for example, is ensuring the sustainment community is integrated into every CFT.

For every weapon system we're de-

signing, one of the main things we're looking at in our key performance parameters is the life-cycle management. Getting a life-cycle plan in place that's not only cost-efficient for managing and upgrading these systems over time, but also keeps operational rates up, is absolutely critical. Gen. Perna has helped each of the CFT leaders really think through the long-term investment of these weapons systems.

So often in the Department of Defense we don't get it right. And it's not just the Army; it's everybody because we're all focused on performance. But if you can't move it and you can't sustain it, it's not going to help you very much. Gen. Perna has gotten those CFT leaders to think very differently about the problem set. These qualified, post-brigade command officers are now coming in and talking about how they're going to lay in their sustainment plans over time, and it really shows the culture is changing.

As new technologies are fielded, how do you foresee logistics evolving?

As the Army modernizes, we can't become so overly sophisticated that we can't move. It's that simple. Speed is a key variable and characteristic of being successful in combat, and we will lose that if we become too heavy and too complex. Three initiatives come to mind.

The first initiative is Army pre-positioned stocks. We have made demonstrable gains in laying these equipment sets worldwide and configuring them for combat. Having those pre-positioned capabilities will increase the flow of moving assets and personnel for contingency operations.

The second is additive manufacturing. I recently toured facilities at Rock Island Arsenal, Illinois, where the Army Materiel Command is championing this initiative. Additive manufacturing will fundamentally change how we do business by reducing the cost of the parts, im-

proving equipment on-hand, and potentially bringing down the weight of both the repair parts we're shipping worldwide and our weapon systems as a whole. It is a game-changing capability that can get our systems back up and running within hours as opposed to weeks or months. I'm very excited about this and want to help as much as I can.

The third, and really the foremost, are the fundamentals. It's all about blocking and tackling—looking at equipment on-hand and really focusing in on the parts. It's not glamorous, but it's got teeth. And that's really the difference in keeping Abrams and Bradleys up and running so units can have high operational rates with their key weapons systems.

You've served at both the tactical and strategic levels. What advice do you have for Soldiers coming into the Army today?

Study your profession. This was the same advice I was given when I was about to go on active duty. Really make every hour count to prepare yourself for getting that awesome responsibility of becoming a platoon leader when you're 22 or 23 years old. Use every opportunity you have to prepare yourself and to learn about your profession.

And listen to your noncommissioned officers. My father, who was an enlisted Soldier during the Vietnam War, gave me that advice. Your noncommissioned officers are the ones who will get you through the longest days of your life.

Arpi Dilanian is a strategic analyst in the Army G-4's Logistics Initiatives Group. She holds a bachelor's degree from American University and a master's degree from Rensselaer Polytechnic Institute.

Matthew Howard is a strategic analyst in the Army G-4's Logistics Initiatives Group. He holds bachelor's and master's degrees from Georgetown University.

A man in a military uniform, wearing a tan cap and sunglasses, is shown in profile, looking towards the right. He is standing in front of a piece of military equipment, which appears to be a vehicle-mounted system with various sensors and antennas. The background shows a cloudy sky and other parts of the equipment. The text "Acquisition Efforts to Modernize Army Sustainment" is overlaid on the image in a large, white, serif font. Below the title, there is a small square icon followed by the text "By Dr. Bruce D. Jette".

Acquisition Efforts to Modernize Army Sustainment

■ By Dr. Bruce D. Jette



Brig. Gen. Joel Tyler, the commanding general of the Joint Modernization Command, explains capabilities to Dr. Bruce Jette, the Assistant Secretary of the Army (Acquisition, Logistics and Technology), in Hohenfels, Germany, on April 26, 2018. (Photo by Staff Sgt. Kalie Frantz)

The Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology) helps provide the Army with combat capabilities and collaborates with stakeholders to execute effective and affordable sustainment strategies.

One of the objectives in the Army Vision is to organize over the coming years to retain overmatch against all potential adversaries. Dr. Mark T. Esper, the Secretary of the Army, and Gen. Mark A. Milley, the Chief of Staff of the Army, stated that the Army must “ensure warfighting formations have sufficient infantry, armor, engineer, artillery, and air defense assets ... and robust logistical support must be readily available to units.”

To provide those assets and support, the Army must continue to excel at employing and using modern sustainment systems. Proper sustainment allows the Army to get equipment ready faster, keep it viable longer, and be more cost-efficient.

Supporting Soldiers

Sustainment plays a large role in the Army’s overall readiness rate. In some cases, asset availability simply means keeping an item in stock. Very little changes once that item is in Soldiers’ hands. For example, .50-caliber cartridges have been used by the Army since 1933, and the Army has been ensuring Soldiers’ access to them for more than 80 years with only small modifications due to evolving technology.

For more complex assets, sustainment begins before the equipment is purchased and even during design. This end-to-end life cycle management approach involves close partnerships with the program executive offices, program managers (PMs), the Army Materiel Command (AMC), the Army G-4, and other stakeholders.

Early Work Pays Dividends

The earlier the Army plans for the sustainment phase, the better the integration of weapon system and product support package design. This integration should begin early during the technology maturation and risk reduction phase (well before the sustainment phase) and continue through the operational use of the weapon system.

Product support packages include the support functions required to field and maintain the readiness and operational capability of major weapon systems, subsystems, and components, including all functions related to weapon system readiness.

The Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology) (ASA[ALT]) provides policy, guidance, and supervision to help PMs provide the best, most reliable, sustainable, and affordable combat capability.

ASA(ALT) emphasizes early planning, integrates 12 product support elements with system design, and assesses support alternatives. This analysis includes costs and risks to select the best product support strategy. ASA(ALT) collaborates with expert stakeholders within the Army to execute an effective and affordable strategy once the program reaches the sustainment phase.

Among those stakeholders are the PMs. PMs are responsible for accomplishing program objectives for total life cycle systems management, including sustainment. To do that, the Army must integrate product support package design into the design process, identify enablers for effective and affordable product support, and focus on minimizing operating and support cost in the sustainment phase. ASA(ALT) documents its strategy in the program’s life cycle sustainment plan, which the PMs and other Army organizations use to develop and field the product support package.

In the production and deployment phase, the weapon system is fielded and enters sustainment. As part of their life cycle management responsibilities, the PM and product support manager oversee the effectiveness of the life cycle sustainment plan and product support package and the performance of product support integrators and product support providers. ASA(ALT) remains agile and responsive to emerging conditions and continually evaluates its product support policies, guidance, and pro-

cesses to improve the sustainment of weapon systems.

Reviews, Processes, and Tools

Part of this evaluation are institutionalized operational sustainment reviews (OSRs). OSRs focus on evaluating the effectiveness of a

platform before a failure occurs. The H-60M Black Hawk helicopter program has used CBM+ to increase aircraft availability and to save approximately 130,000 maintenance man-hours annually.

ASA(ALT) has been working on a transition to a sustainment project in

In fiscal year 2019, ASA(ALT) expects to have a new tool, the Transition to Sustainment Guidebook. This resource will enable PMs to identify all transition requirements and enablers. It will help them plan a smooth and effective transition to AMC for the performance of sus-

“The endurance of Army forces is primarily a function of their sustainment. Sustainment determines the depth and duration of Army operations.”

—Army Doctrine Publication 4-0, Sustainment

program’s product support strategy and the package’s actual performance and cost during sustainment. We can compare this performance to the baseline established during the planning phase.

OSRs include stakeholders from across the Department of the Army headquarters. If a review reveals issues, ASA(ALT) can identify them for the PMs to resolve. It then conducts a follow-on review to assess the corrective actions taken.

One existing process is condition-based maintenance plus (CBM+). CBM+ leverages sensors and computing power to identify emerging sustainment problems within a

collaboration with the Deputy Chief of Staff, G-4, and AMC to address the challenges the Army has for developing a standardized process for PMs to transition sustainment execution functions to AMC.

ASA(ALT) has learned through ongoing pilots with the Shadow tactical unmanned aircraft system and the joint light tactical vehicle programs that this is a highly complex process. The joint light tactical vehicle program remains on schedule to achieve a successful full-rate production decision even while conducting sustainability testing during the multiservice operational test and evaluation.

tainment execution functions.

When announcing the Army’s modernization priorities, Gen. Milley wrote, “The American people expect us to win, and we win on the offense by mastering the fundamentals of shoot, move, communicate and sustain better than any other Army.” ASA(ALT) will do everything it can to improve Army sustainment, and with the support of key stakeholders, it is committed to meeting those expectations.

I want to thank all of the organizations in the Army that work together with the PMs to give our Soldiers a decisive advantage in all operations. Through the efficient leveraging of technologies and capabilities, our acquisition professionals in close collaboration with their counterparts develop, acquire, field, and sustain the world’s best equipment and services in order to meet current and future Army needs.

A joint light tactical vehicle climbs extreme terrain at the Transportation Demonstration Support Area at Marine Corps Base Quantico, Va. (Photo courtesy of the Army Operational Test Command)



Dr. Bruce D. Jette is the Assistant Secretary of the Army for Acquisition, Logistics and Technology. In this position, he serves as the Army acquisition executive, the senior procurement executive, the science advisor to the Secretary of the Army, and the Army’s senior research and development official. Dr. Jette has a bachelor’s degree from the U.S. Military Academy and master’s and doctorate degrees from the Massachusetts Institute of Technology.





Safer, Smarter, Faster: *An Interview With Gen. James McConville*

■ By Arpi Dilanian and Matthew Howard

*Gen. James McConville, the Vice Chief of Staff of the Army, played a key role in developing the new Army Futures Command, which will work to modernize sustainment technology.
(Photo by Matthew Howard)*

Gen. James McConville, the Vice Chief of Staff of the Army, discusses the Army's modernization and the impact it will have on the logistics community.

Since assuming duties as the 36th Vice Chief of Staff of the Army in 2017, Gen. James C. McConville has focused on meeting the Secretary of the Army's and Chief of Staff of the Army's readiness and modernization priorities. A graduate of the U.S. Military Academy, McConville is a master aviator and most recently served as the Deputy Chief of Staff, G-1. In this interview, McConville shares his impressions on the impact the Army's new era of modernization will have on the logistics community.

How are you working to change culture and embrace modernization and the establishment of the Futures Command?

I don't think it's hard to change the culture when we show we're going to get the results we need. There's no one in the Army who disagrees with our desire to develop new equipment at a reasonable price in a timely manner. I think we all share the same goals; it's just a matter of how we get there.

We have had to change the system because most of our processes in the Army—and the military in general—are from the industrial age. They tend to be very linear. With how quickly technology is moving in the civilian sector, we have to change our processes and the way we do business so we can field these systems in the time frame we need to be ready for combat. That's why we're going down this road.

I'm blessed to work very closely with Under Secretary [of the Army] Ryan McCarthy on this. He comes to the Army with broad experience and a unique skill set to help us develop these systems. Together, we synchronize the Secretary [of the Army] and the uniformed members of the Army Staff so we're all collaborating and all sharing the same vision as we go forward.

How important is innovation and modernization for building readiness?

It's extremely important, especially when it comes to logistics. When we look at modernization, some things are going to change and some things are not. When we talk about logistics, we're still going to need to feed Soldiers; we're still going to need to fuel and arm vehicles and helicopters; and we're still going to need to get critical parts to units on the battlefield.

What is going to change is how we do that. We talk about modernization and innovation, and we can take some cues right now from the civilian sector. We're starting to see autonomous vehicles moving around the country conducting logistics, both in the air and on the ground. We're seeing additive manufacturing where we can actually make parts at the point of need, saving a lot of time that would have been required to get them delivered.

We're going to see artificial intelligence involved in helping us with condition-based maintenance, so we know ahead of time when parts will need to be replaced, rather than waiting until they fail or changing them based solely on hours in use. Technology is going to save us a lot of time.

While innovation and modernization are certainly going to change the way we do logistics on the battlefield, it's not going to change the criticality of sustaining our units while they're in combat—I want to make sure our logisticians understand just how important they are on the battlefield.

One of my first jobs in the Army was the support platoon leader for the 2nd Squadron, 10th Cavalry Regiment, and I learned very quickly how important logisticians are for any unit type. Without my support platoon delivering food, Soldiers would not eat. Without

my support platoon delivering fuel, vehicles would not move. Without ammunition, none of those weapon systems would shoot. Without repair parts, there'd be a whole bunch of helicopters that were just expensive paperweights. Logisticians play a critical role on the battlefield, and they will continue to do so in the future.

How will the Futures Command use technology and industry partnerships to modernize faster?

We have major corporations, like Amazon, that do logistics in ways we can learn from. How are they using robots to help complete tasks much quicker and more efficiently? How are they using autonomous vehicles to deliver products or supplies? By studying their operations, we can see, for example, the potential for taking Soldiers out of dangerous areas on the battlefield by using autonomous ground and air vehicles as we go forward.

So we're looking at what industry is doing, compared to what we want to do. Then we're evaluating their technology to see where we can apply it as a military solution.

You have three children serving in the military. They are using some of the same equipment you used as a young officer. Can you discuss how the Futures Command will affect Soldiers at the tactical level?

We have six Army modernization priorities: long-range precision fires, next generation combat vehicles, future vertical lift, the Army network, air and missile defense, and Soldier lethality. Within each of these priorities, we have two or three major programs that are going to fundamentally change the Army.

When my generation came into the Army, we had what we called the big five: the Abrams, Bradley, Apache, Black Hawk, and the

Patriot. They've been around for quite a while, and we haven't fielded a new major combat system in decades. With the Futures Command, our kids and their kids are going to see brand new systems coming into the inventory over the next three to eight years.

Development and acquisition timelines will be shorter and faster. Within each of the modernization priorities, one of the things we've done is set up cross-functional teams. We're bringing together the operators, the sustainers, and the Acquisition Corps. We're having them work very closely in developing requirements. Because they're coordinating so closely, it will cut years from the time it actually takes to produce requirements.

It's also paying dividends with some of the systems that have recently gone into the acquisition phase. The fact that we're keeping the operators and acquisition professionals together throughout the process is allowing us to get a product that the operators want and that acquisition professionals can acquire in a timely manner.

As the senior mentor for the Future Vertical Lift Cross-Functional Team, what have you done to ensure sustainment is incorporated?

Sustainment is extremely important, especially when it comes to helicopters and rotary-wing aircraft. Again, if we can't maintain them, they just become expensive paperweights. We want to make sure future systems are reliable and we've put processes in place to make them easy to maintain by crew chiefs and mechanics.

Whether it's the engine or the transmission, we're thinking about how it's going to be maintained as we're actually developing the system. What type of tools does it take? How can the crew chiefs get in there and actually fix the helicopter if it becomes broken?

Moreover, a lot of weapon sys-

tems are almost massive computers when you really look at them. With our aircraft, they may have a rotor system on them, but what really gives us the edge is the information technology systems that are inside. Crew chiefs and mechanics are also going to need the training that allows them to maintain these very sophisticated pieces of equipment.

We're also looking at how we can innovate the sustainment plan through capabilities like additive manufacturing. How can we reduce the time we would normally wait for a repair part? Are there parts we can 3-D print so we don't have to go back to a logistics hub and then bring those parts forward?

All of these aspects are critical to the development of the system, and that's why we have sustainment professionals on the cross-functional teams providing input as we go forward.

What is the most important thing young Soldiers need to know as the Army modernizes?

Soldiers need to know that we're going to modernize and we're going to get new equipment. But at the end of the day, it's about the Army's Soldiers. They are the most important weapon system. There will always be a Soldier in the loop in anything we do. The technology is there to help them do their jobs, not to replace them. Soldiers are our most important asset.

Arpi Dilanian is a strategic analyst in the Army G-4's Logistics Initiatives Group. She holds a bachelor's degree from American University and a master's degree from Rensselaer Polytechnic Institute.

Matthew Howard is a strategic analyst in the Army G-4's Logistics Initiatives Group. He holds bachelor's and master's degrees from Georgetown University.

A woman in military uniform is working at a computer in a control room. She is wearing a headset and looking at the screen. The background is slightly blurred, showing other people in uniform. The text is overlaid on a dark rectangular area on the left side of the image.

Network Modernization: *Innovation in a Time of Unprecedented Opportunity*

■ By Lt. Gen. Bruce T. Crawford

ROGERS



First Lt. John R. Rogers, 642nd Regional Support Group, takes part in virtual convoy training on Feb. 24, 2018, at his unit's headquarters in Decatur, Ga. (Photo by Sgt. 1st Class Gary A. Witte)

The Army's current networks do not meet the requirements of operational commanders, so the Army is modernizing its tactical, enterprise, and intelligence networks to increase its warfighting capabilities.

It has been well-documented that advances in technology will heavily influence the character of future warfare. Artificial intelligence, information technology (IT), advanced robotics, more efficient and automated uses of the available spectrum, and the ability to leverage investments by commercial industry in low-earth-orbit meshed satellite constellations have the ability to be game-changers in the way we fight.

A Time for Introspection

During the past year, the Army has been on an introspective, intellectual journey to modernize its networks. This effort is clearly the largest of its kind in over 30 years.

To put this in perspective, the last time the Army took on a task of this magnitude, the internet was just beginning to take shape, there was no cybersecurity, software-defined capabilities existed only in laboratories, and the intent and capability of peer adversaries as threats to our networks were virtually unknown.

After a year of assessment, the Army concluded that its current network does not meet the requirements of operational commanders in a highly contested and congested environment against a near-peer adversary. After 16 years in a static, uncontested environment, given the evolution of the threat and advancements in technologies, it is clear that the time for redirection is now.

The Army also concluded that its existing network is too complex, too fragile, and insufficiently mobile. It lacks scalability and is not expeditionary or interoperable with joint and interagency partners.

Further, in its current state, the Army is not postured to acquire and rapidly integrate new technologies in a reasonable time frame or at a reasonable cost. And last but certainly not least, the Army concluded that it is likely entering a state of "perpetual innovation," a cascading series of future states that will be defined by consistent, disciplined innovation instead of an institution-

al mindset of modernizing toward a defined end state.

How Is This Effort Different?

The ongoing modernization effort is not limited to the tactical network. The Army is also developing plans to modernize its enterprise and intelligence networks and continue to build on the great work that is already in progress with its business mission area systems to further enhance warfighting capability.

The enterprise mission area includes capabilities that support hybrid cloud hosting capacity, post, camp, and station infrastructure, and core enterprise services and that reduce the cyberattack surface by regionalizing cybersecurity support concepts.

The business mission area supports network capabilities aligning human resources, logistics, acquisition, and financial services. The intelligence mission area supports specific network capabilities to enable the collection, analysis, production and distribution of intelligence.

What makes this effort different from past attempts to modernize Army networks is this effort takes on an institutional reform approach (from requirements to resourcing) instead of focusing solely on technology.

It also represents a fundamental change in the approach toward modernization because it is threat-informed and it institutes experimentation and demonstrations by actual units that take into account feedback from Soldiers, operational commanders, and the Army's combat training centers, which are the closest thing to actual combat.

This network modernization effort is intently informed by a congressionally mandated Institute for Defense Analyses study of Army networks and an assessment of strategy from the Director of Operational Test and Evaluation.

Enabling The Army's New Vision

The new Army Vision laid out by

the Secretary of the Army challenges us all to “build the Army of 2028 that is ready to deploy, fight and win decisively against any adversary, anytime, anywhere, in a joint, multi-domain, high intensity conflict, while simultaneously deterring others and maintaining our ability to conduct irregular warfare.”

Given the current and future reliance on technology, we must posture ourselves now to deliver the network required to make this vision a reality.

Network Modernization Efforts

Over the past 12 months, the Army has invested quite a bit of intellectual energy outlining the characteristics, requirements, and attributes of its future state networks. In the near term, it is taking several tangible actions to make this vision a reality. Those actions include halting programs that do not meet the objective state and the needs of operational commanders and reinvesting those resources to fix capability gaps that enhance readiness, increase lethality, and enable the Army to fight and win against peer adversaries.

Additionally, the Army is pivoting to a more agile acquisition process of “find-try-adapt and buy” to leverage technology investments of commercial and defense industries quickly. These three pillars are all designed to keep pace with technological developments, stay ahead of current and emerging threats, and enable readiness in our formations as a part of the joint team.

These are the Army’s priority focus areas:

- Developing a common operational environment.
- Consolidating 19 disparate battle command systems into a handheld, mobile, command post computing platform.
- Unifying all transport capabilities into a seamless standards-based architecture.
- Enhancing the mobility and survivability of our command posts

from the enterprise level to the tactical level.

- Increasing joint and coalition interoperability.

The result of this modernization will be a network that successfully enables the Army to continue to “fight tonight” while simultaneously projecting the network it needs for the future.

People and Processes

Delivering the network the Army needs to fight and win demands institutional reform. This effort is also about identifying and overcoming challenges that hinder innovation and, ultimately, the ability to make Soldiers more lethal in preparing for and conducting war. The Army has taken an introspective look, acknowledged potential risks, and set forth a course correction to ensure continual strides to help foster a culture of innovation.

Retain, grow, and recruit the workforce. The Army’s greatest asset is its people. The workforce continues to be critical to maintaining our advantage, and the Army will continue to focus on grooming its current IT workforce while simultaneously looking at ways to recruit the right talent to renew the force.

As the Army’s IT network transforms to defend against emerging threats, the skill sets of the IT workforce must transform and adapt to new technology.

While emerging technologies have great potential to enhance the Army’s posture and readiness, they also bring changes to IT roles and the skill sets required for the workforce. Efforts are currently underway to infuse the anticipated skill sets of the future into training and development opportunities for the workforce.

Encourage and incentivize creativity. Innovation will come from our Soldiers. Their ingenuity and creativity in engineering solutions should not be suppressed. Soldiers should always feel empowered and

have a say in applying creative approaches from the field.

No problem is insurmountable when an environment of experimentation and exploration of new ideas is encouraged. This bottom-up (versus top-down) approach to creativity will continue to be cultivated to yield exponentially more innovative and viable solutions.

Identify and rapidly address prohibitive policy. Although several policy reform efforts are underway, the priority IT-related reform effort is optimizing the risk management framework (RMF). RMF is a process that requires some major adaptation to best support current and future technological integration.

RMF describes the process that communications systems (from all services) must undergo to identify cybersecurity vulnerabilities, assess risk, and achieve authorities to connect new technologies to networks. In its current state, this process impedes the rapid integration of new technologies.

The Army must pivot to a more agile implementation of RMF that moves from a focus on compliance to a more “risk-based,” rapid integration mindset in order to maintain a competitive advantage against peer adversaries.

Modernizing the Army’s networks is critical to maintaining overmatch against increasingly evolving peer adversaries around the globe. The implementation of the network modernization strategy is tangible evidence of the Army’s commitment to be ready to deploy, fight, and win decisively against any adversary, anytime and anywhere.

Lt. Gen. Bruce T. Crawford is the Army chief information officer/G-6. He has a bachelor’s degree in electrical engineering from South Carolina State University, a master’s degree in administration from Central Michigan University, and a master’s degree in National Resource Strategy from the Industrial College of the Armed Forces.



Sgt. Theresa Fuentes, a parachutist with the 301st Psychological Operations Company, prepares to rehearse jump procedures on a virtual reality parachute simulator at Hunter Army Airfield, Ga., on April 24, 2018. (Photo by Sgt. 1st Class Sean A. Foley)

The Synthetic Training Environment Revolutionizes Sustainment Training

■ By Maj. Gen. Maria R. Gervais



New simulation capabilities will allow sustainers to rapidly acquire and maintain the skills necessary to win in multi-domain operations.

March 23, 2003, was a dark day for the Army. This was the day when the 507th Maintenance Company took a wrong turn onto Highway 7, putting 33 Soldiers on a path to be ambushed by Iraqi forces during the Battle of Nasiriyah.

This wrong turn resulted in the death of 11 Soldiers, the capture of Pfc. Jessica Lynch, and numerous lessons learned for our Army. Factors leading to this wrong turn included a lack of equipment, a lack of maps, poor judgment, and a lack of training.

Field Manual 7-0, *Train to Win in a Complex World*, highlights that planning and rehearsing lead to better execution. Simulations enable Soldiers to plan and rehearse events prior to executing operations in a live environment. The 507th Maintenance Company may have avoided this tragedy if it had virtually rehearsed this convoy route before executing the mission.

Imagine an environment in which sustainment Soldiers can put on a pair of virtual or mixed reality goggles and find themselves in any country in the world and on the same type of terrain they will operate on in the near future. In this environment, they are connected with their supported maneuver force and joint and coalition partners, and they have the ability to rehearse the sustainment plan developed for the mission numerous times before they execute it.

It seems far-fetched or like something in a movie. However, this capability is much closer than you might imagine; the virtual and gaming industry is developing leap-ahead technologies at an accelerated pace that will revolutionize the way the Army trains in the future.

This article will discuss the Army's current simulation capabilities and how the Combined Arms Center-Training (CAC-T) and the Mission Command Training Program deliver simulation capabilities to the sustainment community. It discusses how the Synthetic Training Environment (STE) will revolutionize the way the

Army and sustainment community will train in the future.

Current Training Environment

CAC-T, located at Fort Leavenworth, Kansas, delivers world-class live-virtual-constructive (LVC) collective training simulation capabilities for the Army. The deputy commanding general for CAC-T serves as the director of the STE Cross-Functional Team (CFT) and focuses on modernizing the Army's LVC simulation capability.

The Army must modernize its current training environment, known as the Integrated Training Environment (ITE), because of shortfalls that limit the Army's ability to replicate the multi-domain operational environment. The current training environment has served the Army well for three decades; however, the ITE is insufficient to prepare the Army for the future operational environment. The Army must train for multi-domain operations in order to win against near-peer adversaries.

The Army's current training simulation capabilities are based on 1980s and 1990s technology. They operate on closed, restrictive networks, are facilities-based, and require high personnel overhead. They do not support the full range of current mission command information systems.

These current capabilities cannot replicate the complex operational environment that Soldiers will fight in and do not support training for electronic warfare, cyberspace, and megacities.

The ITE cannot fully replicate a combined arms training capability and critical enabling warfighting functions, such as sustainment, in virtual and constructive simulations. Limitations of the current training environment affect the overall quality of training that the LVC ITE provides for commanders and units at all echelons. For the sustainment community, these limitations are readily apparent in warfighter exercises (WFXs) executed by the Mission Command Training Program.

The Mission Command Training Program

The Mission Command Training Program, a subordinate organization of CAC-T, executes the current WFX program of LVC command post exercises for corps, division, and brigade headquarters. These headquarters include sustainment brigades and expeditionary sustainment commands from both the active and reserve components.

The WFX has evolved over three decades from a relatively simple training event using maps and acetate to a sophisticated LVC wargame driven by a computer simulation known as Warfighter Simulation (WARSIM). WFXs focus on preparing commanders and staffs to execute large-scale combat operations

against near-peer adversaries in complex environments.

The Army's current sustainment simulation capabilities are insufficient to train sustainment operations during large-scale combat operations executed during a WFX. WARSIM has a limited interface with Army logistics information systems (LISs) and depends largely on manual inputs by a team of database managers using the Combined Arms Support Command's Joint Deployment Logistics Model (JDLM) and Logistics Federation (LOGFED) for sustainment information.

JDLM is a constructive computer-based simulation designed to train commanders and staffs in sustainment functions from the brigade support battalion through the theater

support command. JDLM supports the visualization of both the strategic and tactical battlespace and imitates sustainment mission command and business systems.

However, simulation-supported training using JDLM is not providing the rigor required to train sustainment units. Specifically, current simulation tools fail to replicate sustainment operations in four major areas: maintenance, sustainment rigor and WARSIM anomalies, LIS interfaces, and human resources operations.

Maintenance. Maintenance and repair parts operations are not simulated in a WFX except for the bare minimum automatic actions within JDLM.

Sustainment rigor and WARSIM anomalies. WFXs create anomalies,

Gen. Gustavo Perna visits the Synthetic Training Environment Cross-Functional Team at the Combined Arms Center's Training Innovation Facility at Fort Leavenworth, Kansas. (Photo by Scott Myers)



such as providing massive amounts of simulated ammunition, which creates less stress on units. These amounts far exceed theater-level allocation and expenditure rates for many Department of Defense identification codes.

LIS interfaces. There is no available LIS to stimulate sustainment training audiences. As a result, sustainment personnel on the digital battlefield fall back on analog systems for reporting.

Human resources operations. WFXs conduct mortuary affairs and replacement operations but not to the level appropriate for command post exercises, which train division and corps commanders and their staffs.

Over the past three years, the MCTP's Operations Group Sierra has observed sustainment shortfalls in units across the Army. Many of the shortfalls found during WFXs were

not the units' fault. For the past 17 years, the Army has fought a stationary, forward operating base-centric conflict centered on a push supply distribution pipeline executed by contractors.

Operations Group Sierra identified three major areas that sustainers need to improve to support an expeditionary force: executing unit displacement operations, developing a logistics synchronization (LOGSYNCH) matrix, and integrating key staff sections to better synchronize meetings and boards.

The high operating tempo in large-scale combat operations requires sustainers to be on the move in order to keep pace with the warfighter. The lack of a LOGSYNCH matrix affects all warfighting functions. A LOGSYNCH matrix is the science behind sustainment op-

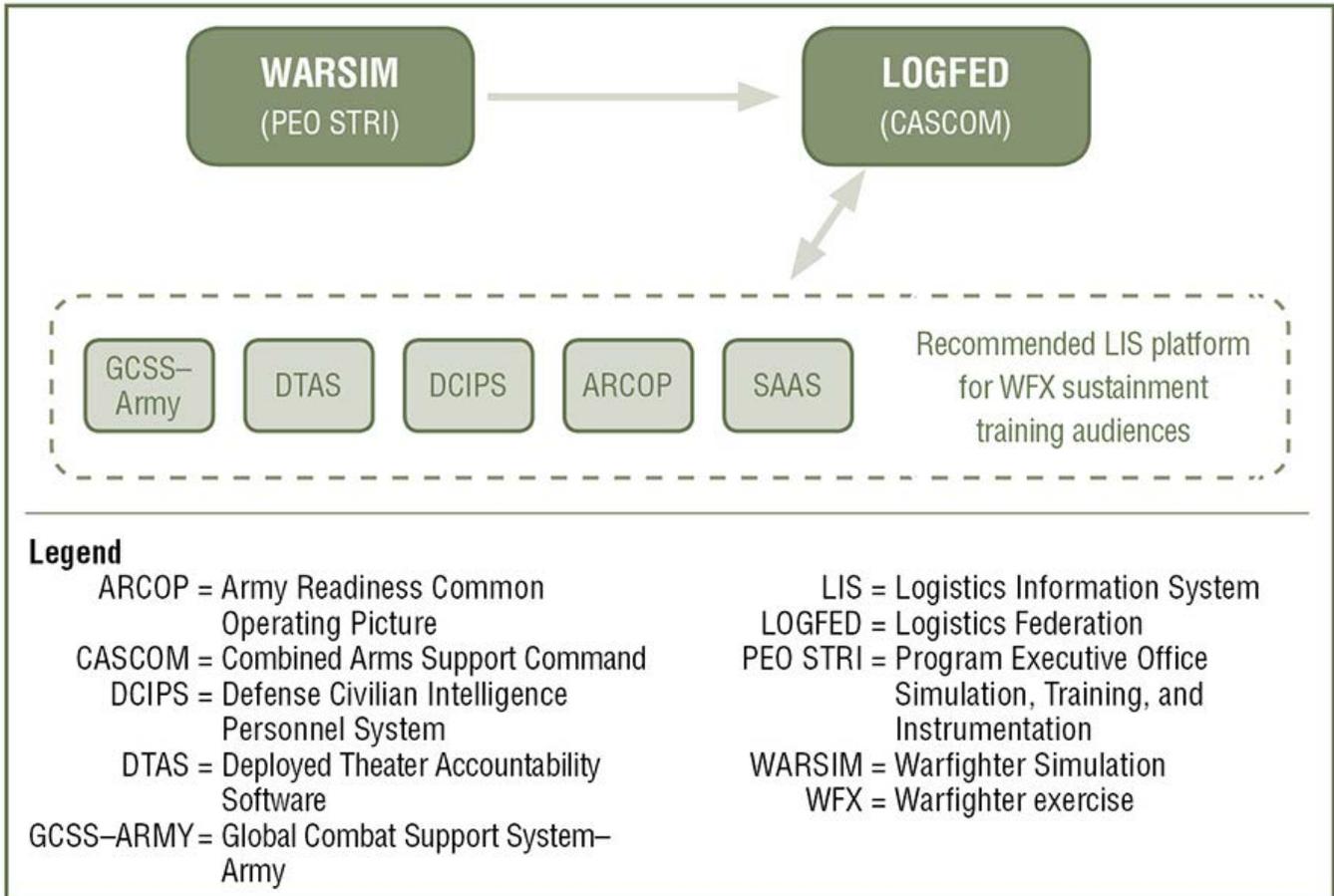
erations and serves as the playbook for when and where to support the warfighter.

The Army's future training environment, STE, must provide the sustainment community with simulation tools that drive the staff processes needed to train all aspects of the sustainment warfighting function.

Improving the Army's simulation architecture for the WFX and bridging capability gaps in simulation across the Army is the mission of the CAC-T's Logistics Exercise and Simulation Directorate (LESD), which is located with the Combined Arms Support Command at Fort Lee, Virginia. LESD is the Army's organization for planning, distributing, and executing large-scale logistics during constructive simulations.

The MCTP is working with LESD and the STE CFT to incorporate an

Figure 1. This proposed logistics information system simulations architecture includes the Army's many sustainment systems that could be added to simulations.



LIS platform into simulations to better stimulate units. An LIS provides the appropriate data to simulate sustainment mission command processes. Figure 1 proposes the LISs and architecture that could be included in future WFXs.

CAC-T continues to improve its current simulation capabilities and integrated training environment in order to better train commanders and units. These incremental improvements are insufficient to prepare the Army (and sustainers) to conduct multi-domain operations in order to win against a near-peer adversary.

Future Training Environment

The STE CFT directive is to rapidly expand the Army's STE, achieve deeper distribution of simulations capabilities down to battalion and companies, and provide a simulation capability to model combat operations in megacities.

STE CFT is one of the eight CFT pilots designated by the Secretary of the Army and Chief of Staff of the Army and is aligned with Soldier lethality, the Army's sixth modernization priority.

The STE will provide the complex training environment and training management tools that will allow sustainers to rapidly acquire and maintain the skills and collective tasks necessary to win in multi-domain operations.

The STE, through the Training Simulation Software, will provide the Global One World Terrain, a digital map that allows sustainers to train on the terrain they will operate on, including terrain such as complex urban areas and megacities.

For sustainers, Global One World Terrain will allow for theater-level logistics planning, to include validation of potential aerial and sea ports of debarkation and theater opening, reception, staging, onward movement, and integration processes. The Training Simulation Software will also replicate a complex operational environment by accurately portraying the culture, patterns of life,

weather, and threat.

Finally, the STE will provide the Training Management Tool, which will allow leaders and commanders to deliver tailored training scenarios quickly. It is a user-friendly database that allows units to design an exercise or operation.

The program prompts the user to consider all aspects of an operation from start to finish. The Training Management Tool archives each exercise or operation, allowing units to download previous exercises and make adjustments as required.

Sustainers will conduct training in a complex environment in virtual immersive simulations that replicate combined arms maneuver with joint and coalition partners. Simulation using artificial intelligence will enable units to improve training through repetition at a much faster pace. This capability increases the repetitions and allow sustainment units and Soldiers to enter live or simulated combined arms maneuver training exercises at a high level of proficiency.

The institutional Army will leverage the STE to train and educate leaders on the application of doctrine. Leaders will have access to the complex operational environment in which they train and operate from the onset and throughout the professional military education process. STE, through its ability to accurately replicate force structure and rapidly introduce new capabilities, will allow sustainment leaders to fight the future fight.

Leaders will introduce emerging sustainment concepts and capabilities into the STE in order to test applications well in advance of fielding them to the Army. The STE will provide sustainment leaders with the ability to shape the future and allow us to outpace our adversaries and ensure sustainment overmatch.

The Army's recently released vision statement signed by both the Secretary of the Army and the Chief of staff of the Army states, "Focus

training on high-intensity conflict, with emphasis on operating in dense urban terrain, electronically degraded environments, and under constant surveillance. Training must be tough, realistic, iterative, and dynamic. Continuous movement, battlefield innovation, and leverage of combined arms maneuver with the Joint Force, allies, and partners must be the hallmarks. This training will require rapid expansion of our synthetic training environments and deeper distribution of simulations capabilities down to the company level to significantly enhance Soldier and team lethality."

Our current simulation capability and the ITE are good, but they are not good enough to train our Army for the threat we see today and expect in the future. Our simulation capability must accurately replicate the operational environment and enable combined arms maneuver with all warfighting functions. Replicating the sustainment warfighting function is hard; however, it is critical we improve this simulation capability in the future.

By leveraging the STE, future sustainment Soldiers will enter into battle better trained and better prepared than ever before. They will have confidence in themselves, their leaders, and their equipment.

As the Army moves forward to the STE, sustainment requirements, both individual and collective, must be included to ensure the Army trains this warfighting function fully during combined arms operations.

Maj. Gen. Maria R. Gervais is the director of the STE CFT and the deputy commanding general of CAC-T. She has a bachelor's degree in biology from Lander College, a master's degree in human resources from Webster University, and a master's degree in military strategic studies from the Army War College. Her military training includes the Chemical Officer Basic and Advanced Courses and the Command and General Staff College.



Readiness for the 21st Century: *An Interview With Retired Gen. David McKiernan*

■ By Arpi Dilanian and Matthew Howard

Gen. David McKiernan, then commander of the International Security Assistance Force and U.S. Forces-Afghanistan, delivers a briefing to the Pentagon press corps on Feb. 18, 2009.



NAN

U.S. ARMY

ISAF

A retired general with nearly four decades of Army experience discusses the need for the Army to modernize during its current period of inflection.

Throughout a career spanning nearly four decades, retired Gen. David D. McKiernan had a front row seat to some of the Army's biggest modernization efforts. Known for his ability to adapt to change and to a wide variety of assignments, McKiernan held command at every level of the Army, including the 1st Cavalry Division, Third Army/Coalition Forces Land Component Command (during Operation Iraqi Freedom), U.S. Army Europe, and U.S. Forces Afghanistan. As the Army now reaches an inflection point, we sat down with him to find out why it's time to modernize.

How did the Army's modernization progress over the course of your career?

I entered the Army in 1972 at a time when modernization had not been a focal point. We were coming out of the Vietnam War. Our major weapon systems were antiquated and not well maintained. Funding was down for the Army; manpower was too.

What I saw in the Army during the 1970s and 1980s was a focus on one particular threat, and that was the Soviet Union. It was the Cold War era, and Gen. Donn Starry and others designed the AirLand Battle doctrine. AirLand Battle drove our modernization and equipping and really all the other doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) domains as well. From that—doctrine driving modernization—the “big five” weapons systems resulted: Abrams, Bradley, Apache, Black Hawk, and Patriot. I'd also add the Paladin and the Multiple Launcher Rocket System that came about during that same time period.

I think modernization over the years has been a factor of two things: funding and what conflict we're in or anticipate we might be in. Throughout the Cold War, the discussion was really doctrine and supporting capabilities against a very predictable, but

certainly catastrophic, threat from the Soviet Union. More recently, I've seen it migrate to the post-9/11 world, where the types of conflicts we're involved in require modernization to focus on things like protection, survivability, precision-guided munitions, and more versatile and adaptable Soldier equipment under increasingly austere and asymmetrical conditions.

The “big five” weapon systems have been the backbone of the Army's lethality for several decades. Why is it time for the Army's six new modernization priorities?

As we look at conflict in the 21st century and to an uncertain future as far as we can see out, we're looking at a wide range of threats: small-scale, wide-area security, and very unconventional-type conflicts, all the way up to high-intensity, near-peer combat.

Again, with modernization being a function of funding and the types of conflicts we anticipate, it's not a discussion of whether it's direct action or counterinsurgency; I think that's a poorly framed, either-or argument. It's a question of what do we modernize to be able to have an Army that can conduct offensive, defensive, and stability operations simultaneously?

As we look at the multi-domain threats we face, our modernization efforts certainly need to prioritize things like precision, range, and unconventional capabilities. We need to be able to fight in very constricted, and most likely urban, terrain. We need to be able to acquire targets as far out, or within very complex terrain conditions, as we want to shoot.

We need systems that are all-weather and complement other joint effects; we won't go to any war without it being a joint effort. And certainly paramount to all of these things is the ability to protect ourselves and have systems that are very lethal.

What role will innovation play in



Gen. David D. McKiernan, then commander of the International Security Assistance Force (ISAF), and ISAF Command Sgt. Maj. Juniasolua T. Savusa salute during the playing of the Afghanistan national anthem at a Remembrance Day ceremony in Kabul, Afghanistan, on Nov. 11, 2008. (Photo by Petty Officer 2nd Class Aramis Ramirez)

ensuring readiness and competitive overmatch?

Innovation will be critical for us to fight in the kinds of urban and restricted terrain in which we increasingly find ourselves in the 21st century, and I think there are several areas where innovation will enhance the capabilities of the Army.

Information technology can enable us to provide mission command from both the command and control components. Artificial intelligence will also certainly play a role in the future.

Innovation can help us in the timeless quest to find lighter materials to build our equipment with while providing even greater protection. That's always been a technology challenge, but innovation must help us in that regard.

Our ability to provide more lethal munitions can be improved—everything from small arms to large

caliber, long-range precision-guided munitions. We've taken great, innovative strides in medical care and medical capabilities, and I think that will also continue in the future.

What advice do you have for leaders in managing expectations and embracing change within the ranks as the Army evolves?

I like to put it in the context of my own service in the Army. You can look back on the 1970s and say it was a time of great constraints, resource shortfalls, and evolving doctrinal and training changes—a glass half-empty viewpoint. But in my experience, it was actually a glass half-full picture, where there were opportunities for leaders in terms of what they could influence and the ability to embrace change.

The Army has always evolved, and we are constantly changing over the

DOTMLPF variables. As we look to today, and look at change and managing expectations, I think the central theme is that we need to expect the unexpected. We need to have a “fight tonight, anywhere” mentality and readiness across the Army.

What are some of the challenges you foresee for the sustainment community in the future fight?

From my own perspective, for many funding and organizational variables, we perhaps embarked on a slippery slope in sustainment in the 1990s; we took a lot of force structure out of the active component and placed it into the Reserve and National Guard. I don't think we've always had timely access to the Reserve and National Guard to make that effective.

From our experiences in Operations Iraqi Freedom and Enduring

Freedom, we've also grown heavily reliant on contractor support, which may not be available at the start of future conflicts. So I think there are certainly some big challenges in the sustainment arena in the 21st century.

There are deficiencies in distribution and intra-theater lift. I spent a lot of time in Europe and remember what capabilities the 21st Theater Support Command had. I look at what they have today, and it's really eroded. Intra-theater distribution seems to me to be a capability shortfall. We can get equipment and materiel to the theater, but how we move it quickly to the hands of the warfighter is going to be a challenge. And in the future, our ability to set the theater to enable our Army Ser-

vice Component Commands might not be guaranteed either.

Maintenance is also critical. I think the transition to the two-level maintenance concept continues to be a challenge, and the evolution of maintenance within the Army is still ongoing. We need to do more with maintenance support above the brigade level.

Finally, especially as we look toward high-intensity offensive operations where casualty rates will be significantly higher than in Operations Iraqi Freedom and Enduring Freedom and might well be under "dirty" conditions, challenges in evacuation and medical care continue to arise.

How important is collaboration

with commercial industry to meet the Army's modernization objectives?

It's absolutely critical for the Army and all of the services. Our ability to collaborate with and leverage industry is, quite frankly, underwhelming in many areas. Some of that belief is rooted in cumbersome acquisition policy and regulatory constraints, some in cultural inertia, and some in examples of "rice bowl" friction.

I think the Army needs more running contact with industry, and collaboration on what is available today in terms of equipping the force. I look at the modernization objectives the Army has set for itself; we need to go out to industry and not be hesitant about going to single vendors and seeing what they have available.



I think sometimes we are very self-constrained in our initiative to go out, talk to vendors, see what technologies are available today, and then move quickly to get them. We tend to do it at big trade shows, on industry days, or for slow-moving request for proposal processes, but I don't think those are necessarily the right venues to meet our objectives in a timely way.

What is the most important thing Soldiers entering the Army should know as they prepare for the future fight?

Whether it's 1972 (when I entered the Army), 2018, or the future, I think Soldiers want two things, and they should be confident in

these two things for any future fight.

The first is leadership. The only way they're confident in leadership is through realistic training to the right tasks, conditions, and standards. Constant training builds confidence in leadership and that unit's skill sets. And about the time you have your basic blocking and tackling skills honed, then you increase and change the conditions. You do it at night or under degraded communications; you do it under increasingly difficult terrain, opposing force situations, and a variety of other challenging conditions.

The second is confidence in our equipment. Our equipment is far better than it was when I entered the Army. I think Soldiers have much greater confidence in our equipment

today, but that's a fleeting condition. We constantly have to modernize and look at improving our equipment as conditions change. And reliability, user-friendly maintenance, precision, lethality, and all-weather ruggedness are all required features.

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Matthew Howard is a strategic analyst in the Army G-4's Logistics Initiatives Group. He holds bachelor's and master's degrees from Georgetown University.



Marine Lt. Col. David L. Odom greets International Security Assistance Force Commander Gen. David D. McKiernan upon his arrival to Forward Operating Base Delaram, Farah province, Afghanistan, on April 17, 2009. (Photo by Lance Cpl. Brian Jones)



Spc. Haley Hays and Sgt. Leonalyn Barnes, assigned to the 5th Squadron, 4th Cavalry Regiment, 2nd Armored Brigade Combat Team, 1st Infantry Division, perform maintenance on an M3 Bradley fighting vehicle to prepare for a tactical movement in Grafenwoehr, Germany, on April 21, 2018. (Photo by Staff Sgt. Julie Jaeger)



Machines Don't Have to Break

■ By Col. David Robinson

Defense Innovation Unit Experimental is helping the Department of Defense achieve the financial and readiness improvements available through artificial intelligence.

New sustainment and logistics tools can have a significant impact on readiness, which is the Chief of Staff of the Army's focus. In the Bradley fighting vehicle fleet alone, an improvement in sustainment efficiency can deliver billions of dollars in savings and, more importantly, improve readiness rates substantially.

Defense Innovation Unit Experimental (DIUx) is helping the Army's sustainment and acquisition communities by bringing advanced commercial artificial intelligence (AI) tools to bear against readiness challenges in the Bradley fighting vehicle fleet.

A Department of Defense (DOD) entity that reports to the Secretary of Defense, DIUx seeks to rapidly bring stable commercial technologies to warfighter problem areas. From its headquarters in Silicon Valley and offices in Boston; Austin, Texas; and the Pentagon, DIUx supports all components across each of the services and the intelligence community.

DIUx already has active predictive maintenance agreements serving Air Force programs for the E-3 airborne warning and control system (AWACS), C-5 Galaxy aircraft, and the F-16 fighter aircraft and will soon have an agreement for the F-35 fighter aircraft. Adding a similar project in support of the Army's Product Manager Bradley Fighting Vehicles was a natural next step.

AI on Predictive Maintenance

Commercial enterprises are increasingly making use of the financial and readiness improvements that predictive maintenance technologies make possible. A recent study indicated that data-enabled efficiency is expected to contribute \$15 trillion to the U.S. gross domestic product by 2030.

DIUx has made a specialty of using those commercial business case dynamics to fuel innovation that can be put to work for the warfighter now—the emphasis being on now, and the imperative being commercial.

The DOD cannot continue to pay for all the technical innovations it needs; it must find new ways to access

nontraditional participants and the efficiencies that the free market drives.

A recent case study by Uptake Technologies Inc. shows that for a North American Class I railroad, including over 600 assets monitored, AI created approximately \$160,000 in value per locomotive per year for an annual savings of \$100 million. This shows that the more complex the system, the more likely that cost savings and real efficiencies in sustainment and logistics will occur through proper application of AI.

The Bradley fighting vehicle is a complex system. Initial AI work on its primary systems, such as the engine, transmission, and brakes, will deliver similar potential for readiness improvements as commercial industries are achieving through their own AI efforts.

In the Army, it is estimated that as little as 1 percent of available sustainment data is being mined to inform proactive and predictive maintenance. Considering that only a tiny fraction of weapon systems maintenance data is being studied by advanced AI algorithms, this sparse penetration of AI in the sustainment community makes the benefits of a concerted program all the more compelling.

Now Fix It!

One of the most promising elements of AI in the sustainment realm is the ability to use it to make repairs when inevitable failures occur. In the future, the Army will operate on a complex and austere battlefield that will take its toll no matter how robust the sustainment preparation or how efficient the failure assessment. At some point, our machines will break, but AI delivers the potential to enable lower level, farther forward repairs.

If we can make AI a primary component of repair and allow it to assist operators with conducting maintenance, the Army will see a marked improvement in readiness rates as weapon systems return to service more quickly, farther forward. The work that the Army Futures Command and its Synthetic Training En-

environment Cross-Functional Team (CFT) are doing makes such innovative solutions possible.

The techniques employed are known as guided artificial intelligence for troubleshooting. They leverage the AI functionality inherent in Bayesian networks. For any given system, these techniques take the wisdom of both the original equipment manufacturer and the

affected by AI prospects and are current DIUx customers.

DIUx employs an acquisition mechanism called commercial solutions opening, a streamlined version of the “other transaction” mechanism, through the Army Contracting Command–New Jersey. Both the commercial solutions opening and other transaction mechanisms allow the DOD to partner with commer-

The Air Force E-3 AWACS program gained access to very rudimentary data, including handwritten pilot logs. The more normalized the data, the more efficient this first step will be.

The better the input data, the more extensive its history and the more normalized for AI, and thus the larger the effect a converted AI program will have on predictive maintenance. Phases two through four will involve

At some point, our machines will break, but AI delivers the potential to enable lower level, farther forward repairs.

most experienced Army maintainers and have it available to the forward operator in a virtual environment.

Even in times of network disconnectedness, the operator could query all available data on a given fault to find a remedy, or the operator could accurately diagnose problems for higher level maintainers to address. The results are savings of time and money and increased safety and readiness. This potential is already being realized in communications and electronics systems on board complex Army weapons systems.

The Army Readiness Imperative

The E-3 AWACS predictive maintenance prototype has demonstrated the potential for both \$186 million in maintenance savings across only a small fleet of aircraft, as well as improved readiness rates. Application across much larger programs of record, such as the C-5, F-16, F-35, and Bradleys, are likely to yield an even greater potential for increased warfighter readiness and taxpayer savings. Better still is that AI tools such as these are in direct support of the Futures Command CFTs as core enablers.

The Long Range Precision Fires, Air and Missile Defense, and Next Generation Combat Vehicle CFTs are all direct benefactors of AI tools in core systems. The Network, Position Navigation and Timing, and Future Vertical Lift CFTs are likewise

assessing the data, constructing a pilot trial product, and evaluating that trial product to inform the next round of data collection.

cial entities with whom it normally would not interact. They provide flexibility to address areas such as intellectual property and payment milestones that are important to commercial entities. These mechanisms provide speed of acquisition and contractual flexibility that other acquisition mechanisms simply cannot match.

Bradley Predictive Maintenance

From the first solicitation posting to the beginning of prototype work, DIUx, the Product Manager Bradley Fighting Vehicles, and the Army Contracting Command–New Jersey moved collaboratively through a roughly 90-day sequence to award a contract for Bradley Fighting Vehicle Predictive Maintenance. Within this time, DIUx ensured the solicitation sequence properly represented warfighter needs, surveyed the commercial AI vendor marketplace for solutions, and identified several options to consider.

The Bradley Fighting Vehicle Predictive Maintenance Program is being executed by a true multicomponent, multiservice DIUx team, which includes activated Reserve Soldiers from the 75th Innovation Command, National Guardsmen, and Air Force reservists.

The initial program is occurring in four phases. First, there is the enormous task of moving data to an accessible location to apply algorithms.

While the mix of technologies and skills it employs may vary depending on the problem at hand, DIUx was created with a simple imperative, which the Army G-4, Lt. Gen. Aundre Piggee, summarized well: “Put today’s technology in the Army, today.”

The logical question is where to go next with this potential. How can we harness the immediate effect of a concerted effort to infuse AI into programs of record and move them from a proven prototype to a steady state?

From business processes to maintenance efficiencies, innovation is occurring across the Army, and DIUx will continue to accelerate the use of commercial development to address warfighter problems. The future battlefield is upon us, and we now have an unprecedented ability to incorporate commercial innovation into the sustainment mission and our readiness imperative.

Col. David Robinson is the acting military director of DIUx. He was commissioned as a Signal Corps officer and holds a master’s degree in space systems operations management from Webster University and an MBA from the University of Delaware.



SKN

The Sustainment Knowledge Network (SKN) provides a variety of knowledge management (KM) tools and resources for all Sustainers, giving them the ability to rapidly produce, share, and meet the critical knowledge needs of Sustainment Soldiers and DA Civilians worldwide.

SKN offers users the ability to:

- Access Knowledge Centers (KCs) with pertinent OD, QM, TC, SSI, and ALU information
- Participate in live broadcasts of Lessons Learned (L2s) and Leader Professional Development (LPDs)
- View over 100 Lessons Learned recordings
- Access pages for various Sustainment Units

SKN is a One-Stop-Shop for relevant Sustainment and Logistics information:

<https://www.us.army.mil/suite/page/372426>

SustainNet

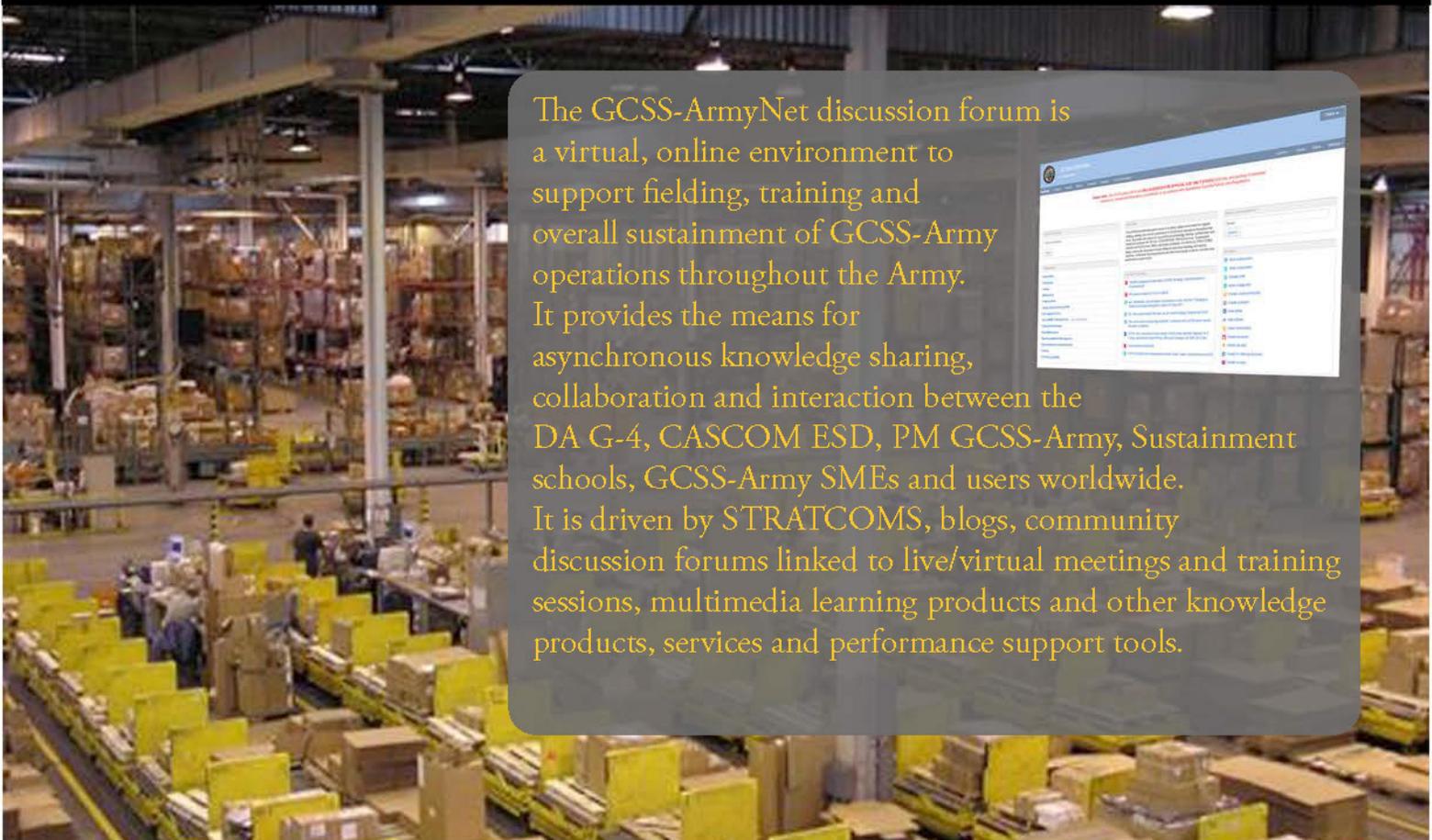
SustainNet is one of the Army's Primary tools for exchanging knowledge and sharing expertise, content, ideas, and solutions. This Professional Forum provides Sustainment Soldiers, DoD Civilians, and other DoD services the ability to:

- Rapidly disseminate and integrate information to Sustainers
- Leverage expertise from Subject Matter Experts (SMEs) and share experiences
- Virtual team on critical Sustainment and Logistics issues
- Participate in Communities of Practice (CoPs), start discussions, and seek solutions

Join SustainNet Professional Forum and share your expertise, knowledge, content, and ideas:

<https://www.milsuite.mil/book/community/spaces/sustainnet>

<https://www.milsuite.mil.book/community/spaces/sustainnet/gcss-armynet>



The GCSS-ArmyNet discussion forum is a virtual, online environment to support fielding, training and overall sustainment of GCSS-Army operations throughout the Army. It provides the means for asynchronous knowledge sharing, collaboration and interaction between the DA G-4, CASCOM ESD, PM GCSS-Army, Sustainment schools, GCSS-Army SMEs and users worldwide. It is driven by STRATCOMS, blogs, community discussion forums linked to live/virtual meetings and training sessions, multimedia learning products and other knowledge products, services and performance support tools.



The Kuwait Energy Efficiency Project

A team from the Logistics Innovation Agency and Area Support Group–Kuwait studied energy consumption at a Kuwait base camp and found a way to improve operational energy efficiency.

■ By John J. Yates

Based on the operational needs of the combatant commander and the recognition that energy is a critical resource necessary to accomplish regional sustainment missions, the Department of the Army G-4's Logistics Innovation Agency partnered with Area Support Group–Kuwait to improve operational energy efficiency within a Kuwait base camp.

Operational energy includes the energy needed to train for, conduct, and support military operations. The scope of operational energy is significant; the Department of Defense consumed more than 87 million barrels of fuel in fiscal year 2014 alone.

As such, Army leaders have emphasized the need to improve energy efficiency at forward locations. Energy efficiency is a vital component of the broader need to fundamentally reduce the demand characteristics of the force.

This article explores the use of operational energy within a base camp and summarizes the results of the Kuwait Energy Efficiency Project (KEEP), which may be leveraged for the current and future operational environments.

Issues Affecting Sustainment

To better understand future challenges and potential solutions, it is important to recognize the issues that affect sustainment requirements. These include such dynamics as Soldiers deploying and operating for longer periods of time, over greater distances, at a higher operational tempo, and in semi-independent modes.

In the realm of operational energy, three main factors should be considered when addressing efficiency improvements at base camps. The first factor is how energy is generated and distributed. Power, in many cases, must be generated locally at base camps using inefficient spot generators, which add to overall fuel consumption.

Secondly, energy consumption by base camp assets and the overall efficiency of those assets must be considered in the context of the mission and corresponding logistics support requirements. For example, tents tend to be used for many temporary base camp facilities just for portability.

However, tents are very inefficient insulators. At more enduring locations—especially in environments with extreme weather conditions—more highly insulated shelter capabilities should be considered.

The third factor involves the distance and vulnerability of the lines of communication. Often, fuel must be delivered across long distances under dangerous circumstances. In fiscal year 2007, more than 6,000 convoys supplied fuel to forward-stationed U.S. forces in Afghanistan and Iraq. Therefore, capacity, duration, performance, distance, and operating tempo must be considered when developing a comprehensive plan.

To address these operational challenges, as well as quality of life concerns, Area Support Group–Kuwait and the Logistics Innovation Agency implemented energy efficiency improvements in Kuwait as a proof of principle.

Completed in July of 2017, the KEEP effort included four key focus areas:

- Replacing selected billeting tents with energy efficient, rigid-wall shelters.
- Improving prime power operations.
- Improving power distribution.
- Collecting and analyzing energy consumption data.

While KEEP capabilities were implemented only at one base camp, similar energy efficiency capabilities and savings could be realized at other camps. In the end, with prudent planning and the use of energy resources, missions can be extended and logistics demand can be reduced. This article will examine the technologies used to improve operational energy.

Energy Efficient Shelters

Temporary base camps within harsh desert environments tend to have large energy footprints that rely on the use of thermally inefficient shelters, such as tents and other un-insulated facilities. Not surprisingly, a study at a Kuwait base camp found that housing was the largest consumer of energy.

Hence, the first priority was to replace selected billeting tents with energy efficient, relocatable shelters. The KEEP insulated shelters incorporated right-sized efficient heating and air conditioning units, LED lighting, and smart thermostats.

Based on energy consumption data, the shelters used about 78 per-

cent less energy compared to the tents they replaced. In addition, the one-story shelters were fitted with solar panels on the roof. When factoring in the power generated through the solar panels to help satisfy requirements at the point of need, the actual energy savings were even greater. (See figure 1.)

Analysis confirmed that replacing tents with energy efficient shelters at larger and more enduring base camps can significantly reduce energy consumption and improve quality of life.

In more tactical and mobile settings, it may be necessary to reduce the weight and volume of the shelters to allow for easier transport, which could result in less insulated and less energy efficient shelters or in higher costs to incorporate more efficient alternative insulation options.

Power Improvements

Similar to what is found at U.S. facilities, centralized power delivery over an electrical grid is the most energy efficient means of meeting power requirements. Consequently, it is usually desirable from an energy savings perspective to leverage a host nation's

power infrastructure in conjunction with a local power backup capability.

However, many base camps generate power locally using a combination of centralized power and point-of-need spot generation. The decision to generate power locally is normally dictated by a number of operational and technical factors such as the size of the camp, mobility requirements, mission duration, electrical standards, availability of power, and security considerations.

The KEEP project focused on local power generation and distribution. The analysis showed that both centralized and spot generators were oversized and underutilized.

To save energy, the KEEP team recommended and helped to implement a policy change that increased the central generators' utilization rates from 60 to 70 percent, which resulted in more efficient use of existing generators. This simple policy change saved approximately 60,000 gallons of fuel per year. Additionally, the team assisted with automating the power plant's controls, which eliminated the need to manually turn the generators on and off.

In other areas at the camp, the

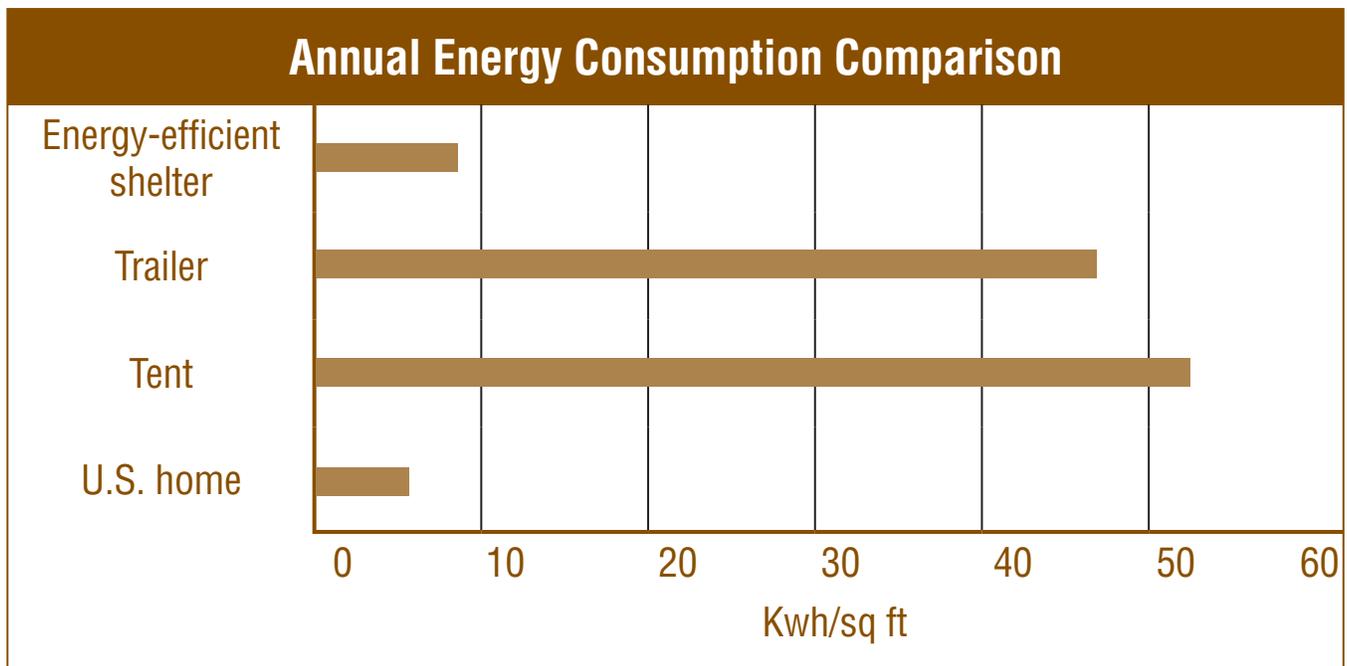
KEEP team found grossly oversized and underused spot generators. Analysis showed that by eliminating as many of these generators as possible, and by resizing the remaining generators to better match the load, additional efficiencies could be obtained.

Accordingly, the team developed a long-range plan to eliminate spot generators, which could save more than a million gallons of fuel per year. Further savings could also be made by expanding centralized power capabilities or by leveraging local microgrids.

Even though eliminating or resizing spot generators (which are always on) can result in significant energy savings, care should be taken to understand the seasonal variation of energy loads. For instance, one of the most significant sources of energy consumption in a desert environment is the power needed to run air conditioning units.

In general, the KEEP team's data indicated that air conditioning units consume approximately 60 to 70 percent of the overall energy used by billeting assets in summer months. The end result is that the power requirements for summer months in desert

Figure 1. This chart compares data from the U.S. Energy Information Administration's 2011 energy consumption data, 2010 U.S. Census data based on average home square footage, and energy consumption data collected in Kuwait.



climates can be twice as large as the power needed for winter months.

So, when right-sizing power generation and distribution, it is important to understand that seasonal and other variations in power and unintended consequences such as power outages

carefully since many commercial meters cannot withstand desert conditions. Another consideration is the onboard meter data storage and associated capabilities to store and forward data automatically.

The KEEP team decided to auto-

Published in May 2015, The Army Energy Security Sustainability Strategy (available at <https://www.army.mil/e2/c/downloads/394128.pdf>) outlines the Army's goals for optimizing energy use, ensuring access to energy, building resiliency, and driving

Gaining knowledge in relation to how power is used over time and across mission profiles is a critical factor in supporting future mission planning within complex and demanding operational environments.

could occur. Gaining knowledge in relation to how power is used over time and across mission profiles is a critical factor in supporting future mission planning within complex and demanding operational environments.

Energy Consumption Data

Unlike at U.S. facilities, very few energy meters are used at base camps outside the continental United States. This is due to a lack of policy requiring energy meters and the temporary nature of the camps.

For the KEEP project, the team successfully metered billeting tents, trailers, and energy efficient shelters. Capturing energy consumption data was necessary for measuring energy savings, gaining knowledge of the loads based on the type and size of assets, assisting with the proper sizing of generators, and supporting decision-making.

In the future, it would be worthwhile to periodically capture energy consumption data on a sample set of facilities. Doing so would further contribute to the knowledge of electrical loads and the effectiveness of energy saving efforts.

In particular, metering showed that using relocatable shelters resulted in greater than 70 percent energy savings per square foot when compared to smaller, uninsulated tents. It also showed that power consumption varies considerably based on the season.

Because of the extreme conditions in Kuwait, temperature specifications of the meters should be considered

mate meter data reporting and ensured that the meters had enough memory to hold data for over six months in case data could not be downloaded on a regular basis.

Other Potential Improvements

In addition to the KEEP efforts, many other energy reduction opportunities exist. These include emphasizing conservation efforts, encouraging commercial industry to propose novel solutions, making more extensive use of solar shading, improving insulation levels at existing facilities, and fine-tuning electrical impedance to maximize power transfer, which is commonly referred to as power factor correction.

Although power factor corrections were not implemented as part of KEEP, calculations showed that correcting the power factor at substations would result in overall energy savings of 1 to 1.5 percent and reduce the stress on the distribution system. Additionally, more extensive use of renewable energy sources could further reduce the need to transport fuel and improve the energy security posture.

Of note, the KEEP project used photovoltaics to supplement energy production for one-story shelters, which resulted in an additional 41 percent energy savings. Although this was implemented only in the one-story billeting shelters, the data clearly indicates that more extensive use of photovoltaic energy sources shows great promise for energy production in the desert.

innovation. The KEEP effort is consistent with these goals.

Results from this project are helping inform the development of future capabilities that will meet the energy demands of the future operational environment. Specifically, the Army captured and analyzed energy consumption data and implemented technologies to improve energy efficiency, quality of life, and the operational energy security posture within a base camp.

Continuing to make advances in the areas of demand reduction and point-of-need satisfaction are central to minimizing requirements for external sustainment support. A continued focus on energy efficiency and alternative and flexible sources of energy will help support lengthening a brigade combat team's days of supply in order to increase maneuverability and mobility.

Implementing more effective energy management and introducing new power and energy processes and technologies will undoubtedly improve the Army's ability to support future multi-domain operations.

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Staff Visits as a Tool for Security Force Assistance

Staff assistance visits can help deploying units frame problems in a foreign institutional environment.

■ By Capt. Denny Luong

In a garrison environment, inspections and staff visits are a regular part of conducting business for an Army headquarters staff. These visits serve as internal measurements of a unit's compliance with Army standards and help commanders make better decisions in executing their duties. In a security force assistance (SFA) environment, inspections and staff visits are also valuable tools for training and mentoring foreign forces.

The 101st Airborne Division (Air Assault) Sustainment Brigade, also known as "Lifeliners," demonstrated this capability when it sent a four-man advisory team to the Democratic Republic of the Congo (DRC) National Logistics School from April to August 2017. The rotation's purpose was to increase the school's ability to develop DRC logistics officers and soldiers at the institutional level.

This article examines how the advisory team applied the principles and elements of a staff assistance visit to an SFA mission to identify issues and measure performance at the DRC National Logistics School. This process created a shared understanding among U.S. forces, interagency partners, and host-nation forces. This shared understanding later enabled the team to execute its corrective training with the full support of the project participants.

Background

In late 2014, U.S. Army Africa and the Department of State started an initiative to professionalize

the DRC National Logistics School. The project's purpose was to help the DRC create technically competent logisticians to fill positions across its armed forces. This initiative was part of African Horizons, a series of SFA missions that took place across the African continent.

Initially spearheaded by the Army Logistics University, the mission relied on regionally aligned forces to provide institutional logistics advisory teams (ILATs). The 101st Airborne Division Sustainment Brigade was the third regionally aligned force to send ILATs in support of African Horizons.

Inspection Principles

The Lifeliners' ILAT that was deployed in 2017 was tasked with teaching and mentoring the school's staff on instructor-centered planning and assessment programs. This was part of the Department of State and U.S. Army Africa's requirements to build the technical competence of the school's staff members.

The ILAT conducted the mission as a staff assistance visit to serve two functions: to generate baseline statistics about the school's operations and to demonstrate the benefits gained by implementing an assessment program for the school's staff. These functions aligned with the principles of any Army inspection or staff assistance visit.

Army Regulation 1-201, Army Inspection Policy, lists five principles of an inspection (or staff assistance visit):

- Purposeful.
- Coordinated.
- Focused on feedback.
- Instructive.
- Followed-up.

Purposeful. Inspections should be performance-oriented events tailored to the specific organization. Because the objective partially relied on implementing an assessment program for the logistics school, the inspection format became the model for the school's staff to emulate.

The challenge was finding the right measures of performance. The team sought measures of performance matching the school's goal of becoming a regional logistics center of excellence. Therefore, the team opted to grade the instructors on their logistics knowledge and teaching ability. This focus on instructor-level competencies formed the frame of the new assessment program.

Coordinated. The inspection plan complemented other agencies' efforts to measure performance at the school whenever possible. While avoiding duplication of effort, the team found that assisting other agencies helped its own execution as well.

For example, the ILAT included additional criteria for evaluation at the request of the Department of State's logistics advisors. So the team identified more problem areas, such as lesson plan development and planned follow-on training. This helped the team form a more holistic training package for the school and helped the Department of State

advisors with their information requirements.

Focused on feedback. The inspection generated a report that outlined the school's strengths and weaknesses to the project's participants, including the logistics school staff and Department of State personnel.

The team presented its results as numerical scores when possible to quantify the results. For example, the team's rubric outlined a grading scheme in which the highest score attainable was a 3 and the lowest was a 0. The average of the instructors' individual assessments made up the

school's overall rating in a particular category.

The team found that by presenting numerical scores, the host-nation forces understood the results better than when they were given verbal descriptions with meanings that could be lost in translation.

Instructive. The team used its initial assessment as both a demonstration of the desired end state and a staff visit. The school's command saw the potential uses firsthand rather than receiving an explanation from the team.

The advisors also conducted class-

es examining the evaluated criteria in further detail and retrained the school's cadre on their weakest areas. For example, while the school's instructors earned high marks overall on logistics knowledge and answered questions clearly, the team assisted in topics such as course planning and visual aid creation. The resulting improvements in those areas balanced the school's existing strengths.

Followed-up. Both the inspected and inspecting units must develop and execute plans to correct deficiencies and then conduct follow-up inspections.

Sgt. Fredrick Stone assists Capt. Nkie Mboranda with lesson planning at the Democratic Republic of the Congo National Logistics School's computer lab on June 22, 2017. (Photo by Capt. Denny Luong)



For example, after learning to conduct internal assessments of its own instructors, the DRC National Logistics School staff executed follow-on assessments under the supervision of U.S. advisors to ensure the staff met the new standards. This function validated the new inspector teams as proficient in their duties and served as a measure of progress for the school overall.

Standardized Procedures

While the principles of the inspection outlined why the staff assistance visit format was critical to the logistics school mission, the elements of the inspection dictated how the team accomplished its duties.

Army Regulation 1-201 lists these basic elements of an inspection (or staff assistance visit):

- Measure performance against a standard.
- Determine the magnitude of the problem(s).
- Seek the root cause of the problem(s).
- Determine a solution.
- Assign responsibility to the appropriate individuals or agencies.

Measure performance against a standard. The focus of any inspection must be on measuring compliance against established standards. In garrison operations, units may use published Army guidelines. In an SFA or multinational training scenario, however, which standard to use may be less obvious. Therefore, the need for consensus on an objective standard is an essential task prior to carrying out any inspection.

The host-nation forces naturally did not operate on U.S. Army guidelines and, furthermore, lacked standards for areas such as quality control of instructor curricula, which presented an immediate challenge. The advisory team reached back to the Training and Doctrine Command to obtain standards and guidance based on publications by international sources. The international na-

ture of these standards bridged the gap between the U.S. system and the French/Belgian system that the Congolese military used.

Determine the magnitude of the problem. Determining the relative importance of particular issues required continual and candid conversations with DRC National Logistics School personnel. During this process, the team incorporated the feedback and guidance of the host nation in order to maintain their support of the project. The results of these discussions helped the team prioritize areas in which corrective training could make the most impact on the school's readiness to train logisticians.

Seek the root cause of the problem. While the numerical scores provided a solid marker of progress, they did not explain the reasons why the school was strong or weak in certain areas. As with the previous element, this required in-depth conversations with host-nation forces in order to separate issues that could be resolved at the school level from issues that required higher echelon assistance.

Further investigation uncovered deeper issues in the area of vehicle maintenance. During the inspection, the ILAT identified shortages in maintenance schedules and services as well as safety issues in the vehicle bays. The team verified that the maintenance teams were competent in their fields and further inquiry found that the actual issue was a systematic problem nested within the DRC national supply system and funding sources. This meant that the problem was beyond the capability of the school itself to resolve.

Determine a solution. The focus of determining solutions for identified issues is to ensure that those solutions are successful over the long term. While the team did create measurable progress in areas such as instructor competency and planning schedules through direct training, the more important aspect was helping the host nation create systems that would allow them to perform the tasks themselves.

For system-wide gaps, the team forwarded the concerns to U.S. Army Africa and the Department of State. In this case, the solution came in the form of contracted maintenance assistance while the logistics school's higher echelons worked to resolve the issues internally.

Assign responsibility to the appropriate individuals or agencies. The team took a hybrid approach to assigning responsibility. While the self-assigned instructor training plan did address the weak areas found in evaluations, the team focused on creating an internal team of inspectors that could perform the same tasks and mentor their peers in the process. This laid the foundation for the host-nation military to assume responsibility for training its own personnel and allowed follow-on regionally aligned forces teams to check progress in later rotations.

Shared Understanding

Successful employment of the principles and elements of inspections allows visiting staff sections to create shared understanding among the inspecting and inspected units. This support and agreement on the recommended course of action ultimately benefits the Army as a whole. This tenet also applies to SFA missions.

Within the DRC National Logistics School, the shared understanding eventually came from cross-communication and sharing information among foreign partners and U.S. agencies, each of which had its own goals and procedures.

In general, the team executed its plan when all parties concurred on the recommended courses of action. The key aspect of this was taking the time to build a supportive dialogue not only with host nation forces but also among U.S. elements in the country.

One overarching theme the team noticed while working alongside Department of State representatives was the overlap of information and execution requirements between agencies.



Sgt. 1st Class Terry Jones conducts a demonstration course on maintenance shop safety for cadre of the Democratic Republic of the Congo National Logistics School on June 28, 2017. (Photo by Capt. Denny Luong)

They consolidated all requirements into one reporting format, simplifying the flow of information.

This focus on consolidated reporting also extended to the ILAT's reports to DRC personnel, who received translated but otherwise identical briefings. Upon receiving clearance from the logistics school command, the advisors trained their DRC counterparts using translated documentation and standards. By working side-by-side with host-nation forces in this manner, the team was better able to guide actions and implement the corrective measures previously recommended.

As the Army continues building more SFA brigades, missions like the Lifeliners' mission at the DRC Na-

tional Logistics School will become more commonplace. With the increase in workload comes a pressing need to ensure progression in Army objectives over time.

Inspections and staff assistance visits offer a systematic way to look at foreign units' progression or performance. The end state for a staff assistance visit to an SFA environment, therefore, is the same as a staff assistance visit conducted stateside. Such visits offer an invaluable way to achieve shared understanding among U.S. and partner nations about what the mutual goals should be.

The Lifeliners' mission in the DRC served as a successful case study of a way to accomplish this shared understanding and obtain the support needed to execute the mission. Al-

though it is not the only method, other units could benefit from incorporating the staff assistance visit model into their mission planning.

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The author thanks fellow logistics advisory team members Chief Warrant Officer 3 Glendia Williams, Sgt. 1st Class Terry Jones, and Sgt. Fredrick Stone for their contributions to this article.

A Shop Stock Optimization System

Having a carefully managed shop stock list can reduce customer wait time and decrease the number of days that key equipment is not mission capable.

■ By Maj. Justin L. Darnell

The Army Materiel Command's common authorized stockage list (ASL) cultivates equipment readiness by ensuring that high-demand repair parts are stocked for armored brigade combat teams (BCTs), Stryker BCTs, and infantry BCTs. However, a BCT can shape and influence its own equipment readiness through the optimization of the unit-controlled shop stock list. Stocking critical, highly used, non-ASL repair parts at the unit level builds equipment readiness, reduces not mission capable (NMC) time, and shortens customer wait times.

Bench Stock and Shop Stock

Two types of maintenance-related supplies are authorized to be on hand in support-level maintenance activities: bench stocks, which are unpredictably used consumables, and shop stocks, which are demand-supported stocks.

Bench stocks are low-cost, high-use, consumable supply classes II (clothing and equipment), III P (packaged petroleum, oils, and lubricants), IV (construction materials), and IX (repair parts) items (less components) used by maintenance personnel at an unpredictable rate. Bench stocks consist of common hardware, nuts, bolts, washers, capacitors, wire, tubing, hoses, ropes, webbing, thread, welding rods, sandpaper, gasket material, sheet metal, seals, oils, grease, and repair kits.

In a decisive action operational environment, brigade support areas, field trains command posts, and combat trains command posts must have the ability to rapidly pack up

and displace to a new area of operations. Considering the requirement for bench stocks to be highly transportable, a unit can order a small-parts storage box (national stock number [NSN] 8115-00-663-0212) or two transport and storage cases (NSN 8115-00-663-0213).

The first case has 64 plastic drawers that are 3x3x5 inches each. The second case has 24 plastic drawers; 16 are 6x2x5 inches, and the remaining eight are 6x4x5 inches. All the drawers contain dividers and a slot for inserting a label.

Shop stocks, on the other hand, are demand-supported repair parts and consumables stocked within a maintenance activity with a maintenance mission authorized by a modified table of organization and equipment, table of distribution and allowances, or joint table of allowances.

Units must also consider requirements associated with the shop stock they choose to keep on hand. Such requirements include storing, transporting, and safeguarding the items in multi-domain or decisive action operational environments. For example, the Joint Readiness Training Center requires that units be able to transport their shop stock in a single lift using organic transportation assets.

A System to Optimize Readiness

Units can implement a shop stock management system to optimize equipment readiness. First, a unit should conduct a deliberate inventory of all shop stock to ensure information is correctly put into the Global Combat Support System-

Army (GCSS-Army) so that personnel can rapidly locate on-hand parts to reduce NMC time.

Then the unit should pull demand history for specific storage locations (SLOCs) over a specified period of time. In GCSS-Army, personnel should use transaction code ZPROSTAT, which is the open status report. Once the data is exported to a spreadsheet, the data should be sorted to find the highest demand items across the organization, and that list should be cross-referenced against the BCT's ASL to produce a list of recommended items to stock on the shelf at the unit motor pool.

To gain greater context and make a well-informed decision regarding which NSNs to stock at the unit level, units should coordinate with the Army Materiel Systems Analysis Activity (AMSAA) to determine Army-wide demand history over the past 365 days for a particular end item.

AMSAA can provide a recommended shop stock list based on the number of dead-lining faults for a particular NSN and a unit's vehicle density. Given the constraints and limitations associated with shop stocks, units should consider the prioritization of its shop stock based on the unit's demand history and AMSAA's observations of Army-wide demand.

After completing the analysis to determine which NSNs to stock on the shelf, a unit can forecast budgeting requirements to purchase the repair parts and place the desired NSNs on order. Units can consider turning on the automatic reorder point in GCSS-Army to replenish



Chief Warrant Officer 2 Michael Beeman, the 210th Brigade Support Battalion maintenance technician, shows Thomas Franzeen, a brigade logistics support team logistics management specialist, how his shop stock is organized to maintain equipment readiness during a Joint Readiness Training Center rotation at Fort Polk, La., on June 14, 2018. (Photo by Maj. Justin Darnell)

shop stock items consumed in daily maintenance activities.

Leverage Other Organizations

A unit can leverage other organizations' shop stocks to reduce NMC days. A unit should ensure its maintainers are trained to use transaction code MMBE (stock overview) and can create a variant with all the SLOCs in the BCT to gain asset visibility for a particular NSN.

Maintenance personnel can pull the SLOCs of adjacent units on its installation to rapidly query their shop stocks when locating a needed repair part by using transaction code ZSPTX, which is the display organi-

zation/force element table.

Once in ZSPTX, a unit can enter the routing identifier code of other supply support activities on the installation. Once the report is executed, GCSS-Army will generate the list of SLOCs associated with that supply support activity. The SLOCs should then be pasted into MMBE, and a unit will have asset visibility of a particular NSN in an adjacent BCT's shop stock.

An optimized and carefully managed shop stock list can significantly reduce customer wait time and decrease the number of days that key equipment is NMC. Stocking the right parts fills in gaps not covered by

the common ASL and enables BCTs to be ready to "fight tonight."

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Army Field Hospitals and Expeditionary Hospitalization

To meet the demands of Multi-Domain Battle, the Army is changing combat support hospitals into field hospitals that provide expeditionary health service support and hospitalization.

■ By Lt. Col. Michael F. LaBrecque and Capt. Michael A. Honsberger

Army Role 3 medical care has not changed since combat support hospitals (CSHs) replaced mobile surgical Army hospitals and evacuation hospitals during the Vietnam War. But as warfare evolves and adversaries seek to exploit perceived weaknesses, the Army is adapting to develop solutions to improve casualty care as far forward on the battlefield as possible.

The emergence of near-peer competitors who pose a significant threat to the United States and its allies has led to development of the Multi-Domain Battle (MDB) operating concept. Today, armed conflict with near-peer adversaries will challenge our assertions and alter our response within the operational environment as described in the MDB concept. This concept highlights the need for expeditionary capabilities that the Army must possess and leverage across the contested domains of air, land, sea, space, and cyberspace.

As the Army adapts to operating in this new environment, the Army Medical Department (AMEDD) has adapted to provide better expeditionary Army Health System (AHS) support. Under the new construct, the joint medical force can conduct expeditionary health service support (HSS), including early-entry hospitalization, rapidly employable resuscitation, and surgery, to increase personnel survivability during cross-domain and semi-independent operations.

In 2017, AMEDD began transforming CSHs into field hospitals in

order to provide expeditionary HSS and hospitalization. The new Role 3 hospital structure rectifies major deficiencies in the CSH with revisions to organizational design, medical and surgical capabilities, and the ability to perform split or geographically dispersed operations.

AMEDD also designed the field hospitals to have the capacity to serve a similar role as NATO's Role 2 enhanced (Role 2E) facility, the Air Force's expeditionary medical support system (EMEDS), and the Navy's expeditionary medical units, which are critical to supporting our joint partners and allies.

Today's CSH

CSHs provide essential care within an area of operations (AO) by treating and returning to duty patients who can be treated within the theater evacuation policy. It serves a critical function in stabilizing and evacuating those patients who require definitive, convalescent, and rehabilitative care at a Role 4, such as Landstuhl Regional Medical Center in Germany or a stateside medical treatment facility.

The CSH capabilities include triage and emergency care, outpatient services, inpatient care, pharmacy, clinical laboratory, blood banking, radiology, physical therapy, medical logistics, operational dental care (emergency and essential dental care), oral and maxillofacial surgery, nutrition care, and patient administration services.

CSHs have a hospital company A

with 164 beds and hospital company B with 84 beds that, when combined, form a 248-bed Role 3 hospital. The hospital company B can serve as an early-entry hospitalization element (EEH) using 44 of its 84 beds with a follow-on hospitalization augmentation element using the remaining 40 beds. This enables CSHs to conduct split-based operations using the 164-bed and 84-bed hospital facilities to provide HSS and hospitalization in separate locations.

Although a CSH can conduct operations in more than two locations, it requires using a variety of deployment manning documents, requests for forces, and requests for augmentation to add the personnel needed to operate in multiple locations.

Tomorrow's Field Hospital

The field hospital's enhanced organizational design and collective medical and surgical capabilities are products of numerous capability development process reviews. A field hospital's design enhances flexibility and provides the requisite medical capabilities to support the Army's goal of developing a versatile, agile, and expeditionary medical force.

The field hospital is a modular medical treatment facility designed to provide Role 3 medical capability in a tailored organizational structure to support the Army's varied unified land operational missions. The organizational design allows the field hospital to support the Army's requirement to conduct a mix of offensive, defensive, stability, and defense

support of civil authorities operations simultaneously in a variety of scenarios.

Both the CSH and field hospital provide essential care within the theater evacuation policy to either return the patient to duty or stabilize the patient for evacuation to a definitive care facility outside the AO.

Field hospitals differ from CSHs because one or more medical detachments augment the field hospital to increase its capability to provide HSS for maneuver forces within the AO. Enhanced mission command and communications capabilities have improved the field hospital's versatility and agility. The augmentation detachments have specific clinical specialties that can adapt to better support an assigned mission.

The transformation from the CSH to the field hospital will ensure that the new Role 3 can operate effectively in the multiple operational en-

vironments described in the MDB concept. The field hospital's expeditionary resources are provided by establishing the initial hospitalization capabilities with the hospital center and 32-bed Role 3 hospital, as opposed to deploying the CSH medical mission command detachment and the 44-bed EEH.

The field hospital gains additional medical and surgical capabilities when it adds its hospital augmentation detachments. The hospital augmentation detachments expand the 32-bed field hospital to 148 beds. This modular and augmented organization allows commanders to tailor medical forces in support of maneuver forces, match capabilities and medical specialties to the supported population, and meet the clinical challenges presented.

The end state once all field hospital units are deployed forward is to provide HSS and hospitalization

with a 240-bed hospital; the hospital center provides medical mission command with up to two field hospitals (32-bed), one medical detachment surgical (24-bed), two medical detachment intensive care units (32-bed), and one medical detachment intensive care ward (60-bed).

The Army Health System

The AHS is a complex system of systems that is divided into 10 medical functions that align with medical disciplines and scientific knowledge. These systems are interrelated and interdependent and must be synchronized in order to reduce casualties from disease, non-battle injuries, and battle-related injuries and to maximize patient outcome. The field hospital provides medical mission command and hospitalization in a unique manner that demonstrates how it has transformed from a CSH.

Medical mission command. The

The 10th Field Hospital, 627th Hospital Center, is set up at Forward Operating Base Warrior at Fort Polk, La., on Nov. 2, 2017. (Photo by Scott Gibson)





The 212th Combat Support Hospital trains in a 34-bed field hospital during the Guard-Ex Field Training Exercise in Landstuhl, Germany, on Nov. 7, 2017. (Photo by Oliver Sommer)

hospital center provides mission command for up to two functioning, split field hospitals (32-bed) by serving as a regimental headquarters in a contingency theater. The hospital center command section provides mission command for elements of the hospital and provides AHS planning support within the hospital AO.

The command section provides advice to the supported tactical commander on the health of the command and provides medical surveillance activities within the AO. Command and staff personnel provide supervision and coordination of administrative, logistics, operational, medical, surgical, nursing, and hospital ministry services.

Hospitalization. Theater hospitalization capability is one of the five overarching joint medical capabilities for HSS that the field hospital

provides. The field hospital can also provide first responder care, forward resuscitative care, definitive care with augmentation, and en route capability, but its primary function is to provide hospitalization support on the battlefield.

Hospitalization provides definitive medical care for Soldiers capable of returning to duty and essential care for patients who must be stabilized for medical evacuation out of the area of operations.

Field hospitals provide hospitalization not only as a primary task but also as a medical function. The hospitalization medical function includes forward resuscitative surgery, respiratory care, clinical laboratory services, blood bank, radiological services, pharmacy support, nutritional care, patient administration, optometry, physical therapy, and preventive medicine.

Expeditionary Hospitalization

Joint doctrine defines an expeditionary medical facility (EMF) as a standardized, modular, flexible combat capability that provides health services to an advanced base environment throughout the full range of military operations. It is designed in multiple configurations to support a wide spectrum of military health support. The Air Force, Navy, and Army all have EMFs that provide expeditionary HSS and hospitalization, which are in line with the MDB concept.

The Air Force's EMEDS unit provides individual bed-down and theater-level medical services for deployed forces or select population groups. The unit's primary mission is to provide forward stabilization, resuscitative care, primary care, dental services, and force health protection. It also prepares casualties for evacua-

tion to the next level of care.

The EMEDS has a similar modular and scalable design as the Army field hospital, and it allows the Air Force to deploy medical capabilities ranging from a small team that provides highly skilled medical care for a limited number of casualties to a large medical system that can provide specialized care to more than 6,500 people. The EMEDS can grow to a full Air Force theater hospital by incrementally building its capabilities.

Navy EMFs, depending on their size, can provide theater hospitalization capability, but they have a large footprint. The Navy's expeditionary medical unit-10 is a stand-alone 10-bed facility capable of being transported by air or vehicle for rapid response to foreign humanitarian assistance missions or immediate short-duration surgical support.

Because of the size of some EMF platforms, significant logistics support is required to relocate these assets once assembly and activation have occurred. The Army field hospital has a similar limitation; once it is established, it is difficult to break down, repack, and prepare for movement as military operations move farther away. The unit's organic vehicles can transport 35 percent of the field hospital equipment in a single lift with some personnel augmentation.

The Army's first field hospital, the 10th Field Hospital (formerly 10th CSH), mitigated this limitation by designing a non-doctrinal EEH that would use the first lift (35 percent) to rapidly establish an EMF capable of providing expeditionary hospitalization (4-bed), forward resuscitative surgery, damage control surgery (2-bed), and limited ancillary services.

The EEH (6-bed) is not a Role 3 but functions as a Role 2E that provides basic secondary health care built around primary surgery, intensive care, and ward beds. The Role 2E can stabilize post-surgical cases for evacuation to Role 4 without the requirement to first route patients through a higher Role 3 facility. The 10th Field Hospital's EEH essential-

ly serves as a medical quartering party that sets the conditions for follow-on Role 3 support in the AO once the remaining 26-bed hospital personnel and equipment arrive and establish the full 32-bed field hospital.

Proof of Concept

The 627th Hospital Center and the 10th Field Hospital, 1st Medical Brigade, demonstrated the capabilities of the new 32-bed field hospital during their inaugural decisive action training environment rotation at the Joint Readiness Training Center in November 2017. The units successfully deployed from their home station at Fort Carson, Colorado, to Fort Polk, Louisiana, and established Role 3 AHS support within 72 hours.

The 10th Field Hospital provided hospitalization and HSS to the 2nd Battalion, 4th Infantry Brigade Combat Team, during the 14-day exercise through all operational phases. The unit received 52 casualties from lower echelons of care including the brigade support medical company Role 2 and from the division-level ambulance exchange point on its first day receiving casualties from the forward line of troops.

Overall, the Role 3 received 242 casualties over seven days with a died of wounds (DOW) rate of 5 percent. Evacuation delay from lower echelons of care was the primary reason for 82 percent of the DOW (9 patients) during the rotation. The DOW rate dropped significantly to 3 percent when a patient successfully progressed through echelons of care.

The 10th Field Hospital EEH demonstrated its ability to operate independently of the 26-bed hospital during the last three days of the rotation. The 10th Field Hospital commander deployed the EEH (6-bed) into the combat sustainment support battalion logistics support area and established a Role 2E to support offensive operations forward.

The Role 2E performed exceptionally well. It treated more than 50 casualties in 72 hours and demonstrated the proof of concept that a

Role 2E is not dependent on a Role 3 to stabilize and evacuate patients from an AO. The Role 3 did not receive any patients during the last three days because they were treated far forward by the EEH (6-bed) at the logistics support area.

The Army field hospital demonstrates that it can serve as a Role 3 and provide expeditionary HSS and hospitalization in future operational environments as described in the MDB concept. Conflict with near-peer adversaries will result in higher casualty estimates requiring robust Army health services far forward on the battlefield to reduce Soldier mortality.

AMEDD continues to provide superior AHS support to maneuver units by transforming the remaining CSHs into the modular and expeditionary field hospitals through fiscal year 2019. Future field hospitals will build on the 10th Field Hospital's success and demonstrate their unique abilities and capabilities through rigorous decisive action training environments provided by the combat training centers.

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New Wonder Material Makes Salt Water Potable

The military could provide troops with clean drinking water using a new material called graphene and purification systems that it already owns.

■ By Maj. Jamie Schwandt

What is the one thing that we all need to survive? What is also the most important asset required for winning any conflict? It is not a weapon system or even a bomb. Undeniably, that asset is potable water.

The human body is approximately 60 percent water, and it needs water for cells, tissues, and organs to live. Water is also needed to neutralize chemical, biological, radiological, and nuclear threats.

Considering that 70 percent of Earth's surface is covered by ocean, you would think we would have more than enough water. However, only 2.5 percent of all water on Earth is fresh water, leaving approximately 97.5 percent as undrinkable salt water. Essentially, our most important asset is scarce, and the military should pursue technology to take advantage of Earth's abundant salt water.

Transporting Bottled Water

During a 2016 study, researchers at the Homeland Defense and Security Information Analysis Center found that the Department of Defense spends more than \$500,000 per day transporting and supplying bottled water for 20,000 troops. In fact, just transporting bottled water is a huge threat; enemy combatants regularly target supply convoys.

Although its primary method of providing potable water to troops appears to be transporting bottled water, the Army does have water purification systems. The Army uses semimobile water purification sys-

tems that can be transported by military vehicle. But its largest system, the reverse osmosis water purification unit, uses diesel generators and vast amounts of energy and resources.

According to the Homeland Defense and Security Information Analysis Center study, the smaller semimobile systems (the lightweight water purification system and tactical water purification system) can remove a variety of contaminants, but they lack the ability to remove sodium.

Researchers found that only one system in the U.S. military has high levels of both filtration and mobility: the Marine Corps' small unit water purifier. However, they found that its intricate system housing makes fielding problematic.

Wonder Material

Our planet provides an abundance of water, yet the military is not using technology to take advantage of it. The military should adopt existing technology to make use of sea water. A new wonder material called graphene is capable of turning deadly salt water into potable water. Graphene is an exceptionally flexible and thin material currently being used for a wide range of purposes.

A 2011 study from the American Chemical Society discussed how graphene could be used to speed up the differentiation of human mesenchymal stem cells, which develop human tissue. It is also being used for (or studied for) display screens, medical and chemical enhancements, so-

lar cells, and many other applications.

Graphene is one of the strongest materials ever discovered. It is an extremely thin sheet of carbon consisting of a single layer of carbon atoms positioned in a hexagonal pattern similar to a honeycomb. It also has the potential to effectively and efficiently purify salt water.

Water Purification Process

The primary technique to purify water is desalination through reverse osmosis. In normal osmosis, water flows across a membrane from areas of low sodium to areas of higher sodium. Conversely, reverse osmosis takes place when salt water is pressurized and forced to go in a direction it does not normally go. It is forced through special membranes in order to isolate the water from the sodium. This process works, but it is inefficient, energy-dependent, and expensive.

The military's water purification systems depend on filters. Graphene would be useful as a filter and would improve efficiency, specifically for the military's portable systems. Graphene filters are essentially nanoparticle filters. In a 2017 *Nature.com* article, "Graphene membranes for water desalination," Shahin Homaeigohar and Mady Elbahri report that carbon nanoparticles are lightweight, abundant, and inexpensive. Graphene filters would remove pollutants, salts, and other harmful chemicals while allowing water to pass through.

If the military were to adopt graphene filters, its water purification systems could be both mobile



Soldiers from the 209th Aviation Support Battalion, 25th Combat Aviation Brigade, assemble a water pump while training on the tactical water purification system on Feb. 27, 2018, near Dillingham Airfield, Hawaii. (Photo by Sgt. Ian Ives)

and efficient. A completely new system would not be required because graphene filters could be incorporated into existing systems.

3-D Printed Filters

If the military decides to use graphene filters in its water purification systems, then it should also use 3-D printing technology (also known as additive manufacturing) to make the filters. Massachusetts Institute of Technology researchers have used graphene to print 3-D objects. They have discovered that graphene has 10 times the strength of steel but is extremely lightweight; graphene is only one atom thick. They also found that 3-D printers can use graphene to print water purification devices.

Additive manufacturing has been around for quite a while now, but the

military has not taken full advantage of it. With 3-D printing technology becoming cheaper every year, it is time to fully adopt this technology because it offers immediate and long-term benefits.

Specifically, 3-D printing lessens the need to keep large inventories of materiel, greatly reduces shipping costs, can create stronger and more complex items, and can deliver items to customers much faster than normal processes can. In essence, 3-D printing sets the conditions for success for the military by ensuring freedom of maneuver, extending operational reach, and prolonging endurance for military operations.

Using 3-D printers and graphene, the U.S. military could print technologically advanced water purification

system filters to make use of Earth's abundant salt water. This would save the military both money and possibly some lives. This technology could significantly reduce the need to send convoys to carry bottled water to troops, which would reduce convoy attacks and protect logisticians. Most importantly, this technology provides the military with immediate access to the most essential resource in existence: clean fresh water.

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The Forgotten Sustainer

■ By Maj. Carson Jump

The unit ministry team (UMT) waited, ready to brief the concept of religious support at the meticulously crafted terrain model, which was set up for a combined arms and sustainment rehearsal. This was the one opportunity the UMT had to outline for the brigade and battalion command teams the details of the religious support plan for the following day's mission. Unfortunately, because leaders failed to see it as part of the sustainment warfighting function, the UMT was overlooked during the rehearsal and missed its opportunity to brief the command teams.

The UMT is made up of chaplains and religious affairs specialists and noncommissioned officers. It is an integral team of advisors to the command on religion, ethics, and morale in the formation. UMTs often struggle with balancing their role of providing religious support to Soldiers and being religious support advisors to their command teams. This struggle is a trend I observed as an observer-coach/trainer at 25 decisive action rotations at the Joint Multinational Readiness Center.

The role of UMT personnel calls for their distinction from traditional sustainers, but this distinction does not warrant exclusion from the sustainment warfighting function. This article intends to help UMT personnel realize this crucial identity and enable leaders to recognize religious support as an integral part of sustainment within the Army. It shows how UMT personnel are forgotten sustainers and encourages command teams to see the UMT as a sustainment multiplier.

Personnel Services

Army Doctrine Publication 4-0, Sustainment, outlines five principles of personnel services that guide

Soldier and family support: synchronization, timeliness, stewardship, accuracy, and consistency. The Chaplain Corps links the personnel services' principles with religious support activities as described in Army Techniques Publication 1-05.01, Religious Support and the Operations Process, paragraph 1-16. Field Manual 1-05, Religious Support, guides the UMT with specific guidelines for preparing and executing religious support.

The UMT must determine how these five principles integrate into the daily operations of the UMT. Applying these five principles solidifies the UMT's role as part of sustainment. Members of the UMT must balance their religious advisor roles as personnel staff officers and provide religious support across the unit.

Synchronization. Synchronization guides the UMT to look beyond itself and see how it functions in the overall operation of the unit. Synchronization in staff sections serves Soldiers and families. The calendar is a constantly moving target, and white space disappears as primary staff members add unit training tasks. UMTs often plan in a vacuum, which leads to dysfunctional synchronization.

It is common at a combat training center for UMTs to overlook or avoid participating in the unit's operations process. The UMT may plan spiritual fitness events in isolation. Then no one shows up because the UMT did not coordinate to ensure space was available on the training calendar. The operations process is not foreign to any of the unit sections; nevertheless, a mindset exists that UMTs operate differently.

The Army uses the operation order to communicate and synchronize. The religious support section falls under personnel services, which is

an appendix within the sustainment annex. The religious support section is the first step of synchronizing religious support. A well-planned and prepared religious support plan ensures execution of religious support directly affecting the morale and welfare of Soldiers and families within the operational process. The lack of synchronization confirms for the executive officer (XO), S-1, and S-4 that the UMT has forgotten its place within sustainment.

Timeliness. The principle of timeliness affects the implementation and execution of religious support. Commanders and staffs do not have the time to do the staff work for the UMT. They expect UMTs to produce relevant and analyzed information. UMTs must produce real-time products.

However, UMTs are not typically updating systems and functions with thorough assessments. The lack of assessment creates a gap in real-time situational awareness for the commander and staff. The battalion UMT must integrate within the unit and staff to gather relevant information and continue to push this information in two directions.

First, the battalion UMT pushes information to the battalion command teams to keep the commander informed. Second, the battalion UMT pushes information to the brigade UMT, creating a picture for the brigade and division.

As the UMT gathers and pushes this information to these two elements, it creates information flow, which indirectly affects the Soldiers and families. The forgotten sustainer must provide information horizontally and vertically. A lack of communication limits the UMT's ability to influence religious support across the operational environment.

Stewardship. Together with time-

liness, the principle of stewardship reaches beyond finances to an often overlooked asset, the Soldier's time. No one can restore someone's time. Wasted and improperly used time equals bad stewardship. Planned and synchronized religious support maintains the value of time. Command teams and individual Soldiers do not have time for meaningless events, services, or ceremonies.

UMTs offer more than prayer and definitely more than planning a recreational or welfare trip, which are not doctrinal tenets. Time is of the essence, and filling the calendar with extras does not promote an image of stewardship. Creative and thoughtful UMTs evaluate products for the operations process. An event or service that does not bring meaningful value to the unit degrades a Soldier's experience of religious support. Constantly assessing the value and relevance of events ensures that UMTs follow the principle of stewardship of time and resources.

Accuracy. The fourth principle of personnel service is accuracy. Although an S-1 deals with casualty paperwork, the UMT supports fallen Soldiers' families. Honoring fallen Soldiers through next-of-kin notification is a humbling duty of the UMT. Although no chaplain hopes to do a notification, he or she will execute the duty with utmost respect for the fallen Soldier.

The delicate and intricate work of the UMT in this process hinges on accuracy. Information is not always easy to gather or communicate, even when using the most developed communication systems. The UMT must push commands and Soldiers to keep records up to date.

Consistency. The final personnel services principle is consistency. The UMT consistently provides religious support across the unit. The Chaplain Corps exists for two reasons: to ensure Soldiers have the free exercise of religion and to ensure the government does not establish a religion.

The Chaplain Corps' guiding regulation, Army Regulation 165-1,

Army Chaplain Corps Activities, says, "The First Amendment of the U.S. Constitution prohibits enactment of any law 'respecting an establishment of religion' or 'prohibiting the free exercise thereof.' Congress recognizes the necessity of the Chaplain Corps in striking a balance between the Establishment and Free Exercise Clauses."

The UMT performs or provides religious support; it does not discriminate, regardless of religion or the lack thereof. The Chaplain Corps is dedicated to serving Soldiers and families by upholding the First Amendment of the Constitution. The execution of religious support within the unit requires consistent application of rights and fairness to all Soldiers across the formation.

Guiding Principles

Army doctrine outlining religious support falls in line with sustainment under personnel services. These guiding principles highlight the role of UMT personnel as sustainers. The chaplain's identity rests in his or her religious calling; their ordination guides their role within the Army and their endorsers direct their steps. The religious affairs specialist is the backbone of the UMT; he or she is first a Soldier and then a provider of religious support.

This vital team upholds the First Amendment, guaranteeing Soldiers and families the freedom to practice religion and guarding against the establishment of religion within the context of a military setting. The UMT is critical for each military formation. Without it, religious support would be greatly diminished. The UMT accomplishes its role using the operation order and operations process.

The way ahead involves the command teams, XOs, Chaplain Corps, and the individual UMTs. First, the command teams must stress the role of their UMTs as their religious advisors. Advising the command includes providing internal and external perspectives of religious support. The

internal advisement focuses on the morale and welfare of the Soldiers within the command's authority. External advisement focuses on the surroundings of the unit, including but not limited to the operational environment, the adjacent multinational units, and the external impact on Soldiers and families.

Second, XOs have the responsibility to remind UMTs of the requirement to balance their role as religious advisors with executing religious support as part of personnel services. Too often XOs do not hold their UMTs to the same standards as other staff sections, making excuses for their lack of experience and limiting challenges that would encourage them to grow.

Third, the Chaplain Corps cannot overlook the religious support responsibility of sustaining Soldiers and families. This starts at the schoolhouse and continues at the combat training centers, where trainers teach and collaborate with UMTs and encourage their role. Within this area, supervisory UMTs must be intentional in home-station and monthly training.

The responsibility of the battalion and brigade UMTs rests on the immediate supervisory UMTs. They must hold subordinate UMTs accountable in understanding their roles as sustainers and advisors. The last and most vital aspect of the forgotten sustainer is using the operation order and operations process as an integral function of the command.

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Command Sgt. Maj. Nathaniel Bartee Sr., Command Sgt. Maj. Mike Perry, and other senior enlisted leaders at Fort Lee, Va., raise their arms in celebration as they pass through spraying water along B Avenue during the installation's annual Army Birthday Run on June 14. Well over 1,500 troops participated in the event, including Airmen from the 345th Training Squadron, Marines from the Marine Detachment Fort Lee, medical personnel from Kenner Army Health Clinic, garrison support staff, and others.