THE ARMY'S OFFICIAL PROFESSIONAL BULLETIN ON SUSTAINMENT

APRIL–JUNE 2019

ARMY SUSTAINMENT

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LOOK INSIDE

Readiness: Priority #1

Inside

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ON THE COVER

On taking office as the 39th Chief of Staff of the Army, Gen. Mark Milley set readiness as the Army's top priority. (U.S. Army photo)

"The difference between being ready and reacting will be measured by the number of lives lost."

Gen. Gustave "Gus" Perna
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Maintaining and Building Materiel Readiness

■ By Gen. Gustave "Gus" Perna

The commander of the Army Materiel Command describes how he is focusing the critical resources of the materiel enterprise on seven key areas.

The Multi-Domain Operations concept, released in December 2018, defines the strategic support area as the space where joint logistics and sustainment functions emanate.

It is where combat power is generated and projected into the support area, close area, and deep area. As such, dominance in the strategic support area is the focus and priority of the materiel enterprise.

Army logisticians must execute precision logistics and provide a reliable, agile, and responsive sustainment capability to support rapid power projection and independent maneuver across all contingencies and operations.

As we prepare to operate simultaneously across multiple domains—land, sea, air, space, and cyberspace—the requirement for these capabilities will increase in complexity and importance.

As the senior leader responsible for the strategic support area, I am focusing the critical resources of the materiel enterprise on seven key areas:

- ☐ Installation readiness.
- ☐ Supply availability and equipment readiness.
- ☐ Munitions readiness.
- ☐ Strategic power projection.
- ☐ Industrial base readiness.
- ☐ Soldier and family readiness.
- ☐ Logistics information.

Initiatives within these seven focus areas range from infrastructure upgrades, to energy independence on our installations, and modernizing our organic industrial base facilities to improve our ability to overhaul and maintain current and next-generation weapon systems.

We are simultaneously laterally transferring equipment, divesting excess to increase supply availability and equipment-on-hand readiness, and scrutinizing and synchronizing munitions production with on hand stocks and operational requirements.

Meanwhile, we are exploring predictive maintenance capabilities to better maintain our equipment and learning how to harness and leverage the power of big data by better understanding the capabilities resident within our enterprise resource planning systems.

All of these efforts are underpinned by caring for our Soldiers and families and stretching our limited resources to maximize those services they rely on most, from Army Community Service to child care.

In the coming months, I will highlight each of the seven focus areas and the critical initiatives within them. I encourage you to consider your role in the strategic support area and how you can improve materiel readiness in support of Multi-Domain Operations.

Our logistics and sustainment efforts at the strategic, operational, and tactical levels—across all domains—must be synchronized and resourced to best meet Army readiness requirements and, ultimately, support operations to win our nation's wars. The difference between being ready and reacting will be measured by the number of lives lost.

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

How do We Win the Battle to Be More Agile?

■ By Lt. Gen. Aundre F. Piggee

Soldiers with the 2nd Infantry Division (ID) Sustainment Brigade in the Republic of Korea had a number of mine-resistant ambush-protected vehicles that were deadlined because a 6-inch-long cap, used to protect the fire extinguisher in wheel wells, needed to be replaced. There are 20 caps per vehicle—they cost about $2.50 each—and without them the vehicles are not mission capable. However, when the unit put the order in for replacements, the estimated delivery date was five months away.

The brigade had been selected as a test site to see if the Army could use 3D printers to make simple parts at the point of need near the battlefield. Working with engineers at Picatinny Arsenal, New Jersey, they printed 284 of the small caps, saving 1,472 days of equipment downtime. That small fix prevented a big problem.

I share this story with you because it shows that the Army's all-out focus to regain readiness after several years of sustained conflict is paying off. We've worked on improving readiness since the Army Chief of Staff Gen. Mark Milley first announced in August 2015 that readiness would be the Army's number one priority.

The Army is in a much better place, as can be seen by our brigade combat team (BCT) readiness levels. We now train for large-scale combat operations and have increased home-station training exercises and combat training center rotations. We have changed the instruction at our institutions and changed our doctrine.

Investing in Agility

One area where work remains to be done is making the Army agile. We must transform at a quicker pace. We need to stay ahead and be prepared to provide required capability when needed. To be sufficiently flexible, we must embrace and take advantage of more technologies.

The 3D printer is a prime example. It makes more sense to send a printer to the front lines than a huge inventory of parts for every potential problem. Soldiers get things faster. We have a smaller footprint. It's easier to transport. And Soldiers will trust the system and not get frustrated and think nobody is doing anything about their broken vehicles.

That is why we are allowing commanders in the field to invest up to $10,000 of their operating budgets on a 3D printer package. We have started a digital library of parts that can be printed. We are sending machine shop sets, as we sent to the 2nd ID Sustainment Brigade, to other sustainment units so they can experiment.

We also are looking for ways to use additive manufacturing at our depots, arsenals, and ammunition plants to augment the supply chain. Why shouldn't we print parts ourselves when vendors cannot make the parts in a timely manner, are not interested in making just one $50 part, or don't know how to make the parts for old equipment to the original specifications? Getting repair parts weeks or months after they are needed is too late.

Other Initiatives for Agility

With Secretary of the Army Dr. Mark Esper's push to modernize, you will see additional technologies and processes making us nimbler in the future. The Secretary of the Army wants us to take advantage of autonomous or semiautonomous vehicles

Using new technologies, such as 3D printing, can improve the agility of Army sustainment.

to deliver supplies. He also wants us to make better use of big data, artificial intelligence, and machine learning. Expect to see new technologies sooner rather than later as the Army Futures Command modernizes the way the Army does business and develops capabilities.

Gen. Milley has pushed for more funding to enlarge and improve our Army pre-positioned stocks around the world. We are assembling equipment into combat-ready configurations so that, in the event of a contingency, we significantly increase our ability to move combat-ready ground forces more quickly.

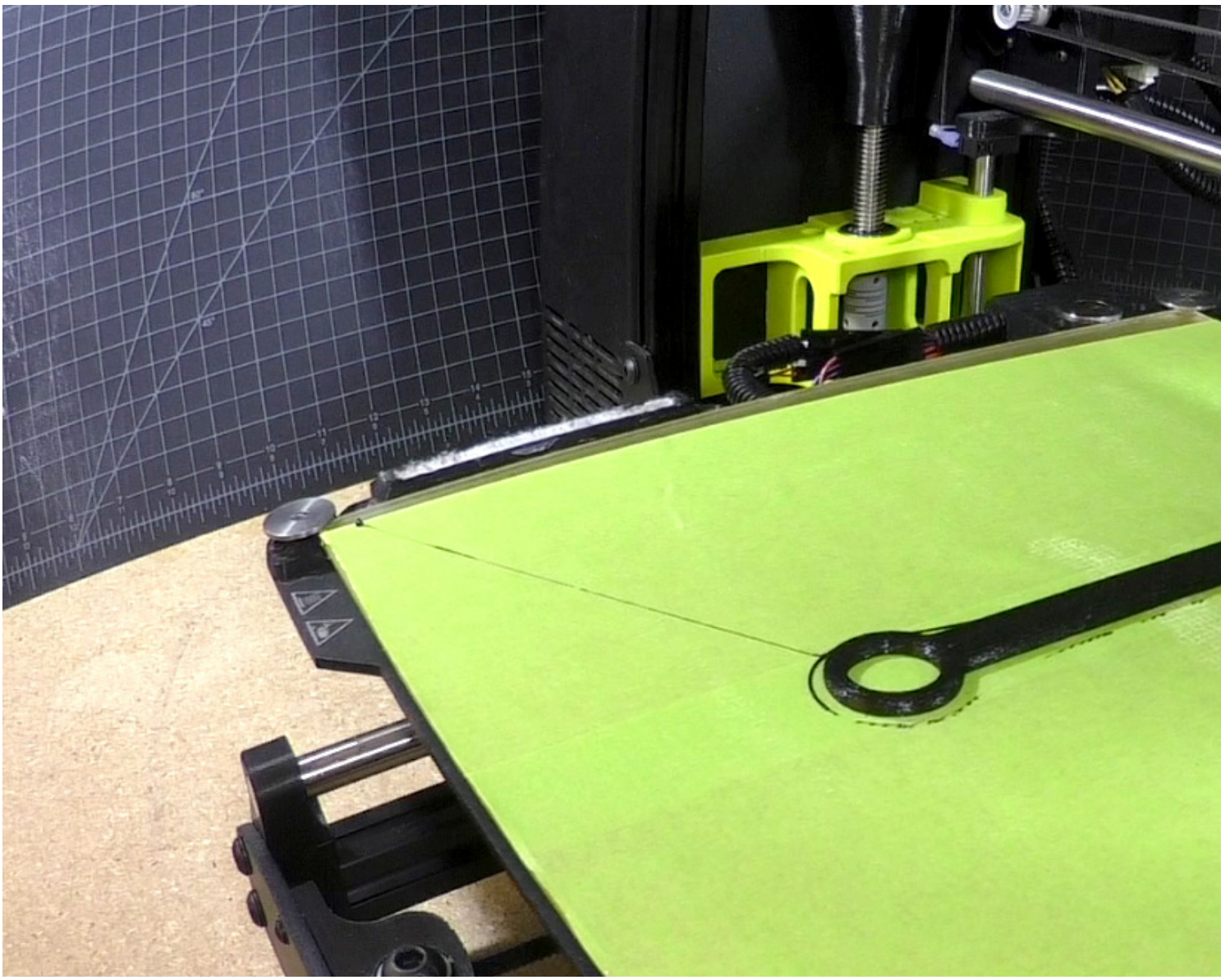
The Chief of Staff of the Army also asked us to pay more attention to our munition's readiness, and he provided additional funds to increase production. Where we have had critical munitions shortages, we have made significant improvements. If there is a crisis somewhere in the world, we are ready.

Additionally, we have improved our supply of spare parts. We standardized BCTs' parts stockages to what we call a common authorized stockage list. We gave the BCTs a mobile supply of the parts we forecast would be most needed. As a result, BCTs are filling more of what is demanded and are repairing weapons systems faster.

Equipment Readiness

For several years, we have placed the turn in and redistribution of excess equipment as a priority. The process has been beneficial to units turning in the equipment because they were still required to maintain equipment they were not using and did not need. The Army standard is 10/20 for all equipment, even if it is excess.

Getting excess equipment out of the motor pools has eased the burden on units and has been beneficial to units that were short equipment. We made sure to transfer the equipment to units that would be the first to deploy, ensuring the highest level of readiness for those units.



Rebalancing the Force

For a while now, my biggest readiness worry has been our ability to set a theater if called upon. The next fight will require all Army components.

The Reserve component is especially key to our success because they make up the majority of our sustainment force. From a sustainment perspective, we are relooking at our balance to ensure we have the right mix of logistics forces with appropriate capabilities at the right time.

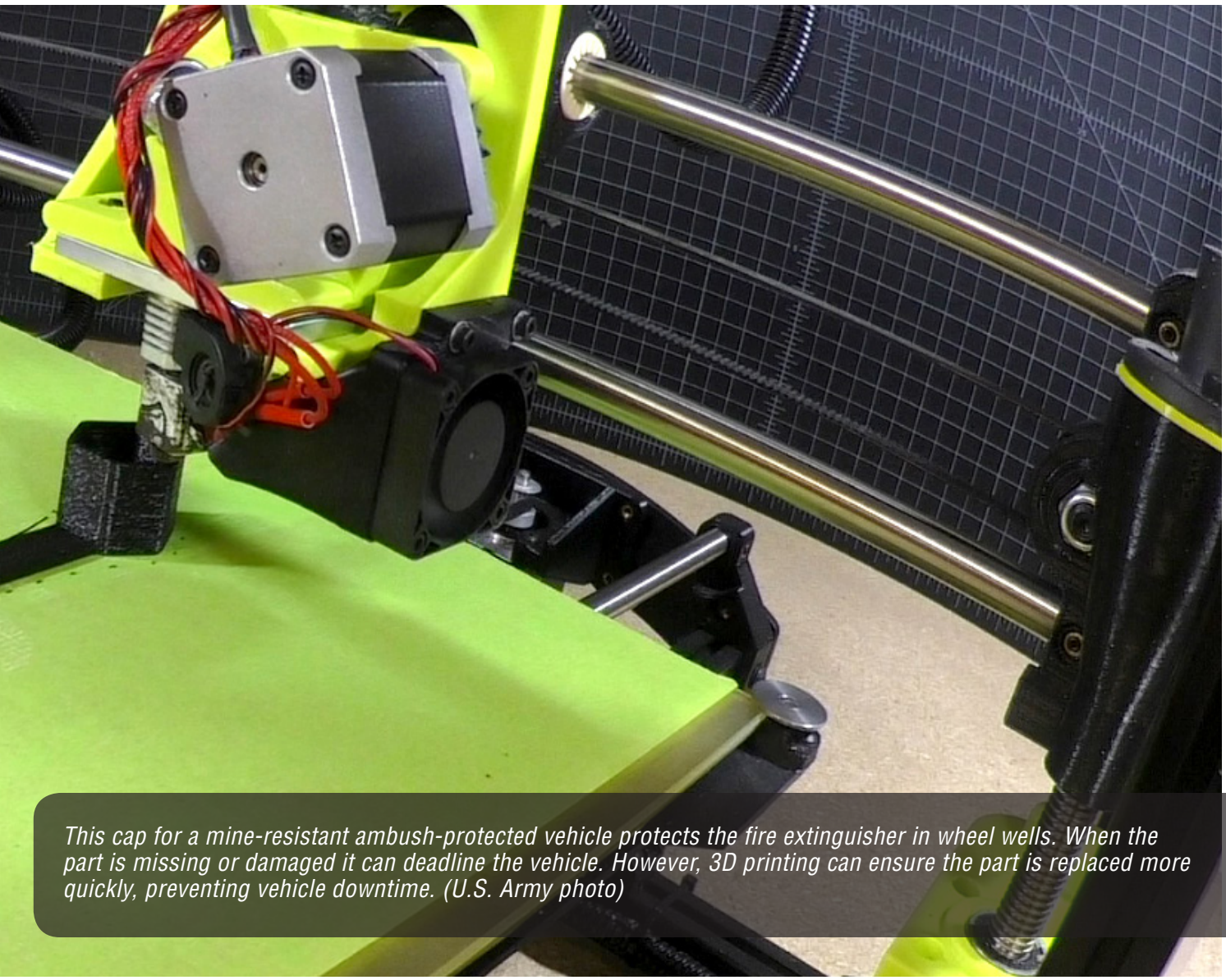
We are continuing to ensure Soldiers train their basic skills. After 17 years of counterinsurgency operations, we let some of our capabilities atrophy. We have addressed this and have made significant improvements.

All of our efforts—using new technologies, enhancing training, improving equipment, changing our acquisition strategy, focusing on modernization, and improving current processes and systems—help us become more agile. Nevertheless, the truth is this is a process that has to continue.

Our peer competitors are catching up quickly, and we cannot accept the status quo. This is true in the halls of the Pentagon, but more importantly in the field. Agility does not come from the Pentagon; it comes from our Soldiers who live with problems we can only imagine.

More than anything, I want to empower our sustainers to be flexible and innovative. That is why we have taken so many steps, from so many angles, to improve readiness. And if all sustainers are as creative at improving readiness as the Soldiers with the 2nd ID Sustainment Brigade are, we are well on our way to winning the battle for a more agile Army.

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.



This cap for a mine-resistant ambush-protected vehicle protects the fire extinguisher in wheel wells. When the part is missing or damaged it can deadline the vehicle. However, 3D printing can ensure the part is replaced more quickly, preventing vehicle downtime. (U.S. Army photo)

Building the Army Readiness–Common Operating Picture

■ By Maj. Gen. Rodney D. Fogg, Brig. Gen. Heidi J. Hoyle, and Percy Alexander

The ability for sustainers and the commanders they support to form a shared understanding of readiness will be critical to future successes.

In Gen. Mark Milley's 2015 initial address to the Army upon assuming his duties as the Chief of Staff of the Army, he said, "Readiness for ground combat is—and will remain—the U.S. Army's #1 priority." The Combined Arms Support Command (CASCOM) is nested with the Chief of Staff of the Army's priorities and also views sustainment readiness as our top priority.

How do we empower commanders to get this job done? What do we give staffs to accomplish the mission of building, maintaining, and improving readiness? How do we assist with streamlining endless data points in order to make sense of readiness reports and give you recommendations to improve readiness? Imagine if you could anticipate sustainment shortfalls and combat system failures before they happen and intervene immediately to replenish or prevent the loss of combat power. That's what the sustainment community is striving for.

To answer the above questions we have leveraged Global Combat Support System–Army (GCSS–Army) as a modern, integrated sustainment tool to consolidate and replace our old legacy systems. GCSS–Army is a transactional system that tracks and enables management of maintenance processes and requirements that build and sustain combat power. It is also the tactical application used to request, receive, store, and issue class IX (repair parts) and accounts for class VII (major end items).

We have taken the information in GCSS–Army and displayed it logically in the Army Readiness–Common Operating Picture (AR–COP) Commander's Dashboard to allow leaders to "see themselves" on the battlefield in order to meet battlefield demands.

Army readiness accounts for a commander's combat power, the unit's maintenance capabilities, and all available logistics resources. In order to improve readiness, commanders need a visual tool that displays supply and maintenance statuses and provides the sustainment analytics needed to make sound logistics decisions.

The value of the AR–COP Commander's Dashboard is the efficiencies gained in resource allocation and the ability to plan, synchronize, and integrate commodities at echelon. This supports building and maintaining combat power for the maneuver commander.

The AR–COP

In December 2018, the Army consolidated data from multiple sources into a central database and rebranded it as the AR–COP. Sustainers now have access to the Army's logistics tools and authoritative data through a single portal that enables better readiness visibility and decision-making.

The Commander's Dashboard is a fairly new tool, which reached its initial operating capability in June 2018. This tailorable tool displays unit and Army readiness at the brigade combat team (BCT), division, corps, and Army levels. It also provides consolidated sustainment information and the capacity for commanders and staffs to drill down to subordinate levels of sustainment data.

Figure 1 shows the overall ground equipment readiness for a notional infantry division. Sustainment leaders are able pull data based on their habitual or task force alignment and can add or delete units based on the

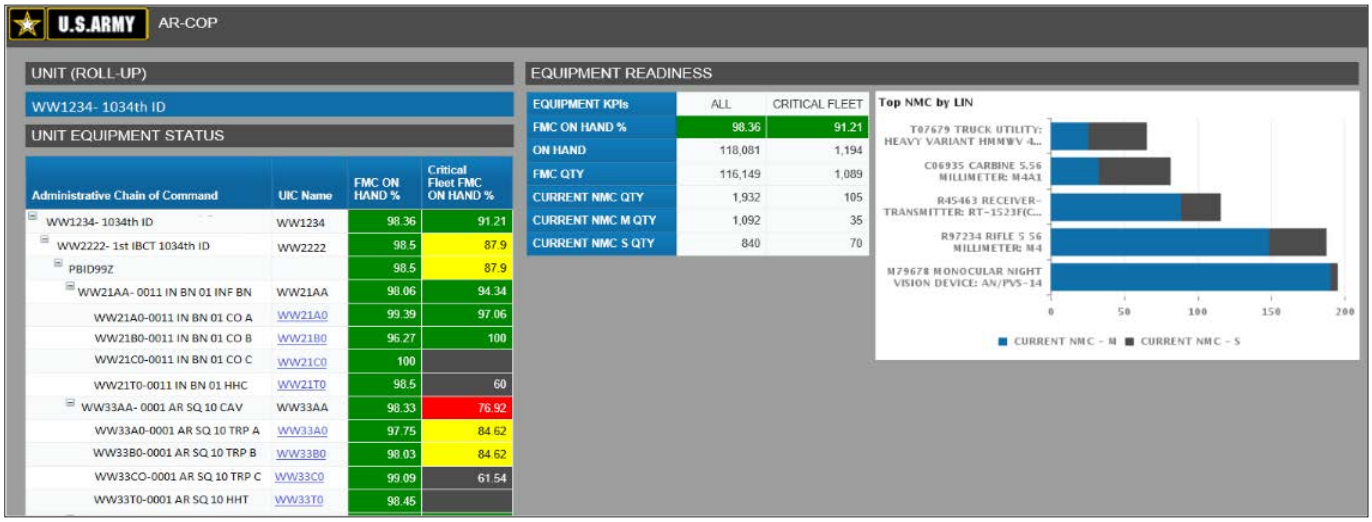


Figure 1 shows the overall ground equipment readiness for a notional infantry division. (The numbers are changed for publication.)

information needed. The system is able to categorize readiness information by unit, vehicle type, or fleet, as shown in figure 2 on page 8.

Commanders can track their status by parts on hand or work order completion status. The system can also display operational readiness rates; this greatly assists with focusing maintenance priorities.

Leaders can also identify their critical assets and track their operational readiness status separately. This real-time data populates directly from GCSS–Army. If the status of a vehicle comes up during a maintenance review meeting, a Soldier can hit the refresh button and receive an updated status immediately.

The Commander's Dashboard also reveals a unit's financial standing through its ZPARK table. (See figure 3 on page 8.) This display helps commanders manage resources for building and maintaining combat power by allowing them to quickly find requests and track their progress.

Figure 3 shows class IX requests staged in ZPARK by priority. This view lets the commander know how many days they have been in their current status. The recommendation is to have the resource manager and sustainment staff work together to post Class IX requests daily as funds are available.

The AR–COP Commander's Dashboard can also show de-obligations and assist resource managers and logistics staffs with tracking their current budgets and forecasting their future budgets for repair parts and equipment.

The Commander's Dashboard continues to add capability and will reach full operating capability over the coming months. Development is underway for a Commander's Dashboard capability to track and optimize shop stock levels in order to ensure the right parts are available at repair sites. The plan is to continually move more capabilities from static sources into this dynamic dashboard to provide near-real-time sustainment information.

Logistics Business Intelligence

GCSS–Army houses logistics business intelligence (BI) that collects and consolidates data from GCSS–Army and other sources in order to provide sustainment information to commanders and their staffs. Logistics BI uses big data formulas and methods to increase visibility of logistics statuses and requirements, lower costs, and improve sustainment performance. BI assists sustainers by turning raw data into useful information that helps them identify negative trends and take proactive steps to resolve them. Those actionable insights unburden Soldiers from spreadsheet management, allowing them to focus on providing commanders with logistics information for decision-making.

The current edition of GCSS–Army BI provides BCT-level readiness information for equipment on hand, including its maintenance posture. It displays how our warehouses are meeting customers' requests and helps us to optimize inventories of critical (high-priority) repair parts.

The next level of BI will provide the echelons above the corps level with the same capabilities provided to BCTs and give us a greater understanding of maintenance trends.

Staffs at all levels will have the ability to anticipate outcomes based on BI information. Our goal is to predict with analytical confidence the actions we must take today in order to achieve readiness goals and milestones tomorrow.

Training

Providing valuable tools and readiness resources are critical as we adapt to technology and best practices. We understand that new initiatives and products require training in order to maximize their effectiveness, and we are working to keep training on track.

GCSS–Army BI tools are being incorporated into relevant professional military education and func-

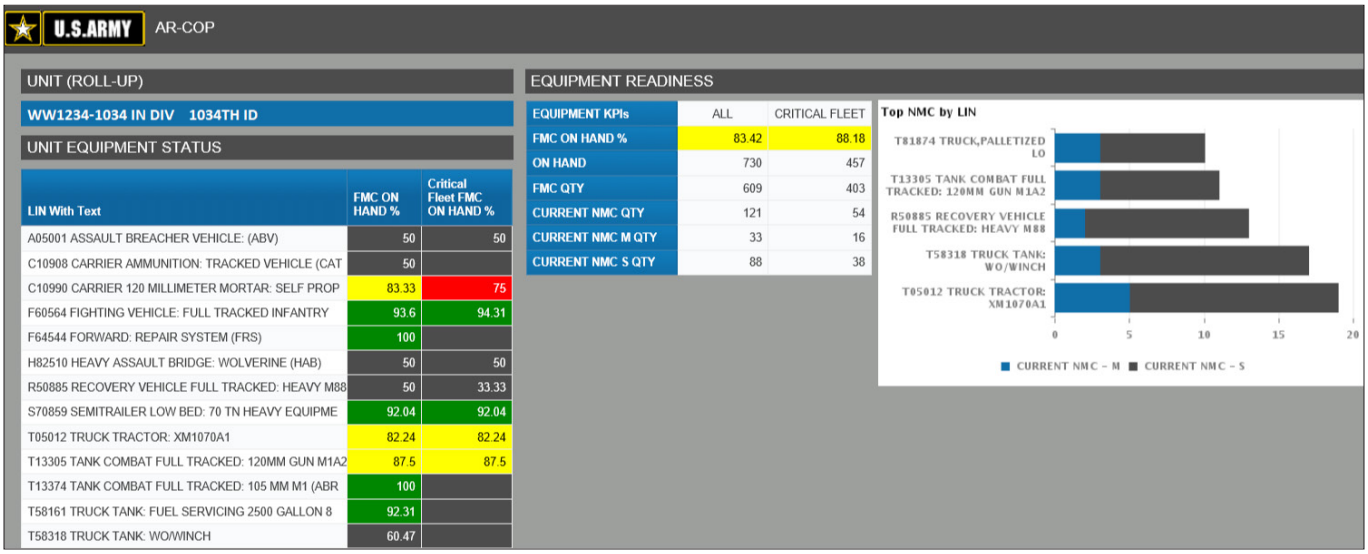


Figure 2 shows the capability to manage readiness information by unit, vehicle type, or fleet within the Commander's Dashboard of the Army Readiness–Common Operating Picture.

tional courses at the Army Logistics University. During these courses, students learn to use their subject-area expertise and employ BI tools and GCSS–Army management skills in order to apply the art and the science of battlefield sustainment to the mission.

The AR–COP Commander's Dashboard, available at https://uperform.armyerp.army.mil/gm/folder-1.11.46236, collates data from GCSS–Army. It does not require the staff logistician or commander to be a GCSS–Army subject matter expert.

There is online training to certify users in each GCSS–Army business area for those who want to know more about the system's functionality.

All products are current and available on the GCSS–Army webpage (https://www.gcss.army.mil/) along with a how-to user's manual.

CASCOM's Enterprise Resource Planning Cell also sends teams to installations when units request refresher training. If you need assistance, the help desk is always available. GCSS–Army has a 24/7 chat line where subject matter experts provide solutions and resources to answer questions. Training for the AR–COP Commander's Dash-

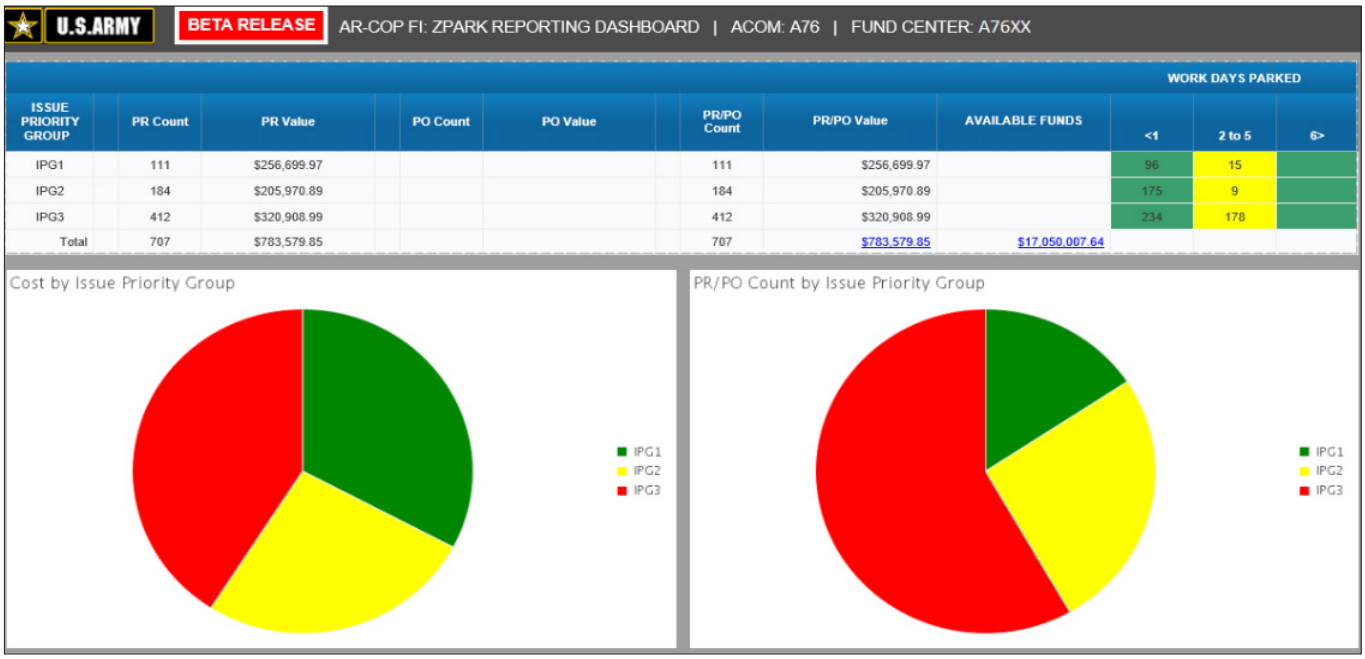


Figure 3 shows class IX (repair parts) requests staged in ZPARK by priority. This view lets the commander know how many days requests have been in their current status.

board is also available online through CASCOM-led webinars at https://conference.apps.mil/webconf/899dcf856d1303b182c9ed3117dc3c87.

These monthly webinars allow users to interact with instructors. Users can visit the GCSS–Army webpage or the CASCOM Sustainment One Stop website (http://www.cascom.army.mil/g_staff/g3/SUOS/index.htm) for visual aids, simulations, and student handouts. Instructors will guide users through the AR–COP Commander's Dashboard menu screens and explain how to use the information to increase efficiency in the logistics decision cycle.

The Way Ahead

Another CASCOM readiness initiative is to provide a self-service sustainment visualization tool that customizes all available GCSS–Army information and displays it however the user wants it presented. Current commercial tools include SAP Lumira, which provides simple icon-driven menu screens that present data in ways the user can easily manipulate to solve problems and assist leaders in making sustainment decisions.

Linking this tool to the data in GCSS–Army will provide a powerful resource to produce battlefield updates and logistics status reports. Leaders will be able to tailor logistics inputs and outputs through unique templates and share them across formations to provide critical information and synchronize efforts.

CASCOM, with significant input from the sustainment community, continues to build on GCSS–Army's current capabilities. We also are working to develop the BI tools needed to use GCSS–Army data to enable faster and better sustainment decision-making to build and sustain combat power for Multi-Domain Operations.

By improving our processes and systems and simultaneously training our users, we aim to increase readiness and empower commanders. Relevant, accurate, and easily accessible logistics information translates to confident sustainment decision-making that improves Army readiness—our #1 priority. Support starts here!

Maj. Gen. Rodney D. Fogg is the commander of CASCOM and the Sustainment Center of Excellence at Fort Lee, Virginia. He holds master's degrees in logistics management and strategic studies, and he is a graduate of the Quartermaster Officer Basic and Advanced Courses, the Command and General Staff College, and the Army War College.

Brig. Gen. Heidi J. Hoyle is the 41st Chief of Ordnance and the commandant of the Ordnance School at Fort Lee, Virginia. She holds a bachelor's degree in engineering management from the U.S. Military Academy, a master's degree in systems engineering from the University of Virginia, and a master's degree in national security and resource strategy from the National Defense University. She is a graduate of the Army Command and General Staff College and the Eisenhower School.

Percy Alexander is the chief of the Logistics Enterprise Systems Division, Enterprise Systems Directorate, CASCOM. He holds a bachelor's degree in government from the University of Maryland and an MBA in logistics management from Colorado Technical University. He is a graduate of the Command and General Staff College and the Warrant Officer Senior Staff Course.

Editor's Note: A Correction to the January–March Focus

In the January–March 2019 edition of *Army Sustainment*, "Sustainment Command Relationships for the Next Fight," included inaccurate information.

Near the end (on page 7), the article discusses emerging techniques concerning the command relationship of sustainment and medical units on the battlefield.

The section included the following sentence: "This includes attaching a medical command (deployment support) to a TSC, a medical brigade to a combat support hospital, a hospital center to an ESC, and a multifunctional medical battalion to a sustainment brigade."

This sentence erroneously describes command relationships that would not exist.

Instead, a more accurate description of what is being explored in emerging discussions on this topic would read in the following way: "We are exploring attached relationships between a medical command (deployment support) and a TSC; between a medical brigade, combat support hospital, and hospital center and an ESC; and between a multifunctional medical battalion and a sustainment brigade. We are also looking at assigning a medical company with medical logistics to a CSSB."

The Number One Priority
An Interview With Gen. Mark Milley

■ By Arpi Dilanian and Matthew Howard

As the 39th Chief of Staff of the Army, Gen. Mark A. Milley has spearheaded the Army's transformation to build readiness. Earning his commission from Princeton University in 1980, Milley has gained a reputation for being a Soldier's Soldier and battle-tested commander throughout his 39-year career. An infantry and special operations forces officer by trade, the Army Ranger's previous assignments include commanding general of Forces Command (FORSCOM), III Corps, and the 10th Mountain Division. We sat down with him to discuss total Army readiness and the importance of sustainment for mission success.

Readiness is your number one priority. What progress has the Army made in building readiness throughout your tenure as the Chief of Staff of the Army?

If you go back to 2015, I think we were on a downward slope of readiness relative to the tasks required to be able to fight near-peer competitors. Our readiness was probably okay for counterinsurgency and counterterrorism but not for the higher end of warfare. At that time, we really only had two or three brigades at the highest levels of readiness; today we're in excess of 20.

There are several reasons we've made strides. One of the biggest is leader involvement and focus. While technically not an evaluated criterion of readiness, the most important function of combat power is leadership. Our leaders are getting many, many swings at the bat in going through some really tough training, and it's paying off. We've increased home-station training and rotations at the National Training Center. The opposing force operational environment has been focused and refocused toward a higher-end fight, and we've improved the incorporation of things like electronic warfare and live cyber ranges. Our annual gunneries for armor, artillery, and mechanized units have also improved significantly.

I would argue that equipping—a logistics task—is arguably the most improved player in the last three years, and I would credit that to Gen. Gus Perna at Army Materiel Command (AMC), Lt. Gen. Aundre Piggee here on the Army Staff, and the entire team of logisticians throughout the Army. Look at operational and equipment readiness rates, equipment on hand rates, the redistribution and divestiture of excess materiel, the delivery of repair parts, and authorized stockage lists inside units. All of those numbers have grown exponentially over the last three years, and that's because the logistics community has leaned in and put its shoulder to the wheel.

The last piece is personnel, the manning function of readiness. Three years ago, there were a lot of holes in operational units that we've been trying to fill. Units were going to combat training centers at only 65 to 70 percent strength. So we modestly increased the end strength of the Army and, most significantly, reduced the number of nondeployable Soldiers from a total Army high of 17 percent a few years ago. Seventeen percent of a million is a lot of nondeployable Soldiers; we've reduced that to about 6 percent now. Between those two efforts [increasing end strength and reducing the number of nondeployable Soldiers], we've drastically increased the number of Soldiers available and filled the holes.

So readiness has certainly improved. But I caution everybody we're not there yet. We need 66 percent of the regular Army and 33 percent of the National Guard and Army Reserve at the highest levels of readiness. Right now we're around the range of the 40 percent mark. We have a ways to go, and we have to continue to press to keep improving. But if we keep going at the rates we're going, I estimate that we will be at the objective levels sometime in the 2022 to 2023 time frame. We're doing okay, but we have more work to do.

How important is sustainment readiness to the total Army's ability to fight and win the next war?

Chief of Staff of the Army Gen. Mark A. Milley discusses the changing character of war and where Army sustainment is heading in the future. (Photo by Samuel Curtis)

It's critical; it's the long pole in the tent. You can do short-duration raids and operations without significant consideration of logistics and sustainment; you can't fight a war. In the Army, our fundamental task under the law is to engage in ground combat and be able to conduct sustained land campaigns against the enemies of our country. You can't do that without having very rigorous logistics planning and execution. It's common sense; it's just not going to happen.

Pick any point in the process. You can't get off your fort unless you have good logistics planning. We're a big Army. We have a lot of equipment and people to move—starting from alert, to assembly and marshaling at the installation, to issuing out the final draws of equipment, to getting all your convoys and railheads put together. All logistics—getting everything down to the port in good order and put onto ships or planes—all logistics.

The strategic lift to then transport it across the oceans is a huge logistics undertaking led by the U.S. Transportation Command and aided by our Navy and Air Force partners. Once you arrive, you have to get off the planes or ships followed by an entire reception and staging function that occurs—another huge logistics exercise.

From there, you have to get into wherever the conflict is, through onward movement and integration. That involves convoys and movements, fuel, and road march tables—all logistics. And then, once you finally get to the fight, you have to sustain yourself in the campaign. That's all your class III [petroleum, oils, and lubricants], class V [ammunition], your medical, and your maintenance [repair parts]—your key supplies.

> "You *can* do short-duration raids and operations without significant consideration of logistics and sustainment; you *can't* fight a war."

There's an old saying [from Gen. Robert H. Barrow, former commandant of the Marine Corps], "Amateurs talk about tactics, but professionals study logistics." When it comes to the higher end of war, we have to be able to think and do both. At the pointy end of the fight, I have 1,000 percent confidence that our platoon leaders, sergeants, and company commanders know how to shoot, move, and communicate. Our Soldiers know how to fight. The bigger issue at my level—the strategic level back in the United States—is getting them there and sustaining them throughout the fight. That's all logistics.

I would argue sustainment is fundamental for the U.S.

Vehicles staged at an Army Pre-positioned Stocks 5 warehouse await movement to a remote staging lot in preparation for forward transport during a large-scale equipment issue to an armored brigade combat team, on June 29, 2018, at Camp Arifjan, Kuwait. (Photo by Justin Graff)

An AH-64 Apache helicopter from the 1st Attack Reconnaissance Battalion, 25th Combat Aviation Brigade, is loaded onto a C-17 Globemaster III aircraft from Joint Base Pearl Harbor–Hickam, Hawaii, on Dec.18, 2016, at Eielson Air Force Base, Alaska. (Photo by Staff Sgt. Robert Hicks)

military to win a sustained land campaign against any serious adversary.

How are we balancing competing requirements to ensure units remain ready?

It's all a function of priorities. At the Army level, priorities must be established and followed up on to ensure they're being resourced. We've established readiness as the number one priority, followed by modernization and reform; taking care of our Soldiers and families is embedded within each.

So first is elevating readiness to its proper place and ensuring all of our leaders fully understand the job of the Army: providing trained and ready functions to the combatant commanders for employment. Within that idea of readiness, you then have to look at the different components of the Army: the regular Army, National Guard, and Army Reserve. You have different units, divisions, and brigades within each, and again you have to prioritize.

Not everybody in any one of the components is going to be equally resourced at any moment in time; with a force that has the size and scale of the U.S. Army, you can't do everything at once. One unit is going to get this upgrade in equipment first, this other unit will be second, and another will be third. One unit is going to be manned at 100 percent strength, another at 95 percent, and another at 90 percent.

The same goes for functional areas; I would argue shoot, move, communicate, protect, and sustain are the critical functions that must be prioritized. You want to make sure your major systems are at acceptable levels of operational readiness, their equipment is on hand and operational, and they're at full mission capability. That requires a prioritization of parts and so on and so forth. So it's all a system of priorities within an organization. You have to make sure priorities are clear and then put your money where your mouth is.

Looking to the future, is the Army at an inflection point for the way it does business?

I would argue we are in the midst of a fundamental change in the character of war. The nature of war never changes; it's immutable. War is a human function, a behavior that involves emotions, fears, friction, and chance. It's the imposition of political will on your opponent by the use of violence.

The character of war though is how you fight—when, where, and with what weapons. It's the doctrine, orga-

A medic with the 82nd Airborne Division, at Fort Bragg, N.C., readies his equipment before embarking on his final evaluation lane while competing for the Expert Field Medical Badge, on Nov. 6, 2018. (Photo by Sgt. Dustin Biven) In the inset photo on the next page, a Soldier from 10th Mountain Division, assigned to Combined Joint Task Force-Horn of Africa's East African Response Force, maneuvers through a smoke screen during a live-fire exercise in Djibouti, on Dec. 27, 2017. (Photo by Senior Airman Erin Piazza)

nization, and materiel. The character of war does change, and it changes often. Every time a new technology is introduced, the character of war is changing. But we undergo fundamental shifts in the character of war only once in a while; it doesn't happen often.

The character of war fundamentally changed when human beings learned to harness the power of a horse. Prior to the technology of controlling a horse with stirrups and a bit, war and violence was done on foot with spears and rocks. But once you have the horse, ground mobility was introduced at a much higher rate of speed and distance. That was a fundamental change. You could argue the introduction of the wheel was again a fundamental change.

More recently in the American Revolutionary War and Napoleonic wars, combatants used smoothbore muskets. What did that mean for tactics? Smoothbore muskets were typically accurate from 50 to 75 yards, maybe 100 yards on a good day. You could probably fire three rounds a minute, so you're looking at about 20 seconds between reloads. Tactically, that meant your best way to deliver effective fire was to mass the musket fire, which led to Soldiers being shoulder to shoulder in a rank. Fifteen or 20 Soldiers would volley fire at once in the hopes that maybe four or five of those musket balls would hit the enemy.

As soon as you fired, you yelled "charge" with the idea that an 18- to 19-year-old who's scared can sprint those 50 to 100 yards faster than your opponent can reload, and then stab them with their bayonet. The sergeant major would stand behind the formation with the first sergeant and the platoon sergeant, and they carried a big, huge pike; if you broke ranks, they'd stab you. So you stood a much higher probability of being killed if you broke ranks than you did charging the enemy and bayonetting them. You went forward, not backward.

A few years later, somebody figured out they could put lands and grooves inside the tube of that musket, which would spin the bullet and turn it into a rifle. So now Soldiers were still shoulder to shoulder, they're dropping their muskets and charging, but the problem was rifling made the muskets accurate out to about 300 yards, maybe 400, depending on the type. Well, you can't sprint that far in less than 20 seconds, especially through fields and woods on the battlefield.

What they discovered in the first couple years of the Civil War was mass slaughter because they were still using Revolutionary and Napoleonic war tactics. If you massed yourself shoulder to shoulder, you

got massacred like during Pickett's Charge in the Battle of Gettysburg. So in the middle of the Civil War, you see skirmishing tactics being developed where they started separating in small groups and coming at you in low crouches.

You also see changes in defense. All of these things start happening as a result of a single technological change: rifling. Toward the end of the American Civil War and into the Boer and Russo-Japanese Wars, the proximate fuse becomes prevalent on a mass industrial base. I don't know that people fully recognized or comprehended the extent to which the character of war was changing. As you get into the late 1800s and the turn of the century, you get an introduction of a whole plethora of technologies. The railroad emerged. You saw the telegraph improve command and control. That evolved into the telephone, with its flexible wire you could string out on the battlefield, and eventually into wireless communication—Morse code.

But again, people didn't quite fully comprehend all of the implications. When they entered World War I, they were using tactics from the 1800s with very modern and destructive weapons like machine guns. What happened? One out of every four European young men was dead within four years; 18 to 20 million people were killed. Empires were ripped apart. Again, the character of war was changing, and the generals of the day didn't quite realize it.

The biggest change happened between World War I and World War II with the introduction of mechanized tracked and wheeled vehicles, full-rate production of the airplane, and the refinement of wireless communication into the radio. These fundamentally changed how people fought in terms of doctrine at the operational and tactical levels, even at the strategic level. Some armies picked up on it, particularly the German Wehrmacht, but for many it took some time.

More recently, we introduced precision munitions toward the end of the Vietnam War. While we once had a corner on the market for many years, now they've proliferated to China, Russia, and most of the more industrial countries. Look around us; every electronic device—from televisions to all of our personal gadgets like fitness trackers and smartphones—could be a listening device. They are emitting signals that can identify our location. And that which you can see, you can hit with a precision munition. From a thousand miles away, you can put a cruise missile right through a window. Just like going from smoothbore to rifling, you've increased the striking range and the accuracy.

So there's a history of the changing character of war; it's not like we've never seen it before. And right now today we are going through a fundamental change in the character of war.

How can innovation and technology affect how we sustain our Soldiers in the next fight?

In introducing things like artificial intelligence, robotics, and 3D printing to the battlespace, think about the implications on the Army's logistics enterprise as we adapt for Multi-Domain Operations. The ability to sustain yourself is a huge deal for a mechanized, modern Army.

Sun Tzu said, "If you know the enemy and know yourself, you need not fear the result of a hundred battles." Think about information management and the ability to see ourselves. What if vehicles had sensors that can transmit fuel data? That data could be aggregated from the platoon to the brigade at various headquarters to have just-in-time logistics for refueling. The same could be done for water or ammunition levels.

A lot of this is already being done today in the commercial world. Tesla's vehicles are kitted out with all kinds of sensors for precise levels of monitoring that can be broadcast back to central control stations. Go to any major oil company and they know exactly how much fuel or natural gas is being produced, where it is, and how it's being transported.

Think about what that type of information technology could mean for commanders. They could know if a vehicle breaks down, and why it happened. They could know if a Soldier is wounded and exactly where the Soldier is and what their vital signs are. Those can have huge implications in the logistics world.

Look at robotics. In World War II, we had the Red Ball Express running huge trucks in massive convoys from the beaches of Normandy, all the way through France, and into Germany to keep Patton's tanks supplied with fuel. Consider all of the casualties we've taken in Iraq and Afghanistan; many were on logistics convoys simply going from point A to point B. If you had robots, you could just load up your fuel, ammunition, or food on a vehicle, program the maps, and satellite-guide it from point A to point B. There's no human being in it. The vehicle might get blown up, and you might lose your fuel or chow, but you're not going to get anybody killed. Robotic trucks are running up and down the highways and byways of California right now delivering goods.

Think about 3D printing and the ability of maintainers to produce

their own spare parts. The requirement to do a supply run would be negated for company and battalion commanders if they could just print their parts right there.

These things are all in the world of the possible; they're not here yet, but they're all possible. They will all have implications on the character of war, and in order to stay current, our logistics force structure, doctrine, and processes are going to have to be modified and adapted.

How do you foresee Army Futures Command (AFC) affecting readiness for moving forward?

If you think of readiness—current readiness of legacy systems and what FORSCOM does—we're sustaining and using systems that were in the modernization program 20 or 30 years ago. Modernization is really just a different word for future readiness. Our job for modernization today is to set the conditions for the future readiness of the force. We have to be thinking 10 even 20 years down the road, laying the groundwork and setting the outlines even though we're not going to be around when many of these things actually come to fruition. He who gets there first with the most is going to have a decisive advantage in combat.

We're setting ourselves on paths for artificial intelligence and robotics, but we're still years away from artificial intelligence being militarily practical and useful. I may not even be alive when we've got large units that are robotic. We know the Chinese and Russians are moving out on these paths very quickly. So we can't be caught short in the future, because at that point, the butcher's bill is going to be paid by kids who aren't even born yet.

About three years ago, the late Sen. John McCain very clearly and unambiguously pointed out how off track Army modernization and procurement had become. We got the Army staff together and realized he was right; processes were slow and very bureaucratic, and a lot of the programs were quite expensive. It wasn't because we had bad people, but we weren't delivering to the needs of the warfighter on time. So in many ways, AFC was conceived by Sen. McCain, not so much in the detail but in the impetus for it, and he was one of the driving forces behind its creation.

Prior to AFC, modernization and procurement programs were diffused throughout the Army and there wasn't a sole, senior-ranking officer-in-charge. We had a command laser-focused on the readiness of the current force: FORSCOM. We had a command focused on logistics readiness: AMC. And we had a command focused on the training, education, and accession of the force: Training and Doctrine Command (TRADOC). But when it came to modernization, some of it was in TRADOC, some was in AMC, and some was in the Army Staff; you didn't have coherency. So AFC was largely designed to bring unity of command to the whole idea of modernization. It's the command the Secretary of the Army and I are looking at to be the pathfinder for the future of our Army.

We knew it needed to be a four-star command, and we were lucky enough to name Gen. Mike Murray as the commander. He has great subordinates with him in Lt. Gen. James Richardson and Lt. Gen. Eric Wesley as well as a great supporting cast in the Pentagon with Dr. Bruce Jette, as the Assistant Secretary of the Army for Acquisition, Logistics, and Technology, and his military deputy Lt. Gen. Paul Ostrowski.

We positioned the AFC headquarters in Austin, Texas; that's the central node and has about 500 people. But AFC is much bigger than that and has tentacles all around the country. AFC is 20,000 to 25,000 people, because we took pieces from AMC, the Army Staff, and other organizations across the enterprise.

It's just standing up now, but there's a real sense of energy. It's the biggest institutional, organizational reform the Army has made in over 40 years, and I think it will have

After donning gas masks, Soldiers with D Company, 3rd Battalion, 509th Parachute Infantry Regiment, 4th Infantry Brigade Combat Team, 25th Infantry Division, engage a target with a M2A1 machine gun during mounted night live-fire training at Joint Base Elmendorf–Richardson, Alaska, on Nov. 16, 2018. (Photo by Alejandro Pena)

a lasting impact. We're going to start seeing the fruits of that labor in the next 12 to 24 months, but that's just the beginning. We won't see the real blooming of AFC's value for a couple more years, but it will happen. It's an important thing to have done, and I'm excited about seeing what they produce.

What one piece of advice would you give young men and women entering the joint force today?

While there's obviously change over time—like change in the character of war—I think there are also threads of continuity. To the Soldier, Sailor, Airman, or Marine recruit entering the military today, think of the threads of continuity all the way back to the Continental Army, and remember why we fight. We serve the colors of our nation to protect the essential ideal embedded within our Constitution that all Americans are created equal in the eyes of the law. We fight so all have an opportunity to rise to the level of their merit based on hard work and their knowledge, skills, and attributes.

Sure, there are benefits of serving: the pay, education, medical care, and housing. But we must never forget the very central, core idea of why we're here. Our whole purpose is to protect the American people and the Constitution of the United States against all enemies foreign and domestic. This means recognizing the hazards of our profession and being willing to give our lives in order to protect and pass that idea on to the next generation.

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Lt. Gen. Laura J. Richardson, acting commanding general of the Forces Command, and Secretary of the Army Dr. Mark T. Esper discuss unit readiness during a warfighter exercise at Fort Bragg, N.C., on Feb. 9, 2019. (Photo by Pfc. Hubert D. Delany III)

When it comes to building readiness across the Total Army, Lt. Gen. Laura J. Richardson is leading the charge. As the acting commanding general of Forces Command (FORSCOM), she is responsible for ensuring the nation's Soldiers are ready to answer the call whenever and wherever needed. A gifted Army aviator who earned her pilot's license at age 16, Richardson's three-decade career has been highlighted by service as the deputy commanding general of the 1st Cavalry Division, the Army's chief of legislative liaison, and the military aide to the vice president. Here are her insights on force readiness and sustainment for the future fight.

FORSCOM focuses on being ready to "fight tonight." In your view, what are some of the critical sustainment challenges to being ready now?

Sustainers and operators are facing the challenging reality of an uncertain world. We are shifting from almost exclusive counterinsurgency (COIN) operations to preparing for large-scale combat operations. Competing against a near-peer threat requires synchronization of all elements of combat power, especially the sustainment warfighting function.

The static, robust, and mature forward logistics base environment we occupied in COIN must evolve to a more dynamic, austere, and expeditionary decisive action environment. Sustaining and regenerating combat power forward in this environment while in contact will be the single greatest challenge.

While we can plan to address this, we must also recognize it is difficult to predict an emergent threat. You may not know when the next mission will come, what it will be, or where you will have to deploy. What we do know is we have to be ready now. We have to plan, prepare, and practice for the most difficult scenar-

Plan, Prepare, Practice:

An Interview With Lt. Gen. Laura Richardson

■ By Arpi Dilanian and Matthew Howard

ios. Building the expertise for expeditionary logistics at every level will be paramount to our nation's ability to fight and win the next war. So we are enhancing training for our sustainment units across the total Army. And we're not just talking about it, we are ensuring it.

At the combat training centers (CTCs), we now require logistics units supporting rotational brigade combat teams (BCTs) to compete in the maneuver box as well. As I visit our CTCs, I see our units being challenged with incredibly aggressive and agile opposing forces (OPFORs) free to take advantage of any perceived weaknesses; the OPFORs are relentless and are experts at their mission, and there are no timeouts. Anyone who has participated in a recent rotation or read the lessons learned knows what that means: surviving to accomplish your mission cannot be assumed.

Whereas we used to be quite scripted with our CTC scenarios that is no longer the case. Our logisticians have to contend with interdicted supply routes, jammed communications and networks, civilians and casualties on the battlefield, and a whole host of other hazards that degrade their mission performance.

It is the most realistic environment we can create to prepare the force for Multi-Domain Operations and drive home the integration of maneuver and sustainment efforts. It forces our sustainment Soldiers to train in the same decisive action environment they will operate in during combat. Our CTCs provide a tremendous return on investment, especially in terms of readiness for our sustainment units.

Although we have increased the number of rotations, we can only send about a third of our units through this world-class training every year. So, to address the shortfall, we've challenged our commanders to intensify their home-station training.

We've increased the resourcing to do so across all Army components,

including training at National Guard and Army Reserve state and regional training sites. Bottom line, our guidance is if it doesn't build readiness, don't do it.

How has sustainment transformed from when you first joined the Army?

First and foremost, the improvements in our logistics analytics redefine our situational awareness. Before, we had a collection of antiquated and stovepipe analog data; now, it's predictive, digital data within an integrated system of systems that informs commanders across echelons. Leaders are now empowered with the analytics to see equipment and materiel readiness across formations in near-real time. This ability to understand our readiness enables all of us to make decisions at multiple levels to support emerging requirements with strategic effects.

We have also transitioned to a modular, brigade-centric fighting formation. Under this structure, commanders and sustainers alike have found they have to leverage all capabilities at echelon via our BCTs, sustainment brigades, and expeditionary sustainment commands to achieve success in combat. Our sustainment doctrine continues to mature, so maneuver commanders are further empowered to leverage the entire sustainment enterprise to achieve the desired effects. We must be able to sustain ourselves at scale, at high operating tempos, and in austere environments.

Finally, I would highlight our recent conceptual transformation of the readiness cycle from the Army Force Generation model to the Sustainable Readiness Model (SRM). SRM is yielding positive results because it entrusts commanders with ownership of their current and future readiness; it's the essence of mission command. Commanders are embracing the culture shift. We're seeing units take a more proactive role in building the competencies to ensure readiness at every level. This all adds up to a remarkable improvement in the readiness rates of our entire Army.

Can you describe how we are improving deployment readiness with emergency deployment readiness exercises (EDREs)?

As the Army's force provider, FORSCOM has the same mission today as we did when we were activated in 1973: all things readiness. Today, maximizing unit readiness is our number one priority as we prepare forces for combatant commanders' rotational and contingency operations.

For emergent and contingent operations, we are honing our ability to rapidly deploy forces into any area of operations, regardless of austere theater infrastructure or any adversary's antiaccess/area denial capability. These operations are often time-constrained events where hours, or even minutes, matter. So our ready now approach focuses on both reducing the amount of time units require to initiate movement to theater and enabling them to do so at the highest levels of readiness.

To achieve this, we must look at every aspect of preparation; if we can't get there, we can't fight, and we can't win. Readiness begins at home station, and, across the total Army, commanders are entrusted to ensure their personnel and equipment are ready to deploy. An essential element of their ability to do so resides in our power projection platforms and our mobilization force generation installations. These facilities provide the backbone from which we can rehearse and refine the systems and skills necessary for expeditionary deployment. To test these systems, commands at all echelons leverage EDREs. FORSCOM, in particular, executes no-notice brigade-level EDREs to exercise deployment systems and assess unit- and installation-level readiness.

In 2018, FORSCOM alerted the 2nd Brigade Combat Team, 10th Mountain Division, to conduct a sealift EDRE out of Fort Drum, New York, through the Port of Philadelphia, and into Fort Polk, Louisiana, through Port Arthur, Texas, for their Joint Readiness Training Center rotation. When they arrived at Port Arthur, they continued to the tactical assembly area at Fort Polk where they completed reception, staging, onward movement, and integration tasks. This was a monumental and challenging operation that moved 1,487 pieces of rolling stock through a relatively unused transportation node and directly into operations—with no notice.

EDREs of this complexity exercise the entire enterprise—from FORSCOM and Army Materiel Command to Installation Management Command and U.S. Transportation Command (USTRANSCOM)—and validate not only the unit but also the entire deployment process. The Port of Philadelphia had not been used for deployment in nearly a decade. Through the EDRE program, we've been able to exercise just about all of the ports, roughly 20 in total. USTRANSCOM's personnel at the ports aren't used to dealing with tanks and military vehicles, so they're exercising us, and we're exercising them. There's training occurring on both sides. It's truly a win-win situation for the ready now mentality and culture.

What message do you have for commanders when it comes to maintenance readiness?

It's all about 10/20! At a certain point in time, budget unpredictability caused us to temporarily go to a maintenance standard of fully mission capable (FMC) plus safety. Now that those measures have been lifted, we have to get that out of our culture. There is only one maintenance standard in our Army: the 10/20 standard. FORSCOM guidance clearly identifies that commanders are responsible for maintaining their equipment to the 10/20 standard at home station, during training, and while deployed.

Operational readiness begins with a deliberate and disciplined supply and maintenance program led by commanders; achieving success starts in our home-sta-

tion motor pools and is reinforced by direct command involvement. These programs teach, train, and reinforce the standards for our operators, maintainers, and leaders.

Resourcing our formations to the 10/20 standard is at the heart of achieving Sustainable Readiness, and the Army is committed to doing so across all Army components. However, consistent, predictable funding is critical to achieve and sustain these standards. When funding becomes unpredictable, readiness across the force is lost, and the true cost is increased risk. It's all about getting back to the basics, the blocking and tackling fundamentals to build readiness. As my old boss, Gen. [Robert B.] Abrams always said, the bottom line is that you can't outrun your maintenance—you have to train what you can sustain.

Can you discuss total force integration and force structure, particularly concerning early-entry requirements?

FORSCOM knits together all of the Army's components in everything we do. Unlike the other services, we have over 50 percent of our forces in the Reserve component, so our relationship and our total force working together as teammates are absolutely critical in building readiness for America's Army. While the bulk of FORSCOM contains predominantly active Army combat power, the partnership we have with the National Guard and Army Reserve is arguably stronger today than it has been since World War II. We are in full alignment in our vision for total Army readiness. Our cooperative efforts to integrate and leverage our strengths are producing tremendous results in both our readiness levels and our training programs across all three Army components.

The Army is under tremendous pressure in terms of force structure. Authorized end strength is set, but the demands of Multi-Domain Operations are evolving and expanding. The business models we used to meet counterinsurgency requirements will clearly need to be modified as we transition to large-scale combat operations. Getting the prioritization and structure of early-entry capabilities right is critical, particularly given the demands that accompany the task of setting a theater in an austere area. Again, it's a balance between components to meet these requirements. Where are we with our current force structure? Overall, I'm pretty comfortable with our ability to meet early-entry requirements.

What role will FORSCOM play in Army modernization?

The need to adapt to emerging threats is not a modern-day phenomenon; if we are to ensure overmatch against any adversary, current or future, we must adapt. FORSCOM has a great partnership with Army Futures Command (AFC) that allows us to provide the warfighter perspective while staying informed on modernization efforts. In turn, we're included in all meetings and decision briefs to help shape the way forward for modernization and the future force.

In making immediate and significant investments in our future capabilities across the Army's six modernization priorities, there may be some near-term impacts on readiness. At FORSCOM, it's our role to mitigate those impacts through integration, experimentation, and training. We select forces to assess equipment, confirm capabilities, and provide feedback to AFC as part of the buy-try-decide methodology. This partnership is critical to identifying and refining capability gaps under real-world conditions and getting equipment into the hands of Soldiers sooner and faster, while minimizing cost and risk to the force.

What is the biggest lesson you learned throughout your career that Soldiers today should know?

The fundamental lesson is that a commander's most valuable resource is time. The way commanders go about spending it for their units is of the utmost importance.

Secretary of the Army Dr. Mark Esper has acknowledged this age-old truth and has taken action to reduce the administrative burden on company commanders and buy additional training time. This is having a direct payoff on our ability to produce ready now units; whether a combat arms unit or a sustainment unit, and irrespective of Army component, commanders should understand and appreciate the effort to ease the burden of time management.

The other lesson I offer is that readiness is all about being proactive. It's personal initiative, and it's responsibility. Prior to addressing manning and equipping, commanders must understand that achieving readiness rates comes down to the individual Soldier being mentally and physically prepared to conduct training. Only after the individual Soldier is prepared can commanders plan and execute collective training of squads, platoons, companies, and battalions.

Any final thoughts you'd like to share?

I want to emphasize how well the enterprise approach to combat readiness is permeating throughout our Army. All four of the Army commands are absolutely teamed across all components with the Army service component commands and direct reporting units in a very positive way that produces tremendous improvements in readiness.

I've been back and forth between assignments at the Pentagon, out in the field, in the testing community, and now in my current role at FORSCOM. Quite honestly, I see less stovepipes across the force. I think we've made a huge effort to break them down and synchronize what exactly our capabilities are and what we can bring to bear across all the functions of the Army. The teamwork we are seeing now to make this work is really tremendous.

Winning can't be about one Army component, or even just one service. It's all about preparing our units to deploy in support of combatant commanders, enabling them to win decisively, and setting conditions for them to return home safely. When it comes to FORSCOM, our objective is clear: maximize readiness in units so our Army can achieve success anytime, anywhere against any enemy.

Operationalizing DLA's Support to the Army

The Defense Logistics Agency has been undergoing many changes to better meet the needs of today's warfighters.

■ By Lt. Gen. Darrell K. Williams

The Defense Logistics Agency (DLA) has undergone an exciting transformation in recent years. The changes are mostly behind the scenes, but they have already contributed to something Army sustainers care deeply about: improved military readiness. DLA has accomplished this through a number of initiatives that operationalize its support to the warfighter.

What does "operationalize" mean? Our customers have traditionally viewed DLA as largely a wholesale, static supply chain organization. What we're doing better is translating what DLA does into immediate, actionable information that is more relevant to our military services. DLA must view success through the same lens as the warfighter. In the Army's case, success is defined as fully mission capable weapon systems and maximum readiness.

Service Readiness Dashboard

In spring 2018, DLA rolled out the Service Readiness Dashboard, a comprehensive tracking tool that has become the centerpiece of our efforts to operationalize support to the services. We have always been good at addressing consumable and depot-level repairable requirements at the aggregate level, but we were not able to relate our support particularly well to the readiness of specific weapon systems.

The Service Readiness Dashboard provides a common operational picture by combining data from the services' automated systems with DLA's wholesale data. Through that combination, we are able to see DLA's operational impact on service weapon

systems and requirements.

This new tool improves our capabilities in other ways as well. While we used to collectively review our agency performance metrics monthly, recent advances in data management and data science have made it possible for us to address the readiness of key weapon systems in near-real time. We can respond more quickly and accurately to critical materiel and supply availability issues, and we are more predictive in our support to service readiness.

As director, I access the Service Readiness Dashboard nearly every day. So do the commanders of our six major subordinate commands and other key leaders across the agency. But more importantly, our DLA professionals now have a powerful decision-making tool to help them prioritize their work. As a result, we have seen significant improvements in our materiel support to Army readiness.

The bottom line is that five of the Army's big six weapon systems (Abrams, Black Hawk, Bradley, Stryker, Apache, and Paladin) have seen substantial improvements in material availability at the DLA level. For example, our data from January to December 2018 shows our material availability for the M1A1 Abrams tank increased by 6.6 percent. Material availability for the UH-60 Black Hawk helicopter went up by almost three percent. The Service Readiness Dashboard has helped us focus on what is important to keep these weapon systems fully mission capable.

Granted, DLA's material availability at the wholesale level is different

than Army supply availability. Nonetheless, by any objective measure, DLA's overall materiel support to the Army has enhanced the readiness of the Army's big six systems.

The future for the Service Readiness Dashboard points to greater levels of definition. For example, the dashboard tells us the systems that are "not mission capable supply." That supply may be service supply or DLA supply. But there is another level of definition required, because in the services' not mission capable supply category, there are some DLA impacts not currently taken into account. So we are working toward greater definition to break out the DLA impact on this category.

We also plan to include metrics for industrial support in Army depots. Right now, the dashboard is focused on support to operational units. Soon we will be able to view our impact on the industrial support, which will give us a much more comprehensive picture. We are very excited about the additional capability the dashboard brings to DLA's ability to operationalize our support to the services, and to date, the Army has been a strong partner.

DLA Regional Commands

DLA's organizational structure includes three centrally selected commanders for its regional commands: DLA Indo-Pacific, DLA CENTCOM & SOCOM [Central Command and Special Operations Command], and DLA Europe & Africa.

These commanders oversee the critical capabilities closely linked to the J-4 sections of the combatant commands they support. Incidentally, DLA CENTCOM & SOCOM and DLA Europe & Africa are commanded by Army colonels.

DLA's transformation over the past three years has made all our elements in those regions centrally led and commanded by our regional commanders, giving warfighters a single point of contact through which to access all DLA capabilities.

Within the Army, the regional commands are also linked with the theater sustainment commands. We consider this a critical element and a significant multiplier that extends DLA's capability and support to the services in their areas of responsibility.

These regional commands are comparable to the Army Materiel Command's Army field support brigades. They provide full service for all DLA capabilities in a combatant command area of responsibility. This has greatly strengthened our relationships with the combatant commands and improved the support we provide to the Army and the joint force.

The ASOC

The linchpin for synchronizing these new operational concepts is the transformation of the DLA Joint Logistics Operations Center to the Agency Synchronization Operations Center (ASOC). The ASOC will provide a better, more comprehensive common operating view of DLA's mission support and business processes.

DLA is organized into six major subordinate commands, three regional commands, and several critical functional directorates, such as our Procurement and Acquisition Directorate or J-7.

The ASOC will dynamically fuse the functions and expertise of nearly every mission function DLA performs with our national account managers for each service, our combatant command representatives, and whole-of-government liaisons. This new approach will enable DLA to better focus and communicate the support it provides to the warfighter and our whole-of-government partners.

A principal element located in the ASOC will be the Army National Account Manager (NAM) team. The NAM will work side by side with the functional subject matter experts across DLA who affect critical Army issues. One-stop shopping with more streamlined support to the NAMs will translate to even more responsive support for the Army.

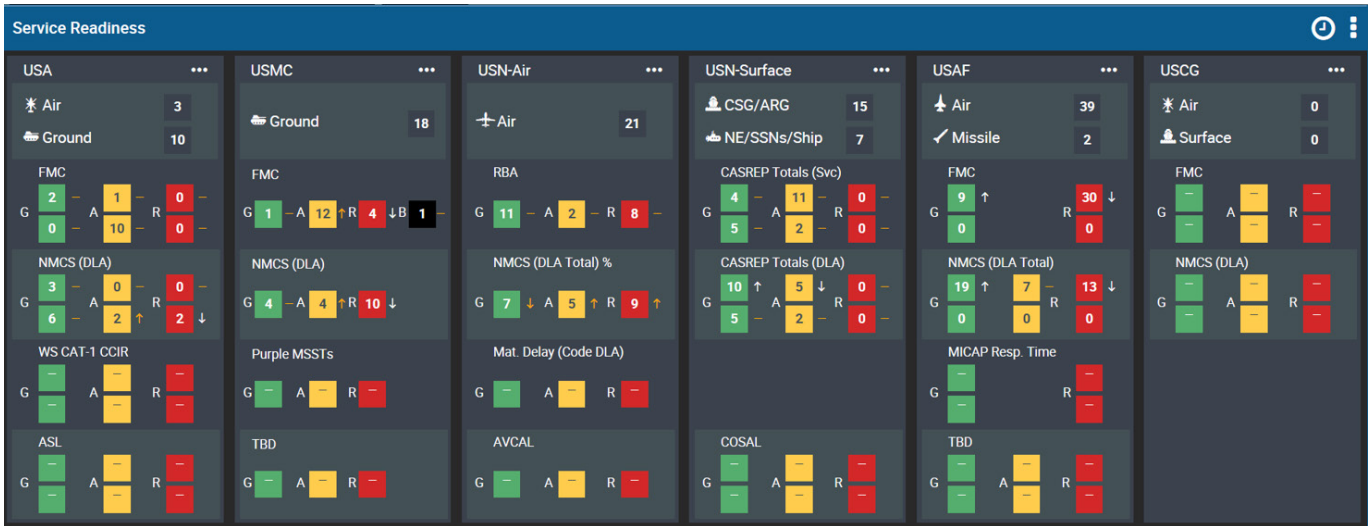
Demand Planning

One of the most challenging areas for any organization of DLA's scope—and a critical aspect of operationalizing DLA's support to the Army—is the accuracy of demand planning and forecasting. Are we ordering the right items and in the right quantities? Are we ordering items that will have an immediate impact on service readiness? Are we over ordering or under ordering? Collectively, we must ensure we are spending the services' and the Department of Defense's precious dollars on items that positively impact readiness.

I cannot overemphasize how much of a team effort between DLA and the Army this must be.

In July 2018, we invited expert demand planners from the services to join us at DLA for the first Demand Planning and Forecasting Summit to provide us with the best projection of their demand for fiscal years 2019 and 2020. This important face-to-face session revealed more demand than we were aware of—about 20 percent more.

This more accurate demand figure allowed DLA to proactively address the increase well in advance of need. We also gained insight into what weapon systems might see less demand or be headed for obsolescence.



The Service Readiness Dashboard provides a common operational picture by combining data from the services' automated systems with wholesale data from the Defense Logistics Agency. The figures used in this example are notional.

Thanks to the participation from the Army G-4 and Army Materiel Command, the summit was extremely successful in identifying projected non-Army-managed class IX (repair parts) requirements for the next two years.

We took this process one step further. Once we received the requirements from the services, we invited about 175 critical industry partners to an industry day. There, we passed along what industry could expect from DLA in the coming months.

Through demand planning and forecasting summits and industry days, we are getting ahead of service requirements and posturing the agency to help the services improve readiness in the future.

What Will You See?

Although many of these operationalizing efforts are internal to DLA, for the Army majors assigned as support operations officers in brigade combat teams, the lieutenant colonels commanding brigade support battalions, the G-4s in tactical divisions, and the sustainment brigade commanders who support those divisions, our goal is for you to see improved supply availability that leads directly to improved readiness.

Make sure you know who your local DLA forward representative is; there is one on every major Army installation. That person or element can be of enormous benefit to you and is a direct link to DLA headquarters and each one of our major subordinate commands. Use this capability to the fullest. Through them and the other enterprise organizations that support the Army, you'll see an improvement in your readiness.

Parting Thoughts

Before I close, I'd like to leave you with a couple of thoughts. DLA is a great place for Army sustainment professionals to serve. In my estimation, DLA is an agency not as well known to our junior leaders, field-grade officers, warrant officers, and noncommissioned officers, but it is a rewarding joint assignment that you should seek.

Furthermore, the alignment and interdependencies between DLA, the Army G-4, and the Army Materiel Command will grow even stronger in the decades to come. As I like to say, to describe the Army as our customer just doesn't cut it—we are partners. None of us can support the warfighter without the others. The enterprise perspective you will gain at DLA will benefit you throughout your career. I look forward to seeing you at DLA.

DLA is dedicated to improving our support to the warfighter. Over the past year and a half, we have made wise investments in an effort to ensure the Army gets what it needs. In fact we've made nearly $250 million in investments in authorized stockage lists, forward stocking initiatives, weapon systems support, and other readiness drivers.

DLA is fully committed to aligning with the Army G-4, the Army Materiel Command, and others to ensure we understand what the Army needs to improve readiness and that we are supporting those requirements.

Our strategic plan contains five lines of effort, but the one that is central to everything we do and that will never be compromised is "Warfighter First." DLA has been and always will be a Warfighter First agency.

Lt. Gen. Darrell K. Williams is the director of the Defense Logistics Agency. He holds a bachelor's degree in psychology from the Hampton Institute and a master's degree in business management (logistics) from Penn State. He is a graduate of the Army Command and General Staff College, the School of Advanced Military Studies, and the National War College.

A Crane Army Ammunition Activity employee stages munitions for delivery to warfighting units. (Photo by Hayley Smith)

From Bullets to Bombs:

JMC Provides Munitions Readiness for the Joint Force

■ By Brig. Gen. Michelle M. T. Letcher

The Joint Munitions Command (JMC) operationalizes to support the Chief of Staff of the Army's priorities and combatant commander requirements to deliver global munitions requirements and ensure warfighter readiness. Every bullet, bomb, and grenade that Soldiers use in training or combat is managed by JMC. This command oversees the life cycle, including production, distribution, storage, and demilitarization, of all conventional ammunition for the entire Department of Defense.

JMC ammunition plants produce more than 1.6 billion rounds of ammunition annually. The command is accountable for more than $30 billion of munitions and missiles. While government-owned entities managed by JMC produce 30 percent of conventional ammunition, the remaining 70 percent is produced commercially. JMC oversees those commercial providers as well.

This article examines how the shift to Sustainable Readiness impacts ammunition forecasting, distribution, and the wholesale-to-tactical concept. These topics affect when and how we get ammunition to warfighting units.

Ammunition Forecasting

JMC's organic industrial base (OIB) is a key source of critical capabilities that provide readiness for current and emerging threats. The munitions OIB, which consists of 14 subordinate arsenals, depots, and ammunition plants, provides unique capabilities not always found in the private sector. These capabilities enable JMC to rapidly meet the requirements of the Army's Sustainable Readiness Model (SRM) priorities. The OIB provides JMC the ability to surge as needed to provide munitions to the warfighter.

One key purpose of the SRM is to generate consistent readiness for the Army, and JMC uses it to better support the warfighter. JMC strives to support everything from basic training to global battlefield dominance. To achieve

this, unit leaders must ensure accurate forecasting and requirements for both training and combat munitions.

Distribution

One of JMC's core competencies is the distribution of ammunition to ensure it is at the right place at the right time as required by the joint force. JMC continuously monitors combatant commander requirements and ammunition consumption rates to ensure strategic readiness.

Increased demand for training and operational ammunition means that it is very important for units to correctly forecast to meet upcoming requirements. Throughout the fiscal year, JMC takes part in several working groups that forecast, plan, and fund ammunition needs and deliver them to the point of use.

Assisting units with improving forecasting readiness are the Army Materiel Command's 101 training and information exchange events sponsored by the Forces Command. A unit's forecast is its demand on the system to ship ammunition to the right location to support its requirement. Overstated forecasts may cause misdistribution of ammunition assets. This might cause second- and third-order effects, creating shortages at other locations or incurring additional costs for redistributing ammunition across installations.

"When developing ammunition requirements and forecasts, it is recommended to review historical usage on ammunition items," said Chief Warrant Officer 5 Pennie Temmerman, JMC's military deputy to the Munitions and Logistics Readiness Center. "Taking into consideration those historical expenditures helps inform future requirements for training plans and forecasts."

One focus area of JMC's SRM efforts is requirements synchronization and forecasting. By developing these requirements, JMC anticipates distribution demand based on projected unit training and planned operations. This means that accurate forecasting from tactical units will result in increased effectiveness and unit readiness.

Recent trends are consistent with the SRM, which aims to ensure our forces have the capability and flexibility to conduct the full range of military operations. Nathan Hawley, director of JMC's Munitions and Logistics Readiness Center, said that the organization is closely monitoring these trends to ensure that munitions are ready for future requirements.

From a tactical perspective, JMC's ammunition plants, depots, and arsenals are analogous to a very large ammunition supply point (ASP). For example, McAlester Army Ammunition Plant, Oklahoma, which is comparable in size to Washington, D.C., has more than 2,200 ammunition warehouses. An ASP is generally smaller at approximately 20 to 40 warehouses. JMC's installations have considerable and varied stock that we continuously strive to manage, store, and distribute more efficiently.

Ongoing worldwide engagements place large ammunition requirements on the OIB. JMC performs primary requirements analyses and tracks requirements for all combatant commands worldwide. Supply planning gives senior leaders the big picture of how the conventional ammunition stockpile compares to future requirements.

Wholesale-to-tactical Concept

In addition to improving readiness at the joint level, JMC works with tactical units to improve ammunition logistics efficiencies. Recently, in an effort to increase unit readiness, JMC coordinated a wholesale-to-tactical delivery exercise to distribute ammunition from a depot directly to a brigade combat team on a range in a factory-to-foxhole scenario.

"Throughput distribution better supports readiness and training in support of large-scale ground combat operations," said Temmerman.

Normally, the JMC Materiel Management Operations Directorate provides munitions to the ASP based on unit forecasts, and then the ASP issues munitions to the unit. However, during this exercise, JMC directly delivered assets from Crane Army Ammunition Activity, in Indiana, to the ammunition transfer and holding point (ATHP) in the field and completely bypassed the ASP.

The ammunition Soldiers in the field need training opportunities to achieve readiness to support combat operations. When JMC enables these types of events, Soldiers achieve those tasks and have a better understanding of ammunition doctrine before they deploy to an operational environment.

This wholesale-to-tactical exercise involved the 1st Combat Aviation Brigade and the 1st Armored Brigade Combat Team, 1st Infantry Division, which conducted brigade combat team gunnery exercises at Fort Riley, Kansas. Chief Warrant Officer 2 Paul Jones, the ATHP accountable officer said that the ATHP section of the 601st Aviation Support Battalion, 1st Combat Aviation Brigade, used the pilot program to conduct an immediate resupply of an attack reconnaissance battalion.

"We managed ammunition through the Standard Army Ammunition System (SAAS) and directly shipped ammunition back to the Fort Riley ASP during Phase I," said Jones.

During Phase II the ATHP team received the shipment from Crane, managed it through SAAS, issued it to the battalion, and then shipped unused ammunition back to the ammunition activity.

"We have trained 12 Soldiers on all of their METL [mission essential task list] tasks and [they] are now more prepared and tactically and technically proficient," added Jones.

Wholesale-to-tactical delivery results in increased Soldier and unit readiness. It allows the ATHP to exercise near-contingency munitions operations and more closely follow doctrine by exercising throughput distribution to better support decisive action in large-scale combat operations.

Students in the 89B Ammunition Supply Course connect a mock ammunition pallet to a Chinook helicopter on June 27, 2018, as part of sling load training at Fort McCoy, Wis. (Photo by Scott T. Sturkol)

This resupply concept enhances the unit's readiness by training ATHP staff on the METL tasks of providing ammunition support to units assigned to their brigade. Some of these METL tasks include the following:

- ☐ Manage ammunition stocks.
- ☐ Plan platoon ammunition support operations.
- ☐ Handle munitions.
- ☐ Issue ammunition.
- ☐ Conduct ammunition inventories.
- ☐ Conduct ammunition sling-load operations.

Through all aspects of ammunition operations, the quality assurance specialist (ammunition surveillance) (QASAS) personnel and logistics assistance representatives (LARs) are available to support unit munitions readiness requirements. QASAS personnel conduct inspections to assess serviceability and deterioration of munitions. QASAS personnel and LARs provide important information to warfighting units regarding proper use and turn-in of ammunition.

For example, some ammunition, such as 5.56-millimeter rounds, is rather labor intensive to turn in once it has been opened and unpackaged. Additionally, the lot number for loose small-arms ammunition may be unknown, which will restrict its use or even make it unserviceable. QASAS personnel and LARs can advise Soldiers on the most efficient use and management of ammunition in order to prevent waste and improve readiness.

Through these efforts, JMC is postured to supply and surge to provide munitions lethality and readiness to the joint warfighter in all operations, from deterrence through the end of combat operations. Through JMC's priorities and lines of effort, its plan will continuously evolve to ensure strategic global munitions readiness.

Brig. Gen. Michelle M. T. Letcher serves as the commanding general of the JMC. She holds a bachelor's degree in social work from Illinois State University, a master's degree in human services and counseling from the State University of New York, a master's degree in advanced military studies from the Command and General Staff College, and a master's degree in national security and strategic studies from Kansas State University. She is a graduate of the Air Defense Artillery Basic Course, Ordnance Basic Munitions Management Course, Combined Logistics Advanced Course, Command and General Staff Officer Course, the School of Advanced Military Studies, and the Senior Service College Fellowship.

Building the Nation's Might:

An Interview With Retired Gen. James Thurman

■ By Arpi Dilanian and Matthew Howard

After a nearly 40-year career in the Army, retired Gen. James D. Thurman knows readiness. An expert trainer and proven leader, Thurman was known for understanding what it takes to get Soldiers ready for whatever they are asked to do. Throughout 10 different command positions, including at V Corps, U.S. Army Europe, and the Forces Command, he never lost sight of the importance of the U.S. Soldier. We sat down with him to discuss the progression of Army readiness throughout history and how it is evolving for the future.

Throughout your career, what were some of the biggest milestones for the Army in building and maintaining readiness?

When I came into the Army as a young lieutenant in 1975, the Vietnam War had just ended and frankly we were in poor shape in terms of readiness. I didn't really know what I had gotten into; we lacked standards and discipline, and we were not very ready.

A number of things helped get us back on the right path for restoring readiness. The first, and most significant actually, occurred between 1971 and 1973 when we ended the draft in favor of an all-volunteer force. The evolution of doctrine also had a tremendous impact. Our focus at that time was shifting to the Russian threat in Europe and rebuilding the Army, which continued through 1989 until the wall between East and West Germany came down and the Soviet Union disintegrated.

We had to be ready. We watched as doctrine developed, primarily FM [Field Manual] 100-5, Operations. It evolved to Active Defense doctrine in 1973 and then to AirLand Battle in 1982. Doctrine drives capabilities development, and this progression allowed us to get a modernization effort going for the post-Vietnam-era Army, where we focused on the big five: the M1 tank, the Bradley fighting vehicle, Apache and Black Hawk helicopters, and the Patriot missile system.

Joint doctrine also evolved, especially after the Goldwater-Nichols [Department of Defense Reorganization] Act of 1986, where there was more focus on the joint force. FM 3-0, Operations, was published in 1993 as the new capstone document, which better addressed the fact that the Army and other services would fight as a joint force.

Gen. James D. Thurman, the commander of the United Nations Command, U.S. Combined Forces Command, and U.S. Forces Korea, talks to Sailors during a visit to the USS Nimitz *in Busan, South Korea, on May 11, 2013. (Photo by Mass Communication Specialist 3rd Class Christopher Bartlett)*

There was also renewed emphasis on training, particularly on responding to an emergency in Europe through REFORGER [Return of Forces to Germany] exercises and on emergency deployment readiness exercises. We also saw the advent of the combat training centers [CTCs], which was a significant milestone for maintaining a trained and ready Army.

During that time period, the focus was still primarily on large-scale combat operations. We saw our efforts pay off with the Army's performance in our fast responses going into Grenada in 1983, Operation Just Cause in 1989, and Operations Desert Shield and Desert Storm in 1990 and 1991. I think these efforts really helped shape the Army.

But when 9/11 hit, our response in Afghanistan put us on a different course to focus more on counterinsurgency operations. The same is true for the Iraq War; we used heavy formations but had to change our focus from a high-end, combat-performing organization back to small-unit, counterinsurgency operations. The challenges in building readiness had evolved.

Now, following the North Korean crisis in 2013 and the reemergence of great power competition with China and Russia, the current National Security Strategy requires the Army to again be ready for high-intensity conflict while maintaining the ability to conduct irregular warfare. Doctrine has again evolved into the current Multi-Domain Operations, and we are adjusting the force. We are making great progress in readiness, but we have to maintain our momentum.

The Army cannot build adequate readiness without consistent, predictable funding. The sequestration that occurred with the Budget Control Act hurt Army readiness. While the Army has had a favorable budget the past two years, we cannot expect the same in fiscal year 2020 unless congress changes the law and gets rid of the sequestration.

You served on the 2016 National Commission on the Future of the Army. What were some of the major findings and recommendations?

The commission was directed by Congress following the Army Restructuring Initiative, particularly the Army's decision to remove AH-64 Apache helicopters from the National Guard force structure. After a detailed analysis on capabilities and shortfalls, we made 63 recommendations, including putting four AH-64 battalions back into the Army National Guard after we saw shortfalls in attack reconnaissance battalion capacity.

We looked at everything from short-range air defense artillery to chemical, biological, radiological, and nuclear response capabilities. We saw a need to increase the number of armored brigade combat teams. There were significant shortages in Army tactical mobility, both current and planned, and in strategic mobility across the entire Department of Defense, including airlift, ships, and rail cars.

Shortfalls existed in quartermaster, fuel distribution, and water purification capacity, which impacted responsiveness to meet war plan needs. And all of these had a direct or indirect application to overall sustainment and logistics.

Perhaps the most significant recommendation was that the Army continue to treat readiness as its most important funding priority. In the past, we struggled to determine how to properly assess overall readiness.

We needed a better methodology for assessing the progression of training readiness and a revised reporting system using quantifiable criteria. Implementing Objective T was another recommendation that will allow us to restore and treat readiness as a top funding priority.

How will the Army Futures Command (AFC) ensure our readiness posture is in line with the future operational environment?

We should see a more streamlined process to field cutting-edge technologies to the warfighter in a more expeditious manner. First and foremost, AFC is creating unity of command. The commander is responsible for developing both future warfighting concepts and corresponding materiel solutions.

In identifying requirements and fielding potential solutions faster, the key will be preventing a lot of requirements creep; when requirements are allowed to creep in programs, it only causes the cost to increase well above what's budgeted.

The competitive advantage the Army has long enjoyed is eroding, and we must acknowledge that. Our current modernization process is industrial age; it's staff-centric and stovepiped, overly bureaucratic and slow.

The current system is not organized to deliver modern, critical capabilities to Soldiers quickly. To be successful, we must turn ideas into action by improving acquisition business processes; pursuing appropriate commercial options; performing continuous experimenting, prototyping, and testing; and improving training.

We're being challenged in every domain today: land, maritime, air, cyber, and space. Coupled with the establishment of the Futures Command, I think the Secretary and Chief of Staff [of the Army]'s six priorities are a great start to modernize the Army.

At the end of the day, it's all about Soldiers and giving them the best hardware our country has so they can fight and win.

What were some of the biggest challenges you faced as commander of U.S. Forces Korea, and how did you overcome them?

My time in Korea really taught me how critical logistics and sustainment are for success; my biggest challenge was always maintaining

"Fight Tonight" readiness. I was surprised by the lack of adequate munitions and the number of single points of failure within our warfighting systems—things that can't be fixed overnight.

So, how did we improve them? Within the first 60 days of being in theater, we started working with the U.S. Pacific Command and the Army and Joint Staffs on these issues. On congressional staff visits, we let members know we had munitions shortfalls as a result of taking risk and not buying sufficient quantities. And I put a lot of emphasis on training readiness; you have to train and exercise to be proficient, especially when it comes to sustainment and joint logistics capabilities.

As an example, we lacked adequate offshore petroleum distribution capacity to refuel the joint force. So we reenergized our joint logistics over-the-shore exercises to practice petroleum distribution.

Another area was rapid joint reception and onward integration. This, too, needed more training and practice.

If we have another conflict on the peninsula, logistics and sustainment of the joint combined forces will be at the forefront due to the large amount of urbanization, limited number of mobility routes, and congested ports.

Supply distribution is always a concern; you never have enough trucks, and tactical mobility is limited. And all of this is further complicated with the potential of having to conduct simultaneous noncombatant evacuations.

I highly recommend folks go back and read T. R. Fehrenbach's *This Kind of War: The Classic Korean War History* and Martin van Creveld's *Supplying War: Logistics from Wallenstein to Patton* as we continue to build our readiness in Korea. These are very good lessons on logistics and sustainment that must not be forgotten.

How do you foresee training evolving for Multi-Domain Operations?

Training and leader development are absolutely essential, and we need a renewed emphasis on training our leaders at all levels, from sergeant all the way up to the general officer.

Our sustainment units must train like they're going to fight; our Soldiers must regain their maintenance and supply skills and be able to perform them under the toughest conditions. You cannot contract these skills out when it comes to Multi-Domain Operations.

Our CTCs are essential to maintaining combat readiness, and they must be properly resourced to conduct multi-echelon training across all domains. Training typically gets between 12 and 13 percent of the total Army budget, and we must ensure that it continues to be a funding priority.

Yes, training is expensive; but we can never put a price tag on an American Soldier. We must never apologize for training too much.

We must remember the Army fights in the dirt and continue to make the CTCs harder. This requires a highly professional and competent opposing force to train against, as well as quality observer-controllers and fully instrumented, modernized training centers to give us realistic, timely feedback to support our after action review (AAR) process. Only then are we able look at what happened, why it happened, and apply fixes to our formations.

If you go back through history, I think the AAR process is the most important reason CTCs have been so effective. Between my time as an armored brigade combat team commander, commander of the Operations Group at the National Training Center, and later commanding general, I participated in 54 rotations; I learned something with each one.

Not only did I learn about our doctrine and how to do things right—good tactics, techniques, and procedures—but I learned about myself and how to be a better leader.

We can never allow our CTCs to become stagnant as they are essential to maintaining readiness. And as I reflect back, that was clearly one of the highlights of my Army career.

How important to readiness are our allies and joint partners, and how can we strengthen interoperability for the future fight?

Our allies and partners are essential to our National Security Strategy. As we move into Multi-Domain Operations, we need to use every opportunity to train and exercise more with our partners. We must ensure we are interoperable, fully understanding how we sustain and maintain greater readiness together.

This will require us to share our doctrine and standard operating procedures to be more proficient. When we sell equipment and help them modernize, interoperability has to be at the top of the list; the same is true when our allies field their own equipment.

History has been very instructive: we must remember that peace through strength helps us prevent war, and our allies and partners are key to this.

You commanded at every echelon. What one piece of advice does every Soldier need in their hip pocket to be successful?

First, always strive to be your very best at what you do. The Army is a standards-based organization; never take shortcuts and perform to standard.

Be humble. Spend more time listening than transmitting. Read—particularly history—reflect, and stay informed.

Second, listen to Soldiers; they are the most precious resource our nation has to offer. Always stay focused on the mission.

Strong Europe: *A Continental*

By Lt. Col. Edward A. Fraser and Command Sgt. Maj. Robert V. Abernethy

On June 6, 1944, the U.S. Army undertook continental-scale warfare. This summer will mark the 75th anniversary of D-Day, and U.S. Army Europe (USAREUR) will be committed to commemorating the largest amphibious invasion ever known.

Reflecting on the success of Operations Neptune and Overlord—the massive invasion by Allied naval, air, and land forces—one significant factor of their success was a well-oiled sustainment machine. Under different names and in different capacities throughout the seven decades since then, USAREUR has remained ready to undertake large-scale operations enabled by logistics lessons learned.

Today, USAREUR serves as the logistics hub for moving equipment, supplies, and personnel to positions across Europe to support the possibility of large-scale combat. This is done with the knowledge that a future conflict might resemble World War II more closely than recent operations in Iraq and Afghanistan.

This article outlines some of the challenges of continental-scale warfare and describes how USAREUR stays ready to present combat-credible forces by preparing the theater to deter and, if required, defeat any threat. It argues that the scale and complexity of the challenges in Europe are greater than in any other current U.S. theater. However, through our dynamic exercise program and rotations of continental United States (CONUS)-based forces, the formal practice of setting the theater, and our efforts to enhance relationships with allies and partners, USAREUR presents tested solutions applicable to any logistics challenge imaginable. So, a bit like the sentiment Frank Sinatra crooned about in the song *New York, New York*, "If I can make it there, I'll make it anywhere,"

l-scale Combat Sustainment Laboratory

Vehicles from the 1st Armored Brigade Combat Team, 1st Infantry Division, fill the holding yard in Antwerp, Belgium, on Jan. 23, 2019, in preparation for Atlantic Resolve. (Photo by Sgt. Benjamin Northcutt)

if you understand sustainment in Europe, you can make sustainment a success anywhere.

Continental Complexity

The European continent has been the site of many of the 20th century's most calamitous and significant events. In addition to the 75th anniversary of the beginning of the end of Nazi rule in Europe, this year marks the 30th anniversary of the fall of the Berlin Wall, signifying the end of the Cold War.

It is easy to assume that the situation in Europe is unchanged from World War II, but a combination of changing factors reveals the theater to be a more complex environment today than it was before. These factors include heterogeneous perceptions of threat, a multitude of transnational bodies, growing numbers of allies and partners, enormous distances, and highly varied environments and terrain.

Throughout its history, Europe has never had a cohesive identity, and it would be unwise to think of today's theater as homogeneous. Cold War and D-Day planners had the dubious benefit of a single unifying threat. Now, forces in Europe must plan against multiple state and non-state actors with neither a consensus view of the preeminent threat nor a priority of response.

NATO continues to play a vital role in maintaining collective defense in Europe, but it is not the only supranational body in the region. Figure 1, on page 37, offers a glimpse of the complexity associated with a few of these bodies.

When the Berlin Wall fell, there were 16 members of NATO. Now there are 29, with two more countries engaged in the accession process. In addition, the alliance has a number of formal partners across the region. This increase in membership has had

implications for language, doctrine, interoperability, equipment, and interior lines of communication.

The expansion of NATO has greatly increased the length of interior lines of communication. In the 1970s and 1980s, U.S. Army units had to be prepared to move from their garrison locations to the inter-German border, a distance of about 170 miles. Now, troops may be moving up to 1,400 miles from their home stations in Germany to NATO's northeastern flank on the shores of the Baltic Sea or to its southeastern flank on the Black Sea.

With the distances in Europe come varied climates that range from Mediterranean summers to Scandinavian winters. Military sustainers, planners, and operators also must consider diverse terrains, from mountain ranges, such as the Alps and Carpathian Mountains, to the plains of Germany and Poland, and the rolling hills of the Baltic region, which are densely packed with forests and lakes.

From the types of threats to the varied terrain, all of these complexities contribute to the logistics conundrum left for sustainment professionals to solve. USAREUR's dynamic multinational exercise program and the routine rotation of forces into theater tests solutions to these challenges on a continental scale.

Logistics Test Labs

One of the most salient lessons from Operation Overlord was that preparing for extended combat operations in Europe requires planning well in advance of the point of crisis. USAREUR uses exercises and rotational deployments to test and refine processes for deployment, which provide lessons for planners preparing for any theater. Simply put, our operational plans demand freedom of movement. We achieve this, in part, by projecting forces through multiple ports, both north and south of the Alps.

USAREUR's sustainers use multi-modal movements to ensure there is no single point of failure in the reception, staging, onward movement, and integration of troops and equipment. A 2017 *Army Sustainment* article described how the command has used brigade combat team rotations from CONUS to test and validate processes. From their arrival at multiple ports, in places such as Zeebrugge and Antwerp, Belgium, brigades have demonstrated their ability to achieve readiness standards at their deployed destinations.

Artillery equipment is loaded at an English port in Brixham, England, on June 1, 1944. (Photo courtesy of the Center for Military History)

By testing the ability to flow through multiple points of entry, USAREUR develops two capabilities: the ability to open another point of entry if the operational situation demands it and the necessary infrastructure to support a variety of potential operations. The use of multiple locations strengthens host-nation partnerships and builds familiarity working alongside commercial partners.

In Europe, National Guard and Army Reserve rotational units provide a unique capability that highlights the total Army construct and offers planners in other theaters an off-the-shelf catalyst for sustainment success. Since most sustainment capabilities are in these two components, they become key enablers.

The 191st Combat Sustainment Support Battalion (CSSB), an Army Reserve unit, is currently providing sustainment support to rotational units stationed and training in Poland, the Baltic States, and Scandinavia. The 191st CSSB supports and trains under the direction of the 16th Sustainment Brigade. This training allows the CSSB to receive real resupply missions with real deadlines.

Deploying units like the 191st CSSB strengthens USAREUR's readiness. They provide the command with additional combat sustainment support capacity that complements permanently stationed units. Their rotations also further the reach of lessons learned from encountering the logistics complexity of the European theater.

The USAREUR exercise program has assigned and rotational forces training alongside our allies and partners more than 50 times a year. This year's focus exercises will happen in the Black Sea region with Saber Guardian. Last year, we deployed units across the Baltics and Poland with Saber Strike. These exercises build our sustainment relationships with allied and partner armed forces and help to identify and solve multinational logistics challenges now so they do not be-

come vulnerabilities later.

In the future, USAREUR will use Exercise Defender 2020 to gather further lessons. Defender 2020 is a Department of the Army-directed, USAREUR-led exercise designed to demonstrate the United States' ability to rapidly deploy a division to the European theater. This exercise, the largest in 25 years, will test echelons-above-brigade units in operational-level warfighting and its associated sustainment.

Through our rotations of combat and sustainment forces as well as through our exercise program, USAREUR, along with its allies and partners, maintains readiness by adapting to today's lessons learned rather than waiting until a crisis emerges. These missions allow us to test the capabilities of air and sea ports, which leads to improved processes, infrastructure, capabilities, and contracts.

The strength of these relationships sustains our ability to rapidly project combat forces to the point of need. Without this flexibility, USAREUR's ability to achieve an advantageous accumulation of forces and supplies would be degraded.

Command Sgt. Maj. Rocky L. Carr, 21st Theater Sustainment Command (TSC), summed it in the following way: This theater is a laboratory for sustainment training, and each unit that gets the opportunity to train here leaves better.

Setting the Theater

Another way USAREUR creates the strategic advantage is by setting the theater in anticipation of crises and contingencies by staging prepositioned stocks and practicing military mobility.

During the Cold War, Europe was arguably the best-set theater ever. Hundreds of thousands of assigned forces were stationed in Germany and the annual Return of Forces to Germany (REFORGER) exercise practiced NATO's ability to reinforce its presence rapidly. The exercise peaked in 1988, when 125,000 troops deployed. This required significant enabling capabilities, with the creation and maintenance of prepositioned stocks, air movement staff, fuel pipelines, and so forth.

With the decrease of U.S. personnel in Europe, the Army's ability to maintain such a well-set theater reduced commensurately. Nevertheless, the 21st TSC must still be able to open the theater to allow for the inflow of troops from CONUS. To this end, many of USAREUR's permanently assigned personnel are enablers. They sustain the troops already present in Europe, enable theater opening, and protect Army personnel, materiel, and installations in theater.

For logisticians in Europe, this has had a number of key implications, including growing Army prepositioned stocks (APS), developing a variety of port operations options across the continent, liaising with rail network operators, and improving convoy operations.

As the Army continues its focus on setting the European theater, APS has become an important part of strategic mobility, readiness, and deterrence. By positioning equipment and supplies forward in combat-configured sets, the time needed to respond with capable forces from CONUS is reduced significantly. Since 2017, the number of APS locations has increased from one to four. Alongside equipment sets for three combat formations and a division headquarters, there are also equipment sets to enable the movement and sustainment of these forces.

Growth of equipment sets will continue through 2021. USAREUR has also established the European Enduring Equipment Set. Units training in Europe can draw equipment from this set, reducing the cost of deploying equipment from CONUS.

Enhancing Relationships

Another variable that adds to the complexity of movement in Europe is that national diplomatic clearance standards vary by nation. The work of USAREUR with national movement coordination centres, host nations, and the 21st TSC's Theater Movement Control Element has stream-

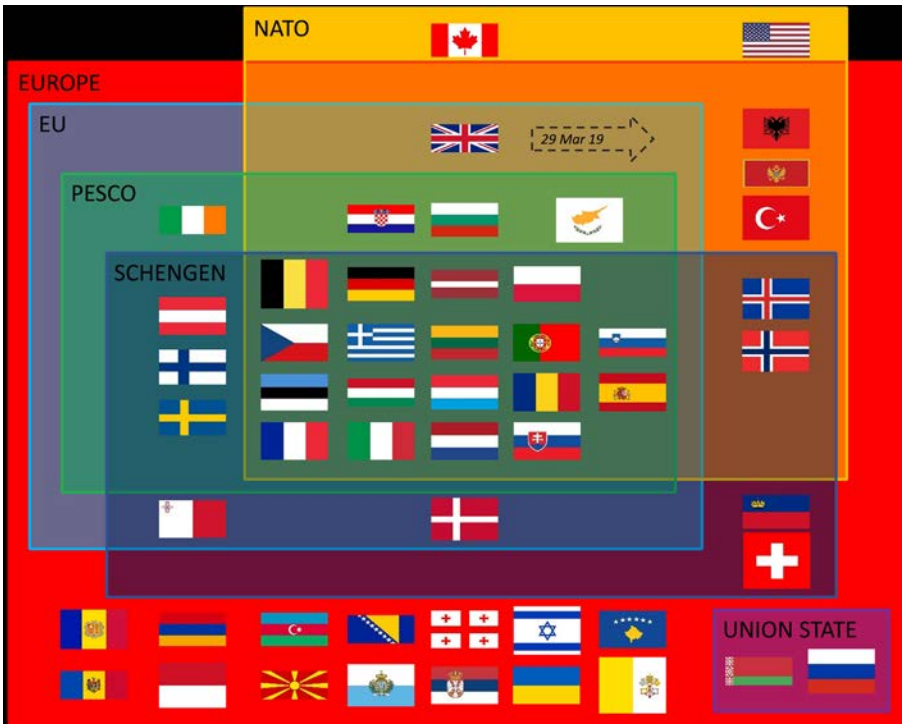


Figure 1. This Euler diagram depicts European membership of supranational bodies.

lined the ability to complete requisite travel documentation to cross borders safely and responsibly.

Re-establishing road movements across Germany and Poland allows our forces to learn post-Cold War lessons, while working with host nations to ensure freedom of movement. In addition to routine movements in support of exercises, our sustainers conduct route reconnaissance to determine the capabilities of roadways in Europe.

These efforts require collaboration among military police, engineer, transportation, and civil affairs units as well as host nations. The result is a holistic view of roadway capabilities; measures to mitigate capability shortfalls and work with host nations to potentially upgrade infrastructure are identified.

For these reasons, it is critical for sustainment professionals and planners to prioritize establishing and strengthening relationships with allies and partners.

During the planning for the D-Day invasion, Allied forces had to solve logistics problems upon which the fate of the world hinged. If the United States is to ever again engage in continental-scale warfare, it will almost certainly be alongside allies. Therefore, it is critical for USAREUR to build relationships and interoperability with its allies and partners in the region, especially those within the sustainment discipline.

At its simplest level, this is about low-level interactions between junior-enlisted personnel from different armies. Whether support to ceremonial events, the annual Nijmegen marches in the Netherlands, or earning the German armed forces proficiency badge or Italian parachutist wings, such events are typically fun, build relationships, and result in great stories to tell family and friends.

The Conference of European Armies for Noncommissioned Officers event is an example of higher-level work on interoperability. This is an annual opportunity for senior-enlisted leaders from European armies to build relationships, understand capabilities, and ensure continuity of efforts for noncommissioned officer development among allies and partners. All of these events address the human element of interoperability from which development of technical and procedural interoperability can flow.

As mentioned earlier, our joint, multinational exercise program is arguably the most closely integrated, complex, and demanding series of exercises in today's Army. In 2018, approximately 29,000 U.S. personnel participated in 52 exercises, involving more than 68,000 participants from 45 countries. During multinational exercises, our sustainers gain real-time, real-world experience in a partnered European environment. Few other training opportunities involve allies and partners on this scale. The value of the multinational cooperation and lengthy lines of communication make training in this theater invaluable.

With no offense intended to our colleagues at CONUS-based combat training centers, they cannot mimic the language, culture, terrain, distance, and interoperability challenges that units routinely face in Europe. Therefore, they also cannot provide better opportunities for units to adapt to the sustainment challenges encountered here, such as cross-border customs processes or road and training restrictions within and around population centers. Such challenges are more readily overcome by strengthening relationships with allies and partners.

The European theater is different from any other because of its scale, complexity, and the number of allies, partners, and supranational bodies with a stake in the theater. It is tempting to treat contemporary threats and contingencies as though they might merely be reruns of the Cold War, but doing so oversimplifies the changes that have affected the region since the fall of the Berlin Wall.

This theater represents today's most challenging mission set for echelons-above-brigade personnel. USAREUR is required to maintain a combat-credible posture in theater to deter aggression and to be able to conduct large-scale combat operations with allies and partners to maintain collective security in the region.

One way the command does this is by setting the theater. The command's day-to-day business practices develop this line of effort through the rotation of units in support of efforts such as Atlantic Resolve and through a demanding series of national and multinational exercises.

For sustainment professionals, it is difficult to think of a more complex theater than Europe. For leaders at the unit level, consider the challenges of European operations in your professional development activities, while planning exercise, training scenarios, and the integration of National Guard and Army Reserve personnel into your formations.

For leaders involved in developing sustainment doctrine and concepts, think about the scale and complexity of continental warfare in a regionally diverse and densely populated theater. For acquisition specialists, we encourage you to ensure interoperability by design by thinking about how platforms might be used in Europe. By understanding the challenges of the Army's most diverse and complex theater, leaders and sustainment professionals will be better equipped to adapt to any theater in the future.

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Increasing Readiness Through GCSS–Army Proficiency

The GCSS–Army Training Strategy mitigates training and learning gaps across the Army to ensure system proficiency for all units.

■ By Chief Warrant Officer 5 Jonathan O. Yerby

Spc. George Santos from A Company, 307th Brigade Support Battalion, processes parts in the supply support activity's receiving section (post goods receipt) at Fort Bragg, N.C. (Photo by Chief Warrant Officer 2 Stephen Mbugua)

For the last few decades, stovepipe logistics information systems (LISs) were the cornerstone of sustainment operations. Global Combat Support System–Army (GCSS–Army) and other Army enterprise resource planning (ERP) systems, such as the Integrated Personnel and Pay System–Army (IPPS-A), the General Funds Enterprise Business System (GFEBS), and the Logistics Modernization Program (LMP), have quickly changed the way the sustainment community has met the readiness and auditability needs of the Army. These systems replaced legacy LISs, providing sustainment and non-sustainment professionals with greater visibility of near-real-time data.

Operators, middle and senior managers, and senior leaders must be trained and educated to leverage enterprise solutions to effectively and efficiently sustain the Army warfighting functions. CASCOM training developers, with the assistance of the GCSS–Army program management office, established the GCSS–Army Training Strategy to define how training is developed and executed throughout the total force. This strategy is intended to mitigate training and learning gaps that the operational force is encountering during implementation.

The strategy provides a framework for leaders and operators to learn, grow, and sustain GCSS–Army proficiency through the institutional, operational, and self-development training domains. It covers all levels of profes-

sional military education (PME) and initial military training (IMT). Leaders at all levels will execute the strategy to build GCSS–Army proficiency by leveraging new tools to train the force on integrated end-to-end business processes.

The Goal

The goal of the GCSS–Army Training Strategy is to provide Soldiers, Department of the Army (DA) civilians, and contractors with the knowledge and skills to operate, manage, and make decisions using all of GCSS–Army's capabilities. The training framework must be flexible but rigid enough to produce operators, managers, and senior leaders capable of performing and understanding end-to-end business processes.

Each Army component must develop a training plan that best fits its needs. All must become familiar with GCSS–Army functions, processes, and capabilities and train these to proficiency.

The strategy and tools invested in for training our sustainment professionals deliver the means for a realistic and agile training environment that enables increased readiness across all ERP systems. Our sustainment Soldiers are dealing with issues encountered during the past five years of the GCSS–Army fielding caused by the revolutionary ERP focus on business process solutions and an inadequate training strategy to effectively leverage these processes.

All Army components are dealing with inexperience among operators, managers, and instructors. Soldiers who did not receive training as part of the fielding plan and those who have not worked with GCSS–Army will continue to be trained in order to build a proficient force of GCSS–Army operators and managers. That will increase readiness for large-scale ground combat operations.

Linking GCSS–Army capabilities to their impact on Army readiness and auditability is an important element of the training strategy. Education and training must describe the relationship between ERP data and mission command systems data that commanders will use to make decisions. ERP data is leveraged by mission command systems throughout the operational Army, but ERP systems are not recognized as part of today's mission command architecture. Including ERP systems in the mission command architecture is becoming more critical as we shape the Army to conduct Multi-Domain Operations.

Training to operate, manage, and make decisions within an ERP environment presents a unique set of challenges for all training domains. In the past, instructors and developers did not have to demonstrate integration points between the Property Book Unit Supply Enhanced, Standard Army Retail Supply System, and Standard Army Maintenance System–Enhanced platforms.

GCSS–Army engages multiple business areas through a single database that constantly changes in near-real time. This makes content development and delivery somewhat challenging for training developers and facilitators. The introduction of integrated business processes in a single enterprise solution demands an understanding of GCSS–Army to ensure data is developed through interactive scenario-based practical exercises.

Equally, instructors are challenged to facilitate learning based on limited functional experience with integrated business processes. Therefore, the knowledge needed to conduct effective training is in high demand. Unit-level trainers will experience this challenge as well and must constantly adapt training to meet the demands of new ERP capabilities.

Training Requirements

The Combined Arms Support Command (CASCOM) has identified five specific training requirements in support of GCSS–Army implementation.

Instructor knowledge and experience. The number of Soldiers proficient in GCSS–Army application across business areas is limited because of the short fielding time of GCSS–Army Wave II.

A live training environment for GCSS–Army. To effectively train and educate sustainment and non-sustainment leaders to effectively and efficiently leverage ERP capabilities, we must provide institutional training tools that replicate "live" GCSS–Army application business processes and ensure they are available for use by the institutional and operational Army. This environment needs to be available across all Training and Doctrine Command (TRADOC) centers of excellence, regional training sites, and installation troop schools.

Mission command integration. Army ERP systems, which include GCSS–Army, GFEBS, IPPS-A, and LMP, directly impact the warfighter by feeding logistics information into mission command systems. These ERP systems are not identified as mission critical components of the Digital Mission Command System architecture. Their exclusion adversely impacts the ability to effectively train and integrate them as part of mission command training.

Training development agility. Traditionally, very little technology has been used to develop training content, simulations, and scenarios for stovepipe LISs. ERP systems constantly update and change, demanding a new approach to training development. Leveraging new software technologies will aid in the development of training products for all training domains.

Training resource materials. The development of institutional training products currently relies on training products from the product manager for GCSS–Army. These products include "End User Manual+" content and technical bulletins for system enhancements and new capabilities. A live training environment will mitigate the need for the institutional domain to rely solely on training that the product manager develops. That will

improve training content delivered to the operational force by providing innovative scenario-based training to the point of need via training support packages and the GCSS–Army Education Environment.

The GCSS–Army Training Strategy

The GCSS–Army Training Strategy comprises four phases that support objectives and desired outcomes. The strategy ensures operators, middle managers, senior managers, and senior leaders will receive the training and education to effectively and efficiently leverage ERP capabilities.

CASCOM has implemented skills-based training and integrated a live training environment. Initially, this training focused on institutional instruction. However, it has grown to fulfill the operational and self-development training needs of the Army.

Phase I. Whether attending officer, warrant officer, or noncommissioned officer courses or advanced individual training, students receive operator-level instruction using simulations that provide end-to-end scenarios on how to complete processes within GCSS–Army. Operator-level training provides Soldiers and leaders with an understanding of how to complete processes within an ERP solution.

Phase I of the training strategy is institutionally focused and the foundation for the training strategy. This phase relies on the analysis of product manager-provided new equipment training products. This analysis leads to the design and development of current and future military occupational specialty courses.

Phase II. Phase II institutional training, which includes scenario-based training at the IMT and PME levels, will vary to incorporate training that is based on the duties and responsibilities of the student. Students in advance individual training are trained through vignettes and scenario-based instruction that focuses on best business practices for end-to-end process completion. Training for officers, warrant officers, and noncommissioned officers uses scenarios focused on analytics supporting causative research and analysis of reports and general data within GCSS–Army.

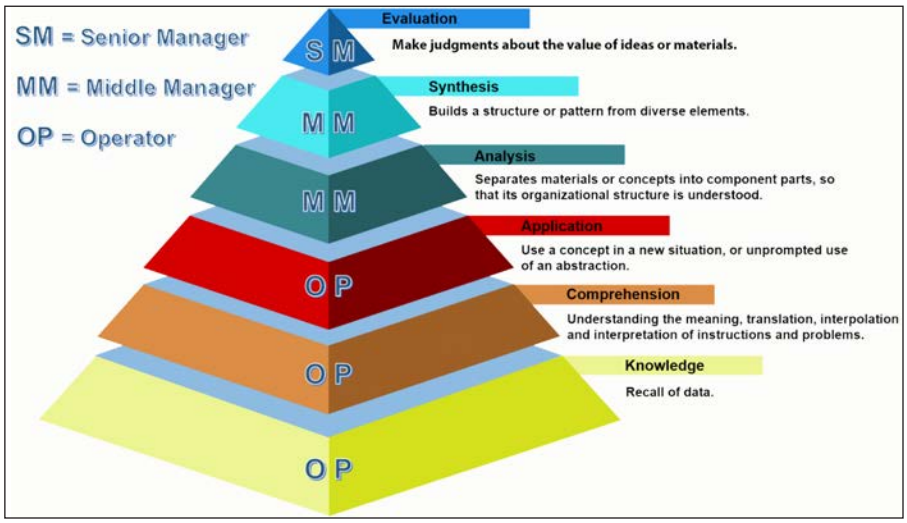

Figure 1. A comparison of Bloom's Taxonomy to GCSS–Army training levels.

Phase II of the strategy is ongoing and contingent upon the incorporation of live training environments to assist in the development of military occupational specialty training, training support packages (TSPs), and targeted functional courses.

Phase III. Phase III is the implementation and integration of the GCSS–Army Education Environment at all skill levels. This phase focuses on the operational and self-development domains of training and provides tools that enable training across the Army at all TRADOC centers of excellence and Forces Command (FORSCOM) troop schools. This training will take place using one sustainment common operational picture.

The GCSS–Army Education Environment consists of three key components that enable synchronized training across all training domains: a live training database, the uPerform training development tool, and an analytics dashboard.

The live training database provides GCSS–Army users with an agile, functional training platform where they can apply, analyze, and interpret data in a realistic environment that is available in classrooms across the Army.

The uPerform (SAP Productivity Pak) is a training design and development tool equipped with a web-based repository that lets trainers collaborate and share training throughout the Army. This tool provides the agility to keep pace and develop training for all training domains. Additionally, it will assist in ensuring one sustainment common operational picture, regardless of where training occurs.

A data analytics dashboard for training development assists in the analysis and development of current and future GCSS–Army courses. The tool will capture metrics to determine critical tasks and topics that need to be developed.

Phase IV. GCSS–Army Education Environment integration across all TRADOC centers of excellence and FORSCOM troop schools is the fourth phase.

This phase empowers operators, middle managers, and senior managers with operational and self-development training opportunities provided through uPerform, e-learning, and instructor-led courses at FORSCOM troop schools and TRADOC's institutional and regional training sites.

Objectives and Outcomes

CASCOM is the proponent for GCSS–Army institutional training and post-new equipment training sustainment. GCSS–Army directly impacts readiness and all Soldiers, DA civilians, and contractors conducting unit supply, property book, maintenance, warehouse, and materiel management functions in support of the Army mission.

Training must exceed users' expectations and include realistic, agile training enablers that expand across all domains of training at the point of need. Operators must be given the knowledge and understanding to effectively execute GCSS–Army business processes. Middle and senior managers must have an understanding of the application and focus on analyzing and evaluating system capabilities. Senior leaders must have the training needed to evaluate ERP data and make critical decisions that will affect readiness in real time.

Figure 1, on page 41, shows the correlation between Bloom's Taxonomy and training of operators, middle managers, and senior managers. It highlights the level of training received by Soldiers, DA civilians, and contractors throughout their careers. The chart represents a career and lifelong learning continuum that begins with institutional training and grows through on-the-job experience and targeted self-development.

The compilation of institutional training, operational on-the-job training, and self-development leads to the ability to analyze and interpret data in order to provide leaders with the knowledge to make readiness decisions using relevant actionable data.

The Way Ahead

We must continue to improve the tools needed to properly train and educate personnel by integrating ERP training into IMT, PME, troop schools, and unit-level training. We must use the same training across the force to create one common training and sustainment picture for the entire Army.

Using new training technologies and tools to develop interactive e-learning will enable synchronization across all training domains. Teaching instructors and training developers to better utilize the live ERP training databases to facilitate training and create scenario-based instruction will improve IMT, PME, troop school, and functional courses.

Training developers will need to determine ERP training requirements for GCSS–Army business areas, including requirements identified through the Command and General Staff College, Army War College, and Pre-Command Course. Additionally, the Army Common Operating Picture and data analytics should be integrated into PME, functional courses, and senior leader courses throughout all TRADOC centers of excellence.

By gather data and feedback from the troop school and regional training sites, we will be able to enhance training support products. We must also partner with colleges and universities to provide credentialing and certification for junior and senior leaders.

Sgt. Mathew Anderson from A Company, 307th Brigade Support Battalion, conducts inventory in the storage section of the supply support activity during training at Fort Bragg, N.C. (Photo by Chief Warrant Officer 2 Stephen Mbugua)

We must link ERP training capabilities with facilities and equipment to replicate operational environments and total GCSS–Army business process integration. The development of fully integrated end-to-end processes depends on the integration of the Army ERP systems. Today most of the end-to-end business processes are interfaced and rely on external manual processes and input versus true ERP end-to-end process integration.

We must continue to enhance ERP capabilities by improving the users' experience, modernizing, and integrating the entire enterprise in order to benefit from a total enterprise environment.

Using better training tools is already improving training across all Army components. Training developers have replaced static data views associated with the legacy systems with scenario-based instruction that leverages constantly changing data.

New training venues provide the tools to achieve truly integrated ERP training, and the dynamic training environment requires leaders to think outside the box. Realistic and agile ERP training is building operator, manager, and leader proficiency to meet operational needs and increase readiness.

Chief Warrant Officer 5 Jonathan O. Yerby is the command chief warrant officer for the Combined Arms Support Command. He previously served as the 14th Regimental Chief Warrant Officer of the Quartermaster Corps at Fort Lee, Virginia.

Deploying an SSA's CASL for an Armored Brigade Combat Team

A common authorized stockage list for an armored brigade combat team can improve readiness, but it needs additional transportation assets in order to be fully mobile.

■ By Lt. Col. Charles L. Montgomery

Soldiers from the 123rd Brigade Support Battalion draw items ordered by customers. (Photo by 1st Lt. Brett E. Harris)

The 3rd Armored Brigade Combat Team (ABCT), 1st Armored Division, from Fort Bliss, Texas, is the sixth rotational brigade supporting the 2nd Infantry Division in the Republic of Korea. Unlike any other ABCT within the last thirteen years of operational deployments, the 3rd ABCT deployed its supply support activity (SSA) common authorized stockage list (CASL) to Korea as part of the operation. The task was monumental, but the experience gave the 3rd ABCT a valuable opportunity to train a skill that has atrophied.

The 3rd ABCT operates a multiclass SSA that contains 4,264 lines supporting seven battalions consisting of more than 4,000 Soldiers and nearly 2,000 pieces of rolling stock equipment. The central idea of combat preparation, at echelon, is to train as the unit will fight. Doing so creates a realistic mental paradigm that allows Soldiers to apply training lessons learned to combat operations.

Brigade combat teams (BCTs) must deploy their SSAs during home-station field training, combat training center rotations, and forward deployments in order to exercise the full scope of the organization. This will pay enormous dividends when called to operate in austere environments without modern infrastructure.

CASL Logic

The Department of the Army contributed significant financial resources of approximately $100 million to ensure each BCT is equipped with a CASL to increase readiness. The rationale for standardizing BCT SSAs falls into two lines of logic. First, standardization increases readiness for worldwide operational deployments. ABCTs can immediately tap into any SSA's CASL, regardless of location, and receive parts that enable operational endurance without experiencing drastic differences in on hand stocks.

The CASL is packaged to remain mobile in combat environments and designed to sustain an ABCT for 25 to 30 days. Organizations can offset any differences with a shop stock list (SSL) designed to sustain their unit for an additional 15 days. Demand-supported (ZV line) items in the Global Combat Support System–Army (GCSS–Army) represent 90 percent of the SSL. The battalion commander has the discretion to keep the final 10 percent of items labeled as command-supported (ZM line) items in GCSS–Army.

Demand supported and command supported lines are updated every 30 days in GCSS–Army. The SSL is validated based on demand analysis conducted at the sustainment brigade. Foundationally, the SSL provides one third of materiel requirements, the SSA provides the second third, and strategic sustainment echelons provide the final third to sustain armored formations.

Second, SSA standardization eliminates individual technicians' interpretations of items to stock. Historical consumption analysis served a significant role in CASL development. The Combined Arms Support Command (CASCOM), in conjunction with the Army Materiel Command (AMC), conducted a comprehensive look into supplies consumed at high rates. This research identified roughly 4,268 CASL line items to stock across ABCT formations. Variances in stocked lines are based on unique equipment fieldings that require additional lines for sustainment.

CASL Conversion

The 3rd ABCT initiated CASL conversion in April 2017 and completed the transition in September 2018. The conversion increased the brigade's ASL from 2,884 line items to 4,264.

The increase of 1,380 lines is significant and requires the organization to use additional resources, to include space, mobility, and manpower, to support the pace and tempo of the ABCT.

Mobility and Deployability

The CASL structure consists of 18 BOH Environmental, LLC, field pack-up (FPU) containers and 35 container roll-in/out platforms (CROPs). In accordance with the CASL planograph, smaller items are stored in FPU containers alongside sensitive items. CROPs are designed to store bulk items; ultimately, CROPs are placed inside 20-foot equivalent unit containers for immediate transport.

In order to move the SSA in one lift, the distribution company requires 27 palletized load systems (PLSs), load handling systems (LHSs), or a combination of the two. Currently, the SSA is authorized 12 systems, leaving a shortfall of 15 vehicles. CASL implementation increased the total number of stocked lines by 1,380. For perspective, an infantry BCT SSA maintains 2,243 lines and a Stryker BCT maintains 3,327 lines.

CASL implementation in ABCTs increased stockage levels by 48 percent, drastically increasing the number of required transportation assets needed to ensure complete mobility. Therefore, until the mobility gap is closed, moving ABCT SSAs in one lift is problematic. This mobility gap forces brigade commanders and brigade support battalion (BSB) commanders to accept tactical risks on supply movement priorities during the initial attack until the sustainment brigade is postured to transport additional assets forward in the area of operations.

The 3rd ABCT developed three courses of action (COAs) based on 552 usable pallet spaces. (These are the spaces available once the ABCT deducts transportation for LHS compatible water tank racks and modular fuel systems from tactical movement plans.) Based on the CASL package, it takes 432 pallet spaces to move the SSA in one lift.

The first COA was to move the entire SSA and dedicate the remaining 120 pallet spaces for moving days of supply (DOS). The focus of the second COA was DOS movement; it dedicated 465 pallets to moving supplies and the final 87 pallet positions to SSA and other BCT movement requirements.

The third COA took a percentage of the SSA, DOS, and key BCT movement requirements to maximize the transportation assets required to extend operational reach. Sustainment leaders identified maintenance significant parts, in accordance with Logistics Support Activity guidance, in order to streamline CASL movement priority. The 3rd ABCT has 2,784 lines containing maintenance significant parts, which, combined with each battalion's SSL, allowed the BCT to sustain operations for a maximum of 30 days (from a maintenance perspective).

The remaining 1,744 lines will move forward at a later date based on the BCT's movement priority. This COA allows the BSB an opportunity to support the fight and provide operational endurance until

the full complement of sustainment assets are positioned forward at the brigade support area.

Challenges

Readiness ensures units are capable of executing their assigned missions. The implementation of CASL represents a substantial investment in increasing and maintaining readiness across the Army. Although CASL implementation is in the early phases, there are key indicators that suggest it will achieve its intended purpose over time. BCTs face three challenges to CASL implementation: planograph analysis, mobility constraints, and additional storage requirements.

Planograph analysis. The CASL planograph serves as the systematic guide to properly store and account for CASL items. Deviation from the planograph is not recommended; however, CASCOM provides sourcing solutions when units encounter situations affecting item placement.

The key friction point during this process is when parts do not fit into the identified space as directed by the planograph. The planograph is primarily dimension-based, and different vendors package and ship items in a variety of methods that alter space requirements.

The national stock number or manufacturer label should be visible to expedite the retrieval of parts during the verification process; this is not always the case since item packaging is not standardized. If the packaging does not fit into the prescribed location, CASCOM will provide sourcing solutions to accountable officers.

Mobility constraints. The extra 1,380 lines increased mobility requirements. The SSA's modified table of organization and equipment authorizes 12 PLS or LHS systems; however, the SSA requires 27 systems to move the CASL.

The difference of 15 systems places the brigade in a peculiar position because of the distribution company's requirements to move three DOS in order to ensure operational endurance.

Additional storage requirements. Space is an issue complicated by facility management, which may take years to rectify. The Army standard for SSA facility implementation is described in an April 14, 2009, memorandum of record that originated from the Army's Assistant Chief of Staff for Installation Management. The memorandum states that SSA facilities composed of a warehouse facility will not exceed 20,640 gross square feet. This design is consistent with military construction projects for fiscal year 2012 and beyond. The decision to implement CASL was made five years later, and its additional space requirements were not accounted for.

Gained Efficiencies

CASL has improved efficiencies in the area of configuration, and mobility will follow once additional transportation assets are fielded. CASCOM and AMC placed tremendous effort into detailing the precise location of each stored part.

The FPU configuration decreases blocking and bracing requirements during transport, which makes movement less of a hassle. Mobility has improved in that the package is quicker to load and displace as the mission requires.

Storing the CASL in 18 FPU containers and 35 CROPs eliminates the requirement to maintain additional containers. Historically, SSA accountable officers were plagued with additional containers that accumulated over time. Based on CASL configuration, the package represents the only requirement for containers, thus relieving SSAs of the burden to maintain unnecessary seaworthy containers during home-station operations.

The implementation of CASL has improved the 3rd ABCT's ability to maintain readiness. Careful consideration and resource solutions for the identified CASL challenges would enhance the overall efficiency and productivity of SSA operations.

The goal of the 3rd ABCT is to remain 100 percent mobile, and the CASL configuration has fundamentally increased mobility. However, until the appropriate transportation assets are issued to close the gap, ABCT formations will not be 100 percent mobile.

CASL effectiveness is based on expert logistics analysis from senior sustainment echelons, inclusions of lessons learned from SSA leaders and Soldiers fielded the CASL, and technological advancements designed to make SSA operations more efficient.

BSB commanders, with guidance from brigade commanders, must continue to conduct in-depth analysis on every individual pallet space to determine the correct supply loads to transport. Information from this analysis provides brigade commanders with opportunities to increase operational reach during initial operational phases.

From an area support perspective, CASL provides ABCT formations the capability to reach across vast distances with confidence in item availability. Units can conduct physical walkups or execute ZDIRECTs to transfer repair parts from one SSA to another SSA, immediately improving readiness.

AMC has clearly advanced the goal of holistically increasing readiness. CASL execution is still in the early phases, but clear signs indicate the implementation will have a significant impact on maintaining readiness at a high level.

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Beyond the CPX–Functional: A Dedicated Sustainment Simulation

The 25th Infantry Division Sustainment Brigade conducted the Reverse Warfighter exercise to wargame large-scale combat operation scenarios specifically from a sustainment perspective.

■ By Col. Dennis H. Levesque, Maj. Michael W. Taylor, and Capt. Justin Treakle

Soldiers from the 25th Division Sustainment Brigade conduct communications training during a Reverse Warfighter exercise at Schofield Barracks, Hawaii, from Sept. 30 to Oct. 11, 2018. The brigade conducted the exercise to wargame large-scale combat operation scenarios from a sustainment perspective. (Photos by Sgt. Sarah D. Williams)

Bullets don't fly without supply!" This common phrase in the logistics community is one that has been around for some time and is now more salient than ever. In today's combined arms fight, logistics plays a heavy role, but it is one that often gets placed at a lower priority in combined arms training. Multiple training events are conducted annually to stress maneuver elements in simulated, near-peer threat environments.

Simulated war games are great training and an ideal way to evaluate the Army's combat arms forces without putting them in harm's way. The thinking behind these traditional warfighter simulations is that logistics training objectives and normal execution duration must be compressed because of the number of training days allocated. As a result, some maneuver commanders are left with unrealistic expectations when it

comes to logistics capabilities in actual combat situations.

Further, the landscape of logistics is changing. How the Army has sustained itself in counterinsurgency operations for the past 17 years is vastly different from how it will sustain itself in near-peer threat environments.

Changes to structure and reduced personnel numbers have increased the need for maneuver commanders to emphasize sustainment rehearsals and incorporate sustainment into their schemes of maneuver. Commanders without a clear understanding of their logistics support could stretch their lines of sustainment to the breaking point and undertake actions that are unrealistic or unsupportable.

Realistic Sustainment Training

To address these issues, the 25th Infantry Division Sustainment Brigade at Schofield Barracks, Hawaii, conducted a weeklong Reverse Warfighter exercise to wargame scenarios specifically from a sustainment perspective. Reverse Warfighter highlighted the complex problems sustainment brigades face.

A growing trend across all branches of the military is the desire to realistically test how sustainment is accounted for in simulated exercises. An April 10, 2018, article in *USNI News*, discussed the Navy and Marine Corps' plan to account for logistics in exercises. In the article, Patrick Kelleher from the Marine Corps Logistics Command is quoted as saying, "We must definitively exercise plans and not fairy-dust logistics like may have been done in the past."

The article goes on to show the need to portray accurate sustainment operations. Making assumptions with sustainment does not allow the military to see what deficiencies exist or allow for process experimentation. Undoubtedly, the need for realistic logistics capability data is not only an Army issue but also one that must be addressed across the entire military.

Soldiers from the 25th Division Sustainment Brigade set up a high frequency antenna during a Reverse Warfighter exercise at Schofield Barracks, Hawaii, from September 30 to October 11, 2018. The exercise tested the brigade's ability to manage, direct, and synchronize logistics for unified land operations.

Academics Week

The 25th Infantry Division Sustainment Brigade determined that the best way to showcase this concern was to "train to failure" using a command post exercise (CPX)–functional combined with the available simulation format, Logistics Federation (LOGFED). In order to accomplish this, the sustainment brigade support operations (SPO) section hosted a week of "academics" with all of the stakeholders. During academics, the team examined all of the capabilities of subordinate and higher units as well as of the brigade itself.

The simulations education occurred simultaneously with fundamentals for the personnel assigned to the "puckster" (simulation operator) role. The sustainment brigade had identified a shortfall in previous exercises: the simulation operator roles were being filled by Soldiers who could work with the simulation to execute the task at hand but often failed to understand key elements of the overall mission. Additionally, the training audience had no understanding of how the simulation worked.

To remedy these problems, the response cell was treated as a tactical assault command post consisting of seasoned personnel who understood the functional aspect of "pucking" units in the simulation, the "sim logic" that LOGFED uses, and the concept of sustainment in order to quickly and accurately relay necessary information to the training audience.

By marrying academics and simulation training together, the simulation operators were able to have a better understanding of the capabilities of all units involved and gain insight into the overall mission, which is essential in performing mission command tasks.

Platform Problems

There were drawbacks, however, and one major lesson learned was that units face many challenges while working with LOGFED. LOGFED is a platform that can work in concert with maneuver simulation platforms, such as Warfighter Simulation (WARSIM), to provide data to training units. However, both LOGFED and WARSIM are cumbersome, inflexible, and require in-depth training.

Before every CPX that involves WARSIM and LOGFED, users get weeklong training from representatives from the Logistics Exercise and Simulation Directorate who also troubleshoot issues during exercises. They served as key agents that allowed our unit to navigate the systems and get the training that we needed with the systems that they provided. However, there needs to be a more comprehensive simulation that allows maneuver units and sustainers to develop one common operational picture.

Since neither platform provides clarity on events, master scenario event lists need to be created by the exercise

control group to inject and notify the units of what exactly happened. LOGFED is only able to provide information regarding the loss of personnel and equipment when the user drills down into the event log and pulls the information.

It is clear that this burdensome platform requires a lot of time to manipulate and relay reports and also requires too much time for training personnel. The Army needs a better way to execute simulated training and must consider other options in order to enhance the training of its sustainment Soldiers.

The platform should be more user-friendly with a graphic user interface that allows both the maneuver and logistics commanders to see the same picture and data without extensive training. It should use adaptive artificial intelligence so that commanders must make decisions as opposed to simply executing the course of action that was approved during rehearsals.

This type of virtual constructive training would allow sustainment Soldiers and commanders to be better trained in decision-making skills and could more easily be paused to discuss those decisions with higher command (HICOM) and lower command (LOCOM) elements.

Coordination

Another takeaway is that the way CPXs are currently being conducted does not allow for effective or efficient information flow. The sustainment brigade designed Reverse Warfighter with this issue in mind and focused on utilizing the entire sustainment team, both horizontally (peer-to-peer) and vertically (HICOM to LOCOM).

External coordination was made with staff counterparts at the 25th Infantry Division, the 8th Theater Sustainment Command, and the 593rd Expeditionary Sustainment Command to provide observer, coach, trainer oversight for the brigade. This external support proved to be critical to the success of the exercise as it allowed the brigade staff and SPO sections to work in a one-on-one environment directly with their higher headquarters counterparts to ensure that the sustainment brigade's concept of support was accurately nested with theirs.

It is important to note that these HICOM elements would not provide traditional observer, coach, trainer support. The intent was to have the training audience, HICOM, and LOCOM in the same localized area observing and executing scenarios.

Following an event, the simulation was paused to allow for discussion of the tactics, techniques, and procedures that were used. These breakout sessions were invaluable as the brigade was able to get a detailed picture of what HICOM needed in terms of reporting and how to best relay that information from LOCOM throughout the entire chain of command and across the organization. This was crucial to establishing new standard operating procedures that streamlined reporting and cut down on delays in relaying information.

Other issues faced included staff coordination and reporting. SPO commodity shops never synchronized logistics past 72 hours in the battle. The shortened planning timelines made it difficult to get refined commander's guidance on logistics decisions with regard to ammunition, fuel, water, and meals ready-to-eat reallocation. The brigade S-3 and S-4 faced challenges with command and support relationships with the division, ESC, and corps and nonstandard supply accountability procedures.

The brigade worked through assessing the combat service support battalion, brigade support battalion, forward logistics element, and refuel, rearm, and resupply point abilities to provide forward services on the battlefield and synchronization with supported units. These issues were presented to the Department of Logistics and Resource Operations and the Combined Arms Support Command in order to facilitate broader discussion about the sustainment community and logistics operations in simulated exercises for large-scale combat operations.

Sustainment brigades across the Army often face unique challenges and competing mission requirements. Reverse Warfighter was an opportunity to accurately showcase the way these requirements affect sustainment operations and to collect feedback. The 25th Infantry Division Sustainment Brigade has recommended that this event be conducted annually.

These talking points spurred discussion with key leaders and provided insight into shortfalls that need to be addressed within the sustainment community and the Army as a whole. The event made the staff think deeper and fully appreciate the need for horizontal and vertical staff coordination and mastering technical areas of expertise by correcting failure points.

The Army, and all military branches, should realize that not facing this problem head on could lead to a potential disaster when lives are on the line because, after all, "Bullets don't fly without supply!"

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Division Transportation Office Capabilities Across Multiple Command Posts

■ By Maj. Mark A. Yore

As the Army focuses its training on high-intensity multi-domain combat using multiple command posts, it is imperative to examine how best to employ a division's transportation movement control experts. The 25th Infantry Division (ID) recently conducted multiple command post exercises (CPXs) to test the use of multiple command posts while conducting high-intensity Multi-Domain Operations.

During Warfighter Exercise 19-01, the 25th ID was part of I Corps' operation, fighting a near-peer enemy on a linear battlefield. The division transportation office (DTO) was challenged to leverage its capabilities at each command post in order to synchronize movements and ensure continuous sustainment. This enabled the division to dictate the tempo of the fight.

This article shares observations and lessons learned about employing the DTO across multiple command posts. Sharing lessons learned and refining how the DTO operates is necessary as the Army continues to update doctrine and fight full-spectrum operations.

Mission Analysis

When evaluating the capabilities required for the DTO in a high-intensity fight, separating the responsibilities of the forward and rear areas is very instructive. Essentially, we need to ask how the DTO can most effectively shape the fight from each command post.

The 25th ID has had the opportunity to conduct multiple CPXs and test the employment of the DTO. When deciding where each vital member of the DTO and elements of a movement control team (MCT) will operate, the 25th ID G-4 team first looked at what the required capabilities were for the division main command post, support area command post (SACP), division tactical command post (TAC), and support area TAC.

The 25th ID conducted detailed mission analysis in order to effectively spread capabilities across the battlefield.

Two important distinctions were made during this analysis. First, the DTO matched capabilities to requirements.

Second, when the G-4 decided where the capabilities would reside, it was clear that the DTO was an office, not an individual. The question should not be, "Where is the division transportation officer in the fight?" Instead the question should be, "What transportation capabilities are required in each command post?"

Testing the Design

The DTO was able to spread its capabilities throughout the command posts, successfully synchronize movements, and provide creative solutions to movement dilemmas. Most of the capabilities were maintained in the SACP where the division transportation officer, sergeant major, senior mobility noncommissioned officer, and elements of the movement control team ran 24-hour operations.

The division transportation offi-

The 25th Infantry Division found that staging division transportation office capabilities at multiple command posts provides responsive support but is unsustainable with its current structure.

cer served as the G-4 and transportation representative for the support area TAC when required.

The deputy division transportation officer provided redundant movement control in the division main command post. The deputy relayed information from the SACP, provided current operations updates to the SACP, and served as the transportation representative for the division TAC when required.

Placing movement control capabilities in the division TAC was a deliberate decision to provide oversight of the MCT used for wet-gap crossings. Both the division transportation officer and his deputy were used when both TACs were employed, and the officers maintained the ability to track and synchronize movements.

The success of the DTO during the exercise depended on understanding the overall purpose of each command post and the scheme of maneuver. This understanding was gained through mission analysis, which enabled the DTO to determine transportation requirements. Additionally, having the right team members in the DTO provided the versatility required.

Synchronization

The DTO's key to success was the evolution of its movement boards. The division movement board began as a transportation working group that shared and verified information.

Over several iterations and after ensuring all of the right warfighting functions were included in the meeting, decisions on road statuses and sequencing movements were made based on the priority of movement and support.

I Corps' movement board provided clarity on the expeditionary sustainment command's movements across the battlefield. That ensured synchronized movements and mitigated congestion and potential fratricide.

The meeting was focused on the information and not the duration in order to have the desired outputs. As the list of participants grew, the forum remained focused on the outputs.

> "As transportation experts, it is imperative that we continually test and challenge current structures in order to ensure we will be able to deliver the capabilities needed to fight and win our nation's wars."

Focusing on outputs enabled the board to reduce the meeting time from 60 to 30 minutes. Although seemingly short, this provided enough time to prepare for the multiple battle rhythm events that required transportation inputs.

Lessons Learned

The dispersion of the DTO across the command posts was successful but not sustainable. DTO capabilities degraded as the battle progressed and lines of communications extended.

Route battle drills and convoy clearance processing were delayed each time the tactical command posts jumped.

The 25th ID identified shortfalls in two primary areas: personnel and training.

Personnel. The deputy division transportation officer position is held by a reserve officer, which does not allow for the continuity and training necessary to immediately provide the capability for a high-intensity conflict. Replacing the reserve officer with an active duty logistics captain would ensure the continuity needed.

The transportation management coordinator noncommissioned officer position was recently removed from the modified table of organization and equipment. The position provided the capability to integrate the MCT in both the division main and the SACP. In order to have a highly functioning DTO across all command posts, I recommend reauthorizing the position.

Training. The 25th ID found that it lacked iterative training with the MCT. Since the exercises, the division has taken steps to remedy the shortfall by integrating the MCT with the DTO for garrison operations.

The 25th ID is a "fight tonight" division and consistently trains to be ready. Understanding the importance of being ready, the 25th ID G-4 has challenged the sustainment team to question if its structure and authorizations meet the required capabilities needed to fight and win in a high-intensity conflict.

Division transportation officers and DTOs in the Army understand the importance of logistics. They also understand that movement synchronization is the connective tissue that enables operational reach, dictates tempo, and ultimately prevents culmination.

As transportation experts, it is imperative that we continually test and challenge current structures in order to ensure we will be able to deliver the capabilities needed to fight and win our nation's wars.

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The Challenges of Multi-Domain Sustainment

The emerging methods of reducing demand are materiel-based solutions focused on unit endurance and sustainment velocity, but the Army also needs the ability to provide sustainment mass at or near the decisive point.

■ By Maj. Peter Van Howe

At all levels of warfare—strategic, operational, and tactical—transportation is a prerequisite for achieving the National Military Strategy. However, the Department of Defense (DOD) has a transportation problem that threatens the nation's ability to project power abroad. The Army remains the largest transportation consumer within the DOD, and every service has voiced concern regarding the ability to provide sufficient lift for the Army in the event of large-scale combat operations.

The Air Force is keenly aware that Air Mobility Command cannot adequately deliver combat forces to the places the Army wants to go. Likewise, the Navy has reported that its sealift fleet, which transports 90 percent of the Army's equipment around the world, will fail in its required surge transportation capacity by 12 million square feet within the next 10 years. The Army Operating Concept, Win in a Complex World, echoes the need for transportation assets to be able to set the theater, sustain operations, and maintain freedom of movement, as described in Army Warfighting Challenge (AWFC) 16.

Reducing Demand

While the Air Force and Navy are focused on strategic lift, the Army's solutions to AWFC 16 are predominantly focused on the operational and tactical levels of warfare. The Army has also chosen a different approach to addressing transportation limitations by focusing on reducing the demand on distribution operations rather than increasing lift capacity.

The Army Functional Concept for Movement and Maneuver states, "Improved mobility and sustainment capabilities, along with fundamental demand reduction, enable BCTs [brigade combat teams] to operate at a tempo the enemy cannot respond to or sustain, while allowing BCTs to concentrate combat power rapidly to close with and destroy enemy forces from multiple positions of advantage."

Demand—a unit's operational requirement for services or commodities that enable freedom of action, extend operational reach, or prolong endurance, but which the unit cannot independently produce or acquire—has historically constrained the employment of maneuver forces at the tactical level. A unit's demand is addressed through distribution operations that rely heavily on transportation assets.

The emerging solutions to reduce demand are materiel-based solutions that focus on narrow aspects of distribution operations, namely unit endurance and sustainment velocity. Without a renewed focus on the ability to provide sustainment mass at or near the decisive point, tactical units face significant operational risk during large-scale combat operations.

Increasing Endurance

Because a unit's lines of distribution are inversely proportional to its operational reach, reducing demand by increasing unit endurance will certainly benefit tactical units. The intent is for BCTs to operate semi-independently up to seven days before resupply, more than double what tactical units plan for currently.

Much ink has been spilled on the Army's desire to employ emerging technologies such as water from air systems (WFAS) to increase endurance at the tactical level. The Army is expecting WFAS to generate 500 gallons of water from the atmosphere per day with each system and thereby reduce the number of water storage assets that units are required to maintain while forward deployed.

The Intelligent Power Management Distribution System (IPMDS) is similar to WFAS in its intent. IPMDS remains a far-term solution with estimates of a 30 to 40 percent reduction in fuel costs for power generation. Both of these technologies already exist and the expectation is that these systems will increase in efficiency over time. Tactical units will find these systems fielded in greater numbers and will be able to eliminate the numerous trailer-borne generators and cumbersome water storage tanks that they currently maintain.

Increasing Velocity

Beyond endurance, the Army is making significant investments to improve distribution by increasing sustainment velocity. Here again, the Army is looking to emerging technologies to change the sustainment paradigm.

The DOD's Unmanned Systems Integrated Roadmap for fiscal years 2013 to 2038 articulates the U.S. military's strategy for developing

and fielding unmanned systems over a 25-year time frame. Chapter 6 of the document describes the need for autonomous sustainment platforms. One such platform is the joint tactical aerial resupply vehicle, an aerial drone capable of transporting loads weighing 300 to 800 pounds. Similar systems are being developed across all of the services, and a few, such as the K-Max, have already found their way into operational theaters such as Afghanistan.

The Army's emphasis on velocity is also apparent in its shift in the procurement of new tactical wheeled vehicles (TWVs). In 2010, the Army published its TWV Strategy, which outlined the capabilities needed in the TWV fleet.

At that time, the threat of improvised explosive devices in Iraq and Afghanistan was reflected in the strategy's emphasis on the need for increased Soldier protection in every class of TWV. The impact of these recommendations is exhibited in the development of the new joint light tactical vehicle (JLTV).

About 49,000 of these vehicles are set to become part of the TWV fleet in the coming years to replace the venerable Humvee. However, JLTVs are larger and heavier than the vehicles they are replacing, and as the Army has refocused on large-scale combat operations, there has been greater emphasis on more agile tactical vehicles.

Accordingly, to complement the large JLTV, the Army has pursued ultralight tactical mobility (UTM) vehicles for certain infantry BCTs. These UTMs are already fielded to some units, such as the 82nd Airborne Division. UTMs have the potential to be used in restrictive areas as "internal/ferry support" for supplies and have even been proposed for more traditional distribution roles, such as for forward arming and refueling points.

Beyond materiel-based solutions, the Army is looking at improving velocity by decreasing the time between processes within the sustainment enterprise. The Velocity Management initiative, which began in 1995, continues to work to generate increased efficiencies at various bottlenecks within the sustainment enterprise.

Historically, class IX (repair parts) supplies have been difficult to forecast because equipment wear and tear is unpredictable. The time lost waiting on spare parts to be shipped, received, and issued to supported units significantly degrades readiness.

Here, additive manufacturing will greatly improve sustainment velocity. 3D printing technology is poised to significantly reduce the supply support activity's authorized stockage lists for tactical units deploying to theaters where depot-level support is far removed.

Providing Mass at Decisive Points

While the Army has chosen to address demand reduction by increasing unit endurance and overall velocity, it has assumed risk in providing maneuver forces with the ability to mass sustainment at or near decisive points on the battlefield. Defined as the concentration of combat power at the most advantageous place and time to produce decisive results, mass has become increasingly neglected in sustainment considerations. This will have major ramifications for units at the tactical level in the event of large-scale combat operations against near-peer or peer adversaries.

Without the ability to mass sustainment at key points in times or locations, sustainers will not be able to provide maneuver forces with the ability to reinforce friendly forces or exploit the enemy in depth. Neither the UTMs nor the unmanned aerial systems discussed earlier have the ability to deliver the quantity of supplies necessary to enable a maneuver unit to close with and destroy an enemy.

Larger loads require exponentially larger, more expensive transportation platforms that cannot deliver directly to the point of greatest need. An unmanned aerial vehicle such as the K-Max is no more effective at providing sustainment than are the Army's current sling load capabilities.

Furthermore, larger autonomous vehicles would likely be finite, operational-level assets similar in allocation to current autonomous aerial reconnaissance platforms. Likewise, the proposal to use UTMs for forward arming and refueling point operations, as discussed in a RAND Corporation assessment, will face similar limitations in lift capacity and deliver a low return on investment for tactical units.

Because of these limitations, the bulk of tactical sustainment will continue to come from medium-sized TWVs. For these vehicles, lift capacities are not measured in pounds but in tons. However, the Army has not seriously committed to improving either capacity or capability within the medium TWV fleet.

Improving Platforms

Although the Army has invested in upgraded medium TWVs, the Automated Ground Resupply program, and the Expedient Leader-Follower (ExLF) demonstration program, a closer examination of these programs reveals that the overall investment in maintaining sustainment mass is out of balance with programs of record designed for velocity or endurance.

ExLF technology is an innovative solution to delivering sustainment on the battlefield and is rapidly approaching operational capability. This program would allow one driver to lead a convoy of almost a dozen vehicles without using GPS.

Technology testing and demonstrations are scheduled to occur throughout 2019 and 2020 using existing sustainment vehicles such as the load handling system. However, the Army's investment in bringing ExLF capability into the fleet amounts to just $50 million over the course of three years and a fielding of just two transportation companies over the same time frame.

Concurrently, for fiscal years 2019 through 2021, the Army's investment

in the JLTV program will be $207.4 million, which is over four times the amount spent on augmenting existing sustainment platforms with ExLF. While the JLTV is a new vehicle and ExLF uses existing platforms, the JLTV does not bring potentially paradigm-shifting capability into maneuver formations in the way ExLF can.

The JLTV capitalizes on current technologies for armor and electronic warfare, while ExLF has the potential to enhance sustainment mass without a corresponding increase in sustainment personnel. In total, $39 billion will be invested into the JLTV program over 20 years. Considering that the Army fields a TWV fleet of 225,000 vehicles, investing in approximately 120 vehicles over three years will not significantly improve sustainment operations in the near term.

A significant investment in improving sustainment platforms is needed; many designs have been in use for several decades. For example, the family of medium tactical vehicles (FMTVs) has been a workhorse of the sustainment TWV fleet since the 1990s.

On Feb. 7, 2018, the Army committed to a seven-year contract with Oshkosh Defense, LLC, for the new FMTV A2 variant. The Army's total investment in FMTV A2s, with upgraded power plants, protection, and cargo capacity, amounts to $467.2 million. A few months later, the Army purchased four new orders of existing FMTV A1s, totaling 771 vehicles at a cost of $159.6 million.

These investments stand in stark contrast to the much larger investment the Army has made in the JLTV. Furthermore, neither of these new FMTVs will augment vehicles currently found in unit motor pools. Rather, they will replace them as the aging sustainment fleet approaches its end-of-use life or maintenance expenditure limit.

Unless the Army makes a serious investment in fielding a more robust medium TWV sustainment fleet, a major capability gap will emerge in large-scale combat operations, not because of demand reduction but because of an inability to mass sustainment in support of the maneuver commander.

Such a capability gap is already evident at the tactical level. Within the brigade support battalion (BSB), where distribution operations are spread between the battalion's combat trains and the forward support company's field trains, personnel and equipment divestment has been ongoing for several years.

As an example, in fiscal year 2010, a BSB from the 82nd Airborne Division was authorized a fleet of approximately 140 FMTVs. By fiscal year 2018, the same unit was authorized only 76. In particular, there was a significant shift in troop transport capability within the BCT.

Between fiscal year 2010 and fiscal year 2018, the number of FMTVs with the low-altitude parachute extraction system was reduced from 72 to 25. Using all 72 vehicles in fiscal year 2010, the BSB could transport 1,080 Soldiers. A few years later, the same BSB would be able to transport only 375 Soldiers using all 25 FMTVs, a reduction of almost 60 percent in troop transport capability.

While demand reduction has been a key component in addressing AWFC 16, demand within the BCT has increased in recent years as a third maneuver battalion was added to each BCT. Simultaneously, the number of sustainment assets and personnel found in support battalions has decreased.

As a result, BSBs are becoming more dependent on support from external organizations, such as the sustainment brigade, in order to meet internal unit demand. If the sustainment brigade's assets are already committed, such as in support of another unit that is part of the main effort brigade, BSBs will remain under-resourced.

The inability to provide internal support is already evident. For example, in garrison units rely extensively on installation bus support in order to move personnel to training sites. Using organic assets would require multiple trips, which would be simply too time-consuming or would require too many vehicles. If the BSB lacks the ability to organically mass sustainment in a garrison environment, large-scale combat operations pose significant operational risk.

Sustainment is the fine art of balancing ends, ways, and means to provide commanders with freedom of action, operational reach, and the endurance to win in a prolonged fight. For the multi-domain environment, the Army has chosen to focus on smaller, more agile platforms, streamlining processes, and emerging technologies to reduce the demand for sustainment at the tactical level. This is undeniably sensible as the days of massed-based logistics, with huge inventories and equally massive inefficiencies, should be confined to the dustbin of history.

However, the current approach neglects the importance of massing sustainment through lift and transport capability. Large-scale combat operations in an increasingly complex operational environment will require a greater number of transportation platforms, not fewer, as tactical units will be expected to fight in new domains. The need for additional lift has already been identified by the Navy and Air Force. Without a more comprehensive strategy to address this issue, the Army will find it increasingly difficult to achieve success on the battlefields of the future.

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Sustainment in Decisive Action on a Distributed Battlefield

■ By Lt. Col. Mike Hammond and Command Sgt. Maj. Dion R. Lightner

Army Doctrine Reference Publication 3-0, Operations, defines decisive action as "the continuous, simultaneous combinations of offensive, defensive, and stability or defense support of civil authorities tasks." The tactical endurance of Army forces is directly related to sustainment tasks and systems that provide support and services to maneuver commanders to ensure freedom of action, extended operational reach, and prolonged endurance.

Sustainment determines the depth and duration of operations and is essential to retaining the initiative gained on the battlefield. Logistics and sustainment planners must consider creative solutions and use critical thinking to succeed on the distributed battlefield of the future.

Considering the principles of sustainment is essential to planning and executing tactical logistics. Synchronized sustainment and logistics operations at this level underwrite the maneuver commander's ability to maintain tempo and extend op-

A Soldier secures an M1 series Abrams main battle tank to a rail car during railhead operations. Railhead operations are a critical element of sustainment at the brigade combat team level in decisive action. (U.S. Army photo)

erational reach to seize the initiative gained on the battlefield.

Brigade Combat Teams at NTC

The National Training Center (NTC) provides an austere environment, the best opposing force in the world, and a professional observer, coach, trainer team for brigade combat teams (BCTs) to conduct decisive action rotations. Accomplishing combined arms maneuver in such an austere environment against a "thinking" enemy force with its own planning cycle requires synchronized logistics from division sustainment assets, such as combat sustainment support battalions (CSSBs), to forward support company (FSC) combat trains that support the execution of tactical tasks as part of unified land operations.

Brigade support battalions (BSBs) and CSSBs face planning and execution challenges that cannot be replicated during home-station training. Planning against these battlefield realities is critical to underwriting the ability of the BCT to maneuver and to providing

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options for the commander to apply combat power.

Sustainment Considerations

Sustainment units at NTC must consider several factors when it comes to sustainment warfighting planning and execution.

The trifecta of successful sustainment planning. BCTs struggle to integrate the sustainment warfighting function into combined arms maneuver. The basis of this problem is a failure to develop the roles and responsibilities of the BCT executive officer, BSB commander, BCT S-4, and BSB support operations officer. The BSB commander must own the sustainment warfighting function and act as the chief and integrator of sustainment for the brigade commander.

The sustainment rehearsal is the venue from which to determine friction points in the scheme of maneuver. Undefined relationships between the BSB commander and FSC commanders result in further complications. Working relationships are key, and leadership is required during the execution of sustainment operations.

Echeloning of sustainment nodes. BCTs struggle to understand the field trains command post (FTCP) and combat trains command post (CTCP) concepts. FTCPs in the brigade support area (BSA) typically lack the mission command capability to synchronize and integrate logistics to support the scheme of maneuver for their battalions.

CTCPs normally do not have the communications platforms to maintain situational awareness of the battle forward and to relay sustainment requirements to the FTCP. The location of the FSC commander, first sergeant, FSC executive officer, and battalion S-4 are critical to uninterrupted sustainment.

Understanding doctrinal terminology. Understanding BSB and CSSB doctrinal terminology is critical to achieving a viable concept of support. Commanders and BSB or CSSB planners routinely misuse terms such as logistics release point, logistics package, and forward logistics element.

Understanding these and other terms and how to apply them on the battlefield is the basis of synchronized logistics during BCT-level combined arms maneuver operations. BSB and CSSB leaders and planners must return to the doctrinal fundamentals of sustainment.

Concept of support. Battalion-level leaders routinely fail to understand the tactical scheme of maneuver and, therefore, cannot develop a detailed concept of support. The concept of sustainment often lacks integration and synchronization with the maneuver plan. Planners rarely take time and space into consideration. BSBs and CSSBs consistently fail to conduct a proper military decision-making process (particularly wargaming) and operations process.

Analog and digital staff and tracking products. BSBs and CSSBs must focus on managing both analog tracking systems and logistics information systems. Logistics information systems will become irrelevant in a decisive action environment against a near-peer competitor with cyber capabilities. BSB and CSSB leaders and planners must still maintain visibility and situational awareness of sustainment assets when systems are jammed. Planners should disseminate analog products, overlays, and other logistics products after every orders briefing and sustainment rehearsal.

Sustainment rehearsals. Sustainment rehearsals rarely contain any substance or show that logistics planners understand the scheme of maneuver. In many cases, the audience is not composed of decision-makers and the rehearsal is just a back briefing of an expanded paragraph 4 of an operation order. Planners also fail to produce analog

graphics and other products to increase situational awareness for maneuver units.

Logistics estimates. Sustainment planners have difficulty developing a logistics estimate with an assessment of capabilities, specific analyses, sustainment requirements, and mitigation strategies. A failure to understand the meaning of tactical tasks further exacerbates this situation. Sustainment planners must realize that logistics estimates get Soldiers to the battle, and the proper use of logistics status reports supports the maneuver operation in that battle.

Logistics planners must determine requirements and translate unit capabilities into an assessment of current operational reach or endurance. Considerations must include how to maintain logistics reporting in an environment where the enemy can execute cyber capabilities against a friendly force.

Common operational pictures. Units continue to grapple with developing and maintaining a logistics common operational picture (LOGCOP). LOGCOPs must be both digital and analog in accordance with a unit PACE [primary, alternate, contingency, and emergency] communication plan. The proponent of the LOGCOP or medical common operational plan must maintain the accuracy of both to allow commanders to make decisions regarding maneuver and sustainment operations.

Maintenance management. Many units do not have pre-established brigade-level maintenance policies and procedures. Issues like controlled substitution, the flow of equipment maintenance and inspection worksheets, and authorized stockage list and shop stock list management are not developed and enforced.

The right audience of decision-makers, such as the battalion executive officer, maintenance technicians, leaders from Army field support brigades and battalions, logistics assistance representatives and field support representatives, and brigade and BSB staff members, must attend a weekly or sometimes daily maintenance meeting to apply brigade-led solutions to maintenance problems. The BSB commander must underwrite the brigade maintenance meetings and maintain visibility of the operational readiness rates of the brigade's equipment and fleet.

Casualty and medical evacuation. Success in casualty evacuation and medevac planning efforts continues to elude BCTs and BSBs. These operations are successful only when BCT command sergeants major (CSMs) are the ramrod and battalion-level CSMs and first sergeants are involved in the planning, rehearsal, and execution of these important battlefield tasks.

BCT medical professionals and planners must apply time and space to their solutions and determine command and control responsibilities, an ambulance exchange point activation timeline, and the launch authorities for medevac aircraft.

Air delivery. Logistics planners do not consider the use of air assets as a method of distribution. BCTs remain ground-focused and rarely are allocated air assets for critical supply delivery. BCT staffs generally inhibit these operations by not planning for sustainment operations as part of the scheme of maneuver.

BSA defense. Sustainment operations and the requirement to defend the BSA challenge battalion commanders. Generally, BSB S-2s do not routinely engage the BCT S-2 section for route analysis and information on enemy movements in the rear area. The execution of tactical logistics operations directly affects the security posture of the BSA. Knowledge of the employment of weapons systems, interlocking fires, preparation of range cards, creation of company-level sector sketches, and engagement area development is severely lacking in BSB and CSSB formations.

The first hundred yards. Many sustainment planners do not consider the challenges of providing sustainment during the first 36 hours of combined arms maneuver. The focus during this period is a transition to tactical assembly areas. Units shut down all systems in preparation for movement.

Sustainment planners do not consider echeloning sustainment onto the battlefield and therefore do not anticipate sustainment challenges within the first 24 to 36 hours of combined arms maneuver. The sustainment of the reconnaissance squadron, which typically moves out 24 hours prior, challenges planners and produces an overdependence on FSC capabilities. Skill sets related to sustainment on the move and the command and control required to accomplish this critical task are severely lacking in BSB and CSSB formations.

Planning and executing tactical sustainment and logistics while deployed to NTC challenges even the best logistics planners and commanders. The decisive action environment at NTC is no doubt as close to combat conditions as possible. CSSB and BSB commanders must balance operational risk in such an environment and develop nested sustainment decision points that support the BCT commander's decisions.

The planning considerations listed above will help BSB and CSSB commanders to hone their sustainment skills and strengthen their ability to sustain maneuver forces on the battlefield of the future.

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