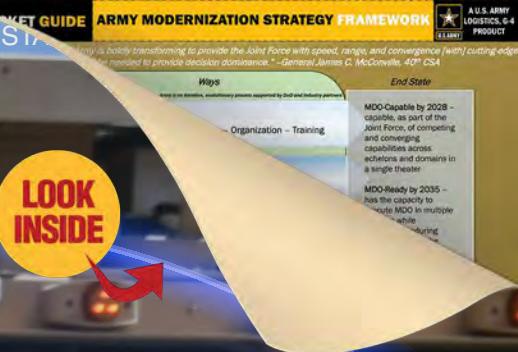


JULY-SEPTEMBER 2021

ARMY SUSTAINMENT

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U.S. Army Spc. Mariliz Serrano, petroleum supply specialist with Echo Company, 2-104th General Support Aviation Battalion, 28th Expeditionary Combat Aviation Brigade (ECAB), flushes the lines on a fuel truck while watching the sunrise at a forward arming and refueling point Dec. 15, 2020, in the 28th ECAB's area of operations in the Middle East. (U.S. Army Photo)

"The Army's transformation and modernization simply cannot happen without the sustainment enterprise. The sustainment warfighting function capabilities are being considered at every phase as the Army prepares for 2035, and it will require the entire enterprise to approach modernization with diligence, persistence, and innovation."

Gen. Ed Daly

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ON THE COVER

A semi-autonomous palletized load system vehicle rolls past attendees during a April 10, 2019, vehicle dedication ceremony at Fort Bliss, Texas, for 16 fallen Soldiers of the Army's 88 Mikes. (Photo by Jerome Aliotta)

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Submissions should be well-developed narratives and can be opinions, techniques, tactics and procedures (TTPs), lessons learned, exploration of new technologies or emerging trends, or other similar content valuable to sustainers.

General public affairs style coverage or content on units, exercises, initiatives and events that do not otherwise hold additional professional development

value are typically not as strong as those submissions that offer real, actionable sustainment information.

While *Army Sustainment*'s editorial staff does maintain its' editorial process and holds authority to approve submitted content, we recommend at least some basic professional coordination between the submitting author and their organization's public affairs or public information office, especially for U.S. personnel working in NATO or other multinational organizations.

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Find more information: www.alu.army.mil/alogs/submissions.html

Sustainers Critical to Force Modernization



■ By Gen. Ed Daly

The U.S. Army is undergoing its greatest transformation in more than 40 years, pursuing persistent modernization across force employment, force development, and force design. The 2021 Army Modernization Strategy (AMS), released in May, establishing the foundation for how we will develop a force ready for Multi-Domain Operations (MDO) by Aim-Point 2035 to retain our position as the globally-dominant land power.

The strategy—reinforced in our Army Senior Leaders' Posture Statement to Congress this year—recognizes that modernization is more

than just weapon systems. It goes beyond materiel modernization—or what we fight with. It also addresses how we fight and who we are. As noted in the strategy, “This approach integrates the elements of doctrine, organizations, training, materiel, leader development and education, personnel, facilities, and policy (DOTMLPF-P) within the Army, with other joint force elements, and alongside allies and partners.”

Army sustainers and logisticians are absolutely critical across all efforts. We must modernize our infrastructure, training, processes, and skillsets to support next-generation capabilities. You must understand the strategy, your roles and responsibilities, and be a part of the change that will set conditions for success.

What we fight with: platforms to ensure overmatch

The Army's six materiel modernization priorities, and 31+4 signature efforts within them, remain constant. To keep pace on a battle-field that is increasingly faster, more lethal and more distributed, focus remains on Long Range Precision Fires, Next Generation Combat Vehicle, Future Vertical Lift, Army Network, Air and Missile Defense, and Soldier lethality.

As we modernize what we fight with, we are also modernizing how we maintain those platforms. The Army Organic Industrial Base (OIB)—our 26 depots, arsenals, and ammunition plants—must have the capability and capacity to keep pace with Army modernization efforts and surge to support MDO at theater scale. The 15-year OIB Modernization Plan aligns with the AMS to incorporate emerging technology, increase breadth and depth, and eliminate single

points of failure in the industrial base, while decreasing reliance on foreign suppliers.

How we fight: execute LSCO in MDO environment

The MDO concept, which is being rapidly integrated into doctrine, is the foundation for how we fight. The Regionally Aligned Readiness and Modernization Model (ReARMM), the Army's modernization framework, is the force generation process providing modernized forces to achieve MDO. ReARMM aligns units regionally to meet current joint force demands while simultaneously implementing change through scheduled modernization and training windows.

Within ReARMM, modernization of the sustainment warfighting function—from sustainment practices and processes to capabilities and infrastructure—will ensure freedom of action, extend operational reach, and prolong endurance of Soldiers and units in the field. This effort starts on installations; our installations must be resilient to cyber or physical disruptions, modernized in support of the future force, and capable of supporting current and evolving readiness needs. The Facilities Investment Plan, which aligns with the Army Installation Strategy, provides a holistic approach to modernizing installation capabilities and infrastructure alongside the Army's transformation. We are also targeting modernization of the complex network of roads, airfields, ports, railheads, sea and air strategic lift assets, and Army Prepositioned Stocks to rapidly project and sustain our forces forward. This key

infrastructure must keep pace with the next-generation of weapon systems to maintain our strategic advantage.

Army sustainers are also leading the effort to divest outdated and excess equipment through the launch of Modernization Displacement and Repair Sites (MDRS). To date, units have divested more than 24,000 pieces of equipment at 13 MDRS locations, unburdening them of storage requirements for obsolete equipment and freeing up space for modernized equipment. While we have had great initial success, we have more work to do to ensure units trust the process, understand the risk if they don't embrace the effort, and execute divestiture within their Unit Training Management process.

Nowhere is the use of big data analytics more critical than within the sustainment enterprise. To make predictive, real-time, and informed decisions based on global visibility of equipment and supplies, the Army is investing in agile and resilient networks and systems. We are streamlining Enterprise Business Systems, modernizing them to ensure cyber security, making the data at our fingertips more usable at echelon, and ensuring integration and interoperability while improving user interface and functionality.

Who we are: our relevance to the fight

The Army People Strategy sets the course for talent management and leader development to ensure a force prepared for the complexities of MDO. We are in a war for talent, and

we will lose if we fail to modernize our processes and systems for recruiting and retaining the Army's most important weapon system—our people.

But we will not fight the next war alone. As the AMS points out, we will win as a member of the joint force alongside allies and partners. To that end, the sustainment enterprise involvement in Project Convergence—not just in fiscal year 2021, but also 2022 and 2023 which addresses joint and multinational roles—is absolutely critical. We have been laying-in joint mission threads that are specific to sustainment so we can develop the capabilities needed for the future as we balance readiness today with modernization tomorrow.

The Army's transformation and modernization simply cannot happen without the sustainment enterprise. The sustainment warfighting function capabilities are being considered at every phase as the Army prepares for 2035, and it will require the entire enterprise to approach modernization with diligence, persistence and innovation. Be part of the change!

People First! Winning Matters!
Army Strong!

Gen. Ed Daly serves as the commanding general of the U.S. Army Materiel Command. He served three years as the deputy commanding general of AMC in his previous assignment. He managed the day-to-day operations of the Army's logistics enterprise, and also served as the senior commander of Redstone Arsenal, Alabama. He served as the commanding general of Army Sustainment Command at Rock Island Arsenal, Illinois, and as AMC's deputy chief of staff, overseeing the roles and functions of the headquarters staff.

DRIVING MODERNIZATION, MAINTAINING READINESS

Aligning Sustainment's Role and Efforts in the Push to 2035



■ By Lt. Gen. Duane A. Gamble

As Army sustainers, we must be prepared to anticipate our role and offer continued support to modernization efforts while serving as the stewards of what we currently use and will use to fight our adversaries. We do this by determining what excellence looks like in the generation, fielding, and maintenance of materiel capabilities. The need for this influence was evident during the Army's last major modernization effort about 40

years ago to counter Europe's Warsaw Pact forces and establish dominance in AirLand Battle through the conception of the Big Five weapon systems—the Abrams tank, Bradley infantry vehicle, Apache and Blackhawk helicopters, and Patriot air and missile defense system. At that time, we were confronted with the need to develop the sustainment capabilities necessary to empower those systems for enduring operations. These critical capabilities—such as the heavy expanded mobility tactical truck and heavy equipment transporter—didn't yet exist to keep pace with our weapon system usage. The resulting readiness gaps threatened our mobility.

Developing, producing, fielding, and sustaining new capabilities is a complex, time-consuming process requiring congressional investment and synchronization across the Army. Altogether, fielding the Big Five took nearly 20 years, and the synchronization needed to arrive at final fielding was no small task. Early system development occurred just after Vietnam and came

before the AirLand Battle doctrine was finalized in the early 1980s. There is no doubt that the Big Five have proven critical in Army and joint force operations across a range of contingencies; however, modernizing the force and enabling readiness is not as simple as buying new systems. Keeping up with the speed of technological change creates training, doctrine, and organizational challenges emphasizing the need for sustained synchronization and a clear understanding of roles and responsibilities in getting to our endpoint.

The Big Five modernization effort was marked by aggressive and revolutionary procurement. Our immediate needs and available resources will dictate how we undertake the next bout of transformational change—the landscape is different now than in the 1980s, meaning this may look more evolutionary. The recently updated Army Modernization Strategy outlines how we must fight, what we must fight with, and who we must be to

support an integrated joint force while conducting multi-domain operations (MDO). All of this is presented in the critical framework of doctrine, organization, training, materiel, leader development and education, personnel, facilities, and policy (DOTMLPF-P) to ensure we strike a balance between current readiness and future capability. The Army's six priorities—long-range precision fires, next-generation combat vehicles, future vertical lift, network, air and missile defense, and soldier lethality—were established to enable the continuous modernization process and deliver constant support from our Congressional, industry, and international partners. Our continued collaboration with other key modernization stakeholders, such as Army Futures Command and the Assistant Secretary of the Army for Acquisition, Logistics, and Technology, ensures new capabilities and solutions are integrated appropriately across DOTMLPF-P.

It's no great secret that training and doctrine must simultaneously develop in support. This evolutionary change will optimize the Total Army to meet the demands of current competition while also posturing us to escalate from competition to conflict. Part of this includes moving away from a modular force. The division will replace the brigade combat team as the primary unit of action in preparation for cross-echelon excellence in large-scale combat operations.

We've also worked to construct the supporting foundation from which modernization and its accompanying force structure realignment will be

sustainably executed. Maj. Gen. Kurt J. Ryan, former deputy chief of staff G4, U.S. Army Forces Command provides an excellent overview of the Regionally Aligned Readiness and Modernization Model (ReARMM) later in this edition. The bottom line is that ReARMM will provide the Army with a unit life cycle model to balance current readiness demand with our modernization efforts, and sustainers will play a critical role in synchronization across strategic and tactical echelons across each of its three phases—Modernize, Train, and Mission.

ReARMM will serve as the synchronization tool we will rely on to effectively outline how to modernize without ignoring readiness. Oddly, the two are simultaneously complementary and at odds. Notions of readiness drive modernization as dictated by ever-evolving operational requirements, and modernization supports readiness by ensuring the force's capability sets can meet and exceed threats from adversaries.

However, each initiative requires substantial resources—borrowing from one to buy another becomes a challenge which ReARMM seeks to resolve. Like I mentioned before, this next bout of transformational change will be slow, gradual, and evolutionary and inform how we build a force that can provide adversarial overmatch as the nature of warfare in MDO evolves in lockstep.

Lt. Gen. Duane A. Gamble, Deputy Chief of Staff, Headquarters, Department of the Army, G-4, oversees policies and procedures used by U.S. Army Logisticians. He has masters' of science degrees from Florida Institute of Technology, and Industrial College of the Armed Forces.

SUSTAINMENT MODERNIZATION

Posture for Multi-Domain Operations Capable Force in 2028



An Interview with Maj. Gen. Rodney D. Fogg and Brig. Gen. Michelle K. Donahue

What is Combined Arms Support Command (CASCOM) doing to modernize the sustainment force to meet the challenges of multi-domain operations (MDO)? To get an answer to that question, we talked to two key sustainment leaders—Maj. Gen. Rodney D. Fogg, the CASCOM commander as he wraps up his tour at CASCOM, and Brig. Gen. Michelle K. Donahue, who is dual-hatted as CASCOM's commanding general (DCG) for modernization and the Quartermaster General (QMG).

One of your major focus areas as the CASCOM commander has been directing the command's activities to support large-scale combat operations (LSCO) as the Army engages in its modernization activities. How have you viewed these challenges and CASCOM's role in helping the Army meet them?

Fogg: Force modernization is one of CASCOM's four overarching priorities. The others are readiness, leader development, and reform and influence. These are not mutually exclusive; they work together to achieve the outcomes our Army requires of the sustainment warfighting function. In a sense, modernization has been integrated into every major CASCOM activity through these priorities.

In terms of specific force modernization initiatives, we consistently nested our sustainment activities with Army senior leader guidance and doctrinal changes. Sustainment modernization must move forward in stride with Army modernization. Therefore, as we progressed in this area, we partnered very closely with critical commands and

staff to ensure our efforts are nested with theirs and achieve the required results. Those stakeholders include the Training and Doctrine Command (TRADOC) and the Combined Arms Center (CAC); Army Futures Command (AFC); Army Materiel Command; Headquarters, Department of the Army (HQDA) G1, G4, and G8; the Assistant Secretary of the Army for Acquisition, Logistics, and Technology; Army Forces Command (FORSCOM); our Reserve Component partners; the Army Service Component Commands, and the U.S. Army Special Operations Command.

Initially, FM 3.0 development, a major doctrinal change, drove our activities to move the Army focus from counter-insurgency to LSCO. That broad doctrinal shift resulted in several operational challenges, or 17 gaps, across all warfighting functions. CASCOM published our capstone FM 4.0, Sustainment Operations, as a companion to FM 3.0 and executed an extensive analysis of the sustainment challenges within the 17 gaps, such as fuel, mobility, maintenance, materiel management, and communication.

To deal with the doctrinal changes and the capability shortfalls we found

in our analyses, we engaged in a comprehensive, integrated effort across all the domains of doctrine, organization, training, materiel, leadership, personnel, facilities, and policy (DOTMLPF-P) as we modernized our sustainment force. In the organization domain, since the new doctrine drove the Army from a modular brigade-based focus to division-centric operations, we were actively involved in shifting the sustainment force structure to enable division-oriented operations. Our most critical effort in this area was creating the division sustainment brigade assigned to each division and its division sustainment support battalions. Those organizations are being fielded now. The sustainment-oriented gaps also required us to develop and implement a number of specific organizational changes, such as adding 100,000-gallon fuel distribution capability with a new petroleum platoon in the organic supply company, a materiel management staff, and the maintenance surge team.

In the materiel domain, we continue to work closely with AFC and our other stakeholders on all the materiel solutions required to sustain LSCO and MDO. Of importance is the critical work we are doing with our automation and communications systems. CASCOM is the lead for Line of Effort 1—Enable the Workforce—for the new converged and modernized enterprise business system (EBS) the Army is working. We are fully engaged in the business process of re-engineering and lead user experience/user interface and training efforts. We are also modernizing the sustainment tactical network and ensuring sustainment information is integrated into the command post computing environment (CPCE)

while leveraging machine learning and artificial intelligence. These efforts will enable sustainers to better see and understand the battlefield by linking sensor data from our combat and support platforms in a cyber-protected environment, delivering near real-time predictive decision analytics to commanders at all echelons.

As I mentioned earlier, leader development (the L domain) has been another of our overarching priorities. We have synchronized our efforts in this area with training, education, and personnel management. We are engaged in career-long assessments, such as the Battalion and Colonel Command Assessment Programs and the Career Course Cognitive Assessment Battery. These assessments have a vital role in talent management initiatives while helping the individual leaders understand their strengths and areas in which they need improvement.

At the same time, we provide "how-to-lead" information to our Soldiers and scrubbing the required knowledge, skills, and behaviors of sustainers in MDO, particularly in such areas as applying data-based decision-making.

We have also increased rigor in many of our courses, such as our sustainment basic officer leader courses, and focused training on warrior tasks and skills. We simultaneously emphasize how to meet the significant challenges of providing the substantial levels of support required in contested, highly lethal environments.

How does institutional change relate to these modernization activities you are working on to build operational readiness?

Fogg: We cannot effectively produce and sustain the operational effects we need using old processes and systems in our institutional Army. That premise underlies our Reform and Influence priority. Internally, we have reformed and reshaped how CASCOM is organized to attain two fundamental goals: adapt our solutions at the speed of change in the operating environment and make ourselves commander-centric.

We have transformed our training development organization and processes to enable our courses to keep pace with operational change, and we created the Logistics and Materiel Readiness Directorate by combining two staff sections with closely related functions. Of course, we also did some significant restructuring due to the stand-up of AFC, and we continue to work hard to ensure we do not allow a seam between the Capabilities Development Integration Directorate of AFC and our Fielded Force Integration Directorate to hinder modernization progress. We also purposefully took several training development positions to create a Training Technology Division. That group has led the way for TRADOC in innovative and responsive digitized training solutions. In addition, we are in the process of standing up a leader development cell in our Army Logistics University so that we can effectively synchronize the various initiatives in this area across all our proponents.

In addition to reforming our organization, we have sought to influence broader change by engaging with leaders and partners across government, industry, community, and academia. For instance, we have actively assisted TRADOC in

building a new resourcing model for training. The existing model is a long and deliberate process that struggles to update our training on pace with the much quicker modernization efforts the Army has achieved; consequently, innovation is slowed and stunted. We are working closely with TRADOC and CAC to gain model approval that resources distributed learning (DL) while reducing overall costs to the Army could expand and sustain that DL innovation. We are getting ready to pilot digitized instruction on common core lessons of the Advanced Leader Course and Senior Leader Course to provide data on DL efficacy to supplement the results we have already achieved with some of our sustainment lessons. We are also working with CAC to speed up the process involved in tracking training development work while adding our “current and relevant” metric across the enterprise. In the area of automation, we are working with numerous strategic partners to integrate medical logistics and pre-positioned stocks into our logistics Enterprise Resource Planning (Global Combat Support System-Army) while also enabling disconnected operations.

Our academic partnerships have us working with universities to help get after advanced learning in supply chain management and data analytics for selected personnel. In addition, we have carefully reviewed our Training with Industry programs and added critical programs such as one associated with enterprise business systems to help as we pursue our converged EBS.

The common objectives of our reform and influence efforts are to enable modernization by attaining faster solutions and employing innovation where it makes sense.

What DOTMLPF-P changes are on the horizon that will address the LSCO gaps and further prepare the sustainment enterprise to meet the requirements for an MDO-capable force in 2028 and ultimately lay the foundation for an MDO-ready force in 2035?

Donahue: As General Fogg has indicated, to sustain the MDO-capable force, CASCOM has been focused on updating sustainment doctrine, modernizing our sustainment formations, increasing rigor in initial entry training (IET) and professional military education, and experimenting with future operational force designs and concepts to meet the needs of an MDO-ready force.

Over the last 24 months, we have also been focused on addressing the fuel, mobility, maintenance, and communication equipment gaps General Fogg mentioned to win on the future battlefield.

In the near term, we are investing in bulk petroleum capabilities, specifically a multi-mile Early Entry Fuel Distribution System, and bulk tactical and line-haul fuel distribution systems to increase inland fuel distribution requirements for the European Command and Pacific Command areas of responsibility. Additionally, we have been focused on increasing distribution capability to enable the division-centric organizational design required for LSCO.

Focused on the future, the sustainment warfighting function continues to pursue transformational capabilities to achieve integrated, persistent, and agile connected logistics from the forward tactical edge to the strategic support area while contested in every domain. We are setting conditions for autonomous and semi-autonomous aerial, ground, and sea-based distribution

and operational reach. We'll continue to field modular pump, fuel, and water tank racks to increase the speed of theater distribution to the tactical point of contact. We'll also continue the operational test demonstration of the Leader-Follower autonomous distribution capability at the Joint Readiness Training Center with the 41st PLS Company and ultimately field this capability to our divisionally aligned composite truck companies.

We've modernized platform diagnostic capabilities in armored brigade combat teams with the fielding of the Next Generation Automotive Test Set and improvements made to ruggedized maintenance support devices. To maintain this momentum, we'll continue to modernize maintenance systems at the point of contact over the next five years – such as the Armament Repair Shop Set and Fire Suppression Refill System.

Finally, efforts to achieve a resilient and integrated sustainment mission command architecture with the fielding of modernized enterprise business systems (EBSs) and the next generation Combat Service Support Very Small Aperture Terminals, as well as efforts to embed sustainment analytic decision tools into the CPCE, will help sustainment commanders coordinate and synchronize sustainment effects.

capabilities, and hybrid electrification and demand reduction efforts, ensuring timely, critical modernization to enable deception and maintain the scale and tempo of future operations.

Initiatives such as the Common Tactical Truck—representing a consolidation of our current heavy truck platforms—will leverage best commercial practices, lower procurement costs, and operationalize technologies such as Prognostic and Predictive Maintenance Logistics (PPMxL), advanced driver assistance systems, and autonomous-enabled solutions to support MDO. Furthermore, investments in tactical power, food, and water sources will reduce demand and increase operational endurance across the battlefield.

Are there any anticipated DOTMLPF-P shortfalls or challenges that still need to be addressed before 2028?

Donahue: I'll highlight a couple of the activities we are working on at CASCOM right now.

As the Army transitions to the Regionally Aligned Readiness and Modernization Model, the sustainment enterprise must continue to modernize at the same pace as our division-centric brigade combat teams. We are closely nested with HQDA G3 and FORSCOM to define the sustainment equipment modernization requirements within the model's parameters.

Under the current fiscal environment, we cannot afford to fully field every sustainment unit with modernized equipment. Some units may only receive

training sets and will be directed to divest legacy equipment. This will require changes in our readiness reporting policies to align with a reduction of equipment on a unit's MTOE without reducing the manpower needed to perform the unit's wartime task when they fall in on Army pre-positioned equipment in theater.

We need to maintain total force integration with our Reserve Component (RC) partners and align units with war plans to meet early entry sustainment requirements. Efforts to mobilize RC units for the Defender Series are critical to ensuring shared awareness and understanding of mission requirements and the readiness of early entry units across the total force.

Finally, we must train to sustain the warfighter in a disconnected environment. Efforts to drive the modernization of our EBSs, integrate artificial intelligence (AI) and machine learning, and build depth and resiliency in our sustainment tactical network are necessary to sustain the warfighter in contested domains.

How do your roles as both the 56th QMG and the CASCOM DCG for modernization align and differ?

Donahue: As the 56th QMG and commandant of the Quartermaster School (QMS), I am responsible for capability development and the integration of doctrine, force structure, training, leader development, and materiel solutions for the Quartermaster Corps. I am also focused on the personnel life cycle management and career development for all 92-series MOSs. Finally, QMS serves as the Army's executive agent on behalf of

While sustainment warfighting prowess will always be critical, we must continually lean into our shared Army values—use your head, yet follow your heart; ensure diversity and inclusion; be vulnerable and “take off your armor;” take risks; and promote trust. If we commit to this, we can ensure our teams will sustain the warfighter as we modernize.

HQDA G4 for the Army Food Program, the Culinary Arts Program, the Enlisted Aide Program, the Supply Excellence Program, Bulk Fuel Operations, and Mortuary Affairs. As the CASCOM DCG for modernization, I primarily focus on capability development and materiel solutions for the entire sustainment enterprise. In addition, we're fully nested with the Army's cross-functional teams and the 31+4 modernization initiatives to ensure future sustainability on the battlefield. The myriad of sustainment initiatives (PPMxL, robotics, AI, point of need production, etc.) will converge at Waypoint 2028 to catapult us into the future with unprecedented velocity and capability realization. Both roles are aligned in the capability and materiel development arena and allow us to pursue our senior sustainment leaders' major initiatives and set budgetary and programmatic conditions now for the Aimpoint Force of 2035. As the 56th QMG, they differ in that I mainly focus on training and development while serving as a critical proponent for more than 110,000 Quartermaster Soldiers across the total force and our HQDA G4-directed missions.

The Army of 2028 and 2035 will look radically different than that of today. What advice do you have for our young Soldiers that will join the ranks over the next decade?

Donahue: Gen. Colin Powell once said, "A dream doesn't become a reality through magic; it takes sweat, determination, and hard work." As we transform our Army over the next decade, hard work and dedication are absolute requirements. We're currently working in support of

the CAC to reimagine our organizational sustainment designs to support new divisional concepts. We're placing big bets on new technology such as AI and production capabilities at the point of need to speed up decision-making and reduce our reliance on sustainment distribution. We're changing our doctrine for MDO while updating our programs of instruction for IET to meet the demands of the future battlefield. The list goes on to ensure we're modernizing the sustainment enterprise for competition, conflict, or crisis.

What is our sustainment modernization way ahead for 2035 and beyond?

Fogg and Donahue: First, we remain synchronized with the efforts of CAC to redesign our organizations to support Joint Forcible Entry, penetration divisions, division artillery and cavalry, and the lethal and mobility brigade combat teams. With AFC-Sustainment, the Joint Staff, and HQDA G4, we are progressing the Joint Concept of Contested Logistics (JCCL). We have spent significant time with AFC-Sustainment drafting the Army Functional Concept for Sustainment (AFC-Sustainment), which is nested with the JCCL, the Waypoint 2028 force requirements, and our science and technology (S&T) priorities. Those S&T priorities fall within six critical sustainment components of: (1) analytic decision tools/diagnostic, prognostics, and integrated data, (2) advanced power solutions/energy logistics, (3) alternative water solutions, (4) additive manufacturing, (5) autonomous resupply, and (6) ammunition. Our activities in these areas include efforts on demand reduction, such as hybrid and fully electric

vehicles, Army alternate energy solutions, and application of AI, and enhanced distribution capabilities. We continue to work with our partners to gain incremental efficiencies in the near- and mid-terms while pursuing revolutionary technological advances to meet long-term requirements. Ultimately synchronized investment in, experimentation with, and developing these capabilities will revolutionize how we fight and support the future MDO battlefield.

In closing, people remain our top priority—leading Soldiers with a people-first mentality will remain central to winning. As Gen. Martin E. Dempsey, our 37th Chief of Staff of the Army and 18th Chairman of the Joint Chiefs of Staff, suggested, every leader needs to lead with "a warrior's heart, an immigrant's optimism, and a servant's soul." While sustainment warfighting prowess will always be critical, we must continually lean into our shared Army values—use your head, yet follow your heart; ensure diversity and inclusion; be vulnerable and "take off your armor;" take risks; and promote trust. If we commit to this, we can ensure our teams will sustain the warfighter as we modernize.

Maj. Gen. Rodney D. Fogg completed his tour as commander of the U.S. Army Combined Arms Support Command in July 2021. Fogg has served in various positions, including the commander of the 13th Expeditionary Support Command and Quartermaster General. He currently serves as deputy chief of staff for logistics and operations of the U.S. Army Materiel Command.

Brig. Gen. Michelle K. Donahue serves as the 56th Quartermaster General since May 2020, after serving the Army for 25 years in varying positions, most recently in HQDA, G-8, and as commander of the 16th Sustainment Brigade. She is responsible for the professional military education of more than 20,000 Soldiers, Civilians, and members of other services and nations annually.

Ordnance Corps Modernizes Training and Education Through Self-Development and Credentialing

■ *By Chief Warrant Officer 4 Jeremy Bentley*

Future technological advances will increase the complexity of repairing, managing, and maintaining equipment. The Army currently operates in a resource-constrained environment that may continue to persist into the future. To maintain a competitive advantage over our adversaries, time and resources will have to be used efficiently and effectively. Future educational strategies will have to evolve to support the training and educational requirements of Soldiers and Army civilians. The responsibility to educate and train Soldiers is shared between the learner, the institutional training community (i.e., Training and Doctrine Command instructors, training developers, etc.), the chain of command, and leadership roles. The learning strategy described in the U.S. Army Learning Concept 2020-2040 calls for a career-long adaptive and continuous learner-centric training and educational environment that requires individual commitment to career-long learning. The Army People Strategy, Line of Effort 2: Develop Talent, calls for the development and employment of education and training opportunities that extend Soldiers talents, close talent gaps, and maximize Soldiers contributions to the Total Army. This is envisioned to be achieved through the "Educate," "Train," and "Credential" supporting objective areas that provide the framework for implementing initiatives that achieve Army strategic outcomes. The United States Army Ordnance School, in partnership with the National Institute for Automotive Service Excellence (ASE), has developed the Military Tactical Wheeled Vehicle (TWV) Certification Test Series, otherwise known as the MIL Series, to modernize and supplement the training and education of TWV maintainers now and into the future.

Development of the ASE Military TWV Credentials

The ASE Tactical Wheeled Vehicle credentials have been in development since early 2020, following a memorandum of understanding between the Ordnance School and ASE. Junior enlisted Soldiers, noncommissioned officers (NCO), warrant officers (WO), officers, and civilians from the Army, Air Force, Marines, served as subject matter experts and collaborated with ASE to develop the tests. All

seven intermediate-level tests will be available by August 2021, and an entry-level test should be available by January 2022. Additional details on the test series can be found on the ASE website: <https://www.ase.com/test-series> - See MIL Series. The Military TWV tests are designed to provide Army maintainers with a relevant and viable self-development credentialing program that develops them outside of the institutional training domain. The tests align ASE tests to Army equipment, critical task lists, and processes, set the conditions for career-long learning and growth and provide maintainers with a portable credential that can be used both in and outside of the Army.

Benefits of ASE Military Credentials to the Army

The ASE Military TWV credentials are tests that objectively measure an individual's level of technical job competence and provide feedback to themselves, their unit's leadership, and the Ordnance School to support training and leader development programs that improve maintainer and unit readiness. Time in grade, service, or position will no longer serve as a primary factor in determining occupational knowledge and skills. Leaders and Soldiers can use the test results to develop individual training plans tailored toward areas that require improvements. The Ordnance School can use the test results to inform and assist training developers and Critical Task and Site Selection Board members in determining critical tasks and developing relevant institutional training. The tests can inform and influence personnel

actions in areas such as promotions and WO accessions. For example, test scores and/or certifications achieved could be documented on NCO and officer evaluation reports to assess technical competence in addition to the performance and potential metrics that are currently used. This could be accomplished by revising evaluation forms or writing comments in the rater and/or senior rater blocks on evaluation forms. Test scores and/or certifications achieved could also be used to identify an NCO's level of technical proficiency for warrant officer accession purposes. The credentials could also be viewed favorably on promotion boards and used to identify and select technically proficient NCOs and WOs for promotion advancement. Furthermore, the tests could also be used to assess a civilian applicant's knowledge and technical competence on military equipment before being hired or during probationary periods for civilian employees who are being considered for jobs that require a considerable amount of military vehicle knowledge. Finally, the tests could be used as a viable self-development option for civilians in the same manner that they can be used for Soldiers.

Benefits of ASE Military TWV Credentials for civilian and defense industry employers and employment

ASE was founded in 1972 as a nonprofit, independent organization dedicated to improving the quality of automobile and truck service and repair through the voluntary testing and certification of technicians. ASE certifications are widely accepted and

recognized as the standard industry credential for automotive professions in the automotive service, parts, collision, truck, school bus, and transit bus segments. ASE tests were originally designed to test and certify civilian sector automotive professionals so shop owners and service customers could better gauge a technician's level of expertise before contracting the technician's services. ASE tests certify automotive technician professionals to offer tangible proof of their technical knowledge. The ASE certification testing serves to provide peace of mind to automotive service managers and customers. Correspondingly, the ASE Military TWV tests will provide contentment to Army commanders, maintenance managers, and operators of Army equipment.

Before the development of the ASE Military TWV tests, neither the U.S. Armed Forces nor defense contractors had an independent, third-party administered program to establish the competency levels of maintainers and provide a measure of trust for employers who want to know that they are hiring a civilian or veteran who possesses the knowledge and skills required to work independently on tactical wheeled vehicle systems (i.e., engines, brakes, etc.) and repair them right the first time. The ASE Military TWV credentials, which are open to any military or Department of Defense (DOD) civilian mechanic and/or technician, will prove invaluable to employers who provide products and services for military equipment such as contractors, Army National Guard military technicians, U.S. Tank-automotive and Armaments



Sgt. Jacqueline Santana, 91B, wheeled vehicle mechanic, 140th Quartermaster Company, Fort Totten, N.Y., prepares to work on a Humvee. (Photo by Cheryl Phillips)

Command, Logistics Assistance Representatives, and general schedule employees. The credentials can also be used by civilians and veterans applying for jobs at defense companies, who manufacture vehicles and components for the DOD and provide training to DOD personnel.

Civilian sector employers also favor the Mil Series credentials. They are looking for credentialed military technicians as they are aware that military training for tactical wheeled vehicle mechanics and technicians are somewhat aligned with training for private sector technicians. However, they also understand that because of

the differences between military and civilian vehicles, that some military mechanics and technicians may lack critical knowledge and hands-on experience in specific areas that keep them from successfully passing the A Series (Automobile and Light Truck) and T Series (Medium-Heavy Truck) ASE tests that are designed for civilian sector technicians who primarily maintain and manage maintenance on automobiles and over-the-road or commercial vehicles.

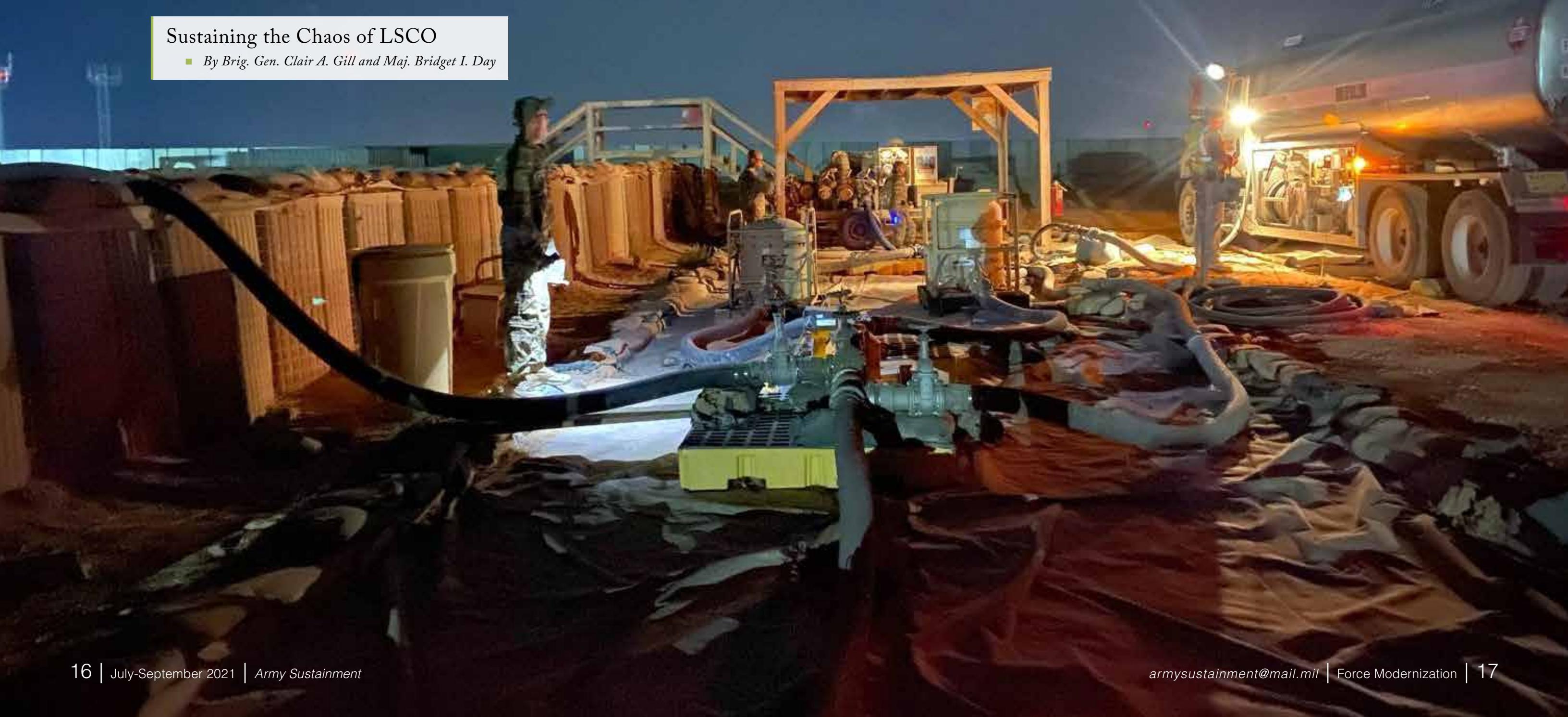
With the right emphasis and management, the ASE Military TWV certification tests will modernize the self-development domain of

Chief Warrant Officer 4 Jeremy Bentley is a training developer at the U.S. Army Ordnance School, Fort Lee, Virginia. He holds an MBA from the Louisiana State University in Shreveport, and a BS in Management and AA in Business from Upper Iowa University. He completed all levels of warrant officer professional military education and is a graduate of the Industry Based Broadening-Logistics Seminar.

FARP OPERATIONS

Sustaining the Chaos of LSCO

■ By Brig. Gen. Clair A. Gill and Maj. Bridget I. Day



In 1415 during the Hundred Years War, the French Army faced King Henry V's English expeditionary force on home terrain in Agincourt. While France enjoyed interior lines of communication, better equipment, and numerical superiority, they were ultimately defeated. The French failed to adapt to the conditions of the day, they failed to modernize their warfare, and they fought the British using tactics and techniques that had worked in battles past, all ultimately leading to their demise. As the U.S. Army continues to modernize and shift focus to large-scale combat operations (LSCO), it is critical that we innovate every warfighting function and consider relevance with an eye toward the future of warfare. Specific to the sustainment warfighting function, we must review the doctrine, training, manning, and equipping of brigade combat teams (BCTs) and push logistical capabilities, such as forward arming and refueling points (FARPs), as far forward as possible. Because sustainment was the bill-payer for BCT 2020, units now lack critical organic logistical capabilities. The echeloned capability cannot keep up with the demand of troop transportation, water purification, refueling, and the list goes on. If we modernize our force without a critical eye toward how we sustain the LSCO fight, history warns this oversight may cause our Army to suffer the fate of the French at Agincourt.

Desert Storm – “Super FARP”

On Dec. 17, 1990, the 101st Airborne Division (Air Assault) (Div.) rehearsed the “Super-FARP,” an innovative fusion of divisional Class III distribution assets (as well as Air Traffic Controllers

and Pathfinders), capable of refueling a single lift of 66x UH-60s and 30x CH-47s in as little as 43 minutes. This incredible synchronization of capability allowed the division to assault two infantry brigades, the division assault command post, and the division support command (DISCOM), forward into Iraq on Feb. 24, 1991, the morning of G-day. With this synchronization, the division struck enemy targets in the zone and established a foothold for follow-on operations in Desert Storm. At the time, this was the largest air assault in history, but it was against an undisciplined, ill-equipped Iraqi military that proved no match for the U.S. and its allies. While this singular capability proved decisive for the division to project combat power, its utility in today’s modern battlefield against peer competitors might not result in such resounding successes. Just because it worked in the past does not necessarily mean it will be repeatable; the Super-FARP concept relevant in airland battle has little chance of survivability in 21st-century LSCO. However, just as DISCOM and the 101st Aviation Brigade spearheaded the “Super-FARP” concept in the ‘90s based on the BCT ground tactical plan, it is critical that the tactical force continues to drive innovation for the future.

Transition to LSCO

Since 2001, the U.S. Army has become quite proficient in counterinsurgency and counterterrorism operations. During the past two decades, however, several of the principle peer state threats to the U.S. and its allies have taken note and modernized their militaries, while the U.S. consumed resources

to win decisively in contact. The Department of Defense leadership took note of the need for a generational shift when they authored the 2018 National Defense Strategy (NDS). The 2018 NDS focused on future modernization for LSCO against threats such as Russia, China, Iran, North Korea, and violent extremist organizations. Like other U.S. Army divisions, the 101st Div. quickly shifted the focus of their collective training towards LSCO, while also supporting the Army’s modernization strategy. The 101st Div. is known for its ability to strike from a distance using helicopters to execute vertical envelopment, but with the resulting extended operational reach, aviation assets rely heavily on forward sustainment operations.

The Combat Aviation Brigade (CAB), 101st Div., was designed to be self-reliant in terms of extending its operational reach through FARPs established by its organic support companies. FARPs are critical to the CAB (and the division), but FARPs established by the CAB are also large, cumbersome, slow to move, and generally are emplaced rearward in the consolidation area. In a LSCO fight FARPs are desirable, easy targets for the enemy, and it is widely accepted that killing a FARP is easier and more effective than shooting at low-flying, highly maneuverable aircraft. The aviation brigade does not have enough redundancy to make their organic FARPs enduring and survivable in the battle zone, thus, we need to be innovative, creative, and bold in how we maintain our deep capability for the division. BCT FARPs would naturally be farther forward and would allow

aviation assets to continuously fight forward. The BCT forward support companies (FSC) and the brigade support battalions (BSB) are the first to push resupply forward as the ground lines of communication open, and having a BCT FARP extends the operational reach and creates multiple dilemmas for the enemy. BCT FARPs must be trained, resourced, and ready in the event the CAB FARP is destroyed or the division needs to extend operational reach quickly. Failure to adapt to the new era of combat will leave FARPs, Army aviation, and ultimately our ground forces to suffer the fate of the French—too big, too slow, too predictable, and too vulnerable for the modern era of warfare.

One Standard

If the CAB FARP is too large and cumbersome or positioned too far rearward, the LSCO fight will outrun the CAB’s ability to refuel and extend its operational reach, ultimately hindering the air assault capability from the division. Identifying this LSCO capability gap, the division adapted and directed its BCTs to purchase the necessary FARP equipment and to certify all of their 92F Petroleum Specialists to pump aviation-grade fuel. Each BCT was to train and certify their BSB’s alpha companies and FSCs to set up, establish, filter, certify, and execute a two-point Heavy Expanded Mobility Tactical Truck (HEMTT) Tanker Refueling System (HTARS) FARP in less than one hour.

It is commonly misperceived that the aviation support battalion distribution company and battalion FSCs in aviation brigades have different fueling

capabilities than BCT BSBs. The only difference, however, is the filtration standards adhered to by the CABs. In fact, all 92Fs are trained in both ground and air fueling operations during their advanced individual training, but these skills are perishable. It is imperative that 92Fs continue to train to the standards required of circulating and testing fuel to aviation standards and actively train with aircraft per ATP 3-04.17. It will take command-emphasis to ensure that FARP training is an enduring change in BCT sustainment training, and to gain commander-level engagement, FARP operations must be added as a primary METL task for Alpha Company and FSCs. In the 101st Div., we are changing the support structure and culture. FSCs are ordering hoses, fittings, nozzles, Aqua Glo test kits, filters, spares, and safety equipment, and BCT Soldiers are getting time and repetitions pumping fuel into live aircraft. In the 101st Div. every 92F pumps aviation-grade fuel!

Training the BCT Fuel Distribution Team

By certifying every brigade to establish and execute FARP operations in support of aviation operations, the division is expanding options available to commanders. 3rd BCT, 101st Div., took the lead on executing training with CAB expertise and oversight to establish a FARP validation program for all of the division’s 92Fs. This nested well with their innovative concept of support that challenged doctrine by making the brigade support area (BSA) as small as possible and massing sustainment personnel and capabilities forward to the forward support companies. As Gen. Mark A. Milley stated during his 2016 AUSA speech, “The battlefield will be non-linear, compartmented and units will have non-contiguous battle spaces with significant geographical separation between friendly forces. This type of battlefield will place a high premium on independent, relatively small formations.” Heeding this sage guidance, the 3rd BCT (Rakkasans) adapted to limited echeloned communications, rapid aggregation and disaggregation, and constant movement to enhance survivability. Keeping the BSA small, augmenting FSCs with personnel and equipment capabilities, and extending the aviation operational reach will not only present additional challenges to the enemy but will prevent sustainment from being outpaced by the operational demand.

In order to implement their concept of support, the 626th BSB, 3rd BCT, deliberately implemented a training glide path to incrementally train their 92Fs. The training began first with Alpha Company, 626th BSB, executing multiple iterations of familiarization and hot refueling operations and ultimately being validated by the CAB safety officer. Once validated, 92Fs in Alpha Company will then conduct training with the FSC fuel teams until each battalion fuel team is validated to conduct independent FARP operations. Although the training can be as simple as refueling aircraft after an Air Assault School support mission, the 92Fs collaborated with the CAB to provide the FARPs for two aerial gunneries. This provided realistic training that involved rearming, refueling, sling loads, and multiple iterations. In the near future, Soldiers will conduct a



Sgt. Nicholas Bostic, a 92F, petroleum supply specialist, conducts forward arming and refueling operations June 1 for the 1-3rd Attack Battalion during the landing of two UH-72 Lakota helicopters assigned to the 7th Army Training Command at Tazar, Hungary, during exercise Saber Guardian in support of Defender-Europe 21. (Photo by Sgt. Preston Malizia)

validation exercise, where they will be given a date, time, and grid coordinate to tactically convoy to, find cover and concealment, establish communication with the aviators, and expeditiously conduct FARP operations under the security of organic gun truck crews. This culminating FARP operation will validate that 101st Div. outside of the CAB can safely and independently provide FARP capabilities, extending the division's reach throughout the battlefield giving the commander

multiple options while presenting the enemy multiple dilemmas.

LSCO Concept of Support

In response to a fiscally-constrained and reduced force cap, BCT 2020 drastically reduced the sustainment equipment and personnel at BSB and FSC echelons. The Army Sustainment Professional Bulletin article, located in the November-December 2016 publication, "BCT 2020 Logistics: Where the Rubber

Meets the Road," explains that the BCT 2020 sustainment force structure is not suitable to sustain the support requirements of the BCT and as a result, a BCT must rely on the division support brigade (DSB) to provide any support requirement gaps. BCT 2020 was designed prior to the transition to the LSCO fight, and the modified table of organization equipment (MTOE) of the BSB and FSCs has continued to decrease and pull capabilities from brigades. Consolidating sustainment

assets in the rear with the DSB cannot reasonably sustain or keep pace with the LSCO fight; the focus must shift to forward sustainment. On a battlefield where lines of communication between echelons will be challenged and the ability to move rapidly every few hours is the difference between life and death, it is necessary to have as many support capabilities forward as possible to keep pace with demand. Adding BCT FARP capability throughout a division supports this concept. BCT MTOEs need to authorize both the personnel and equipment to support ground and air-fuel requirements. Although 101st Div. BCTs are experimenting with support structure changes to better support the LSCO fight (and training to execute FARPs), it is imperative that the MTOEs also change for support personnel and equipment to keep pace.

The infantry brigade combat team (IBCT) MTOE has shifted away from M978 HEMTT fuelers in order to account for reduced manning and now authorizes Tank Rack Modules (TRMs). The MTOE for Alpha Company, BSB replaces 5x M978s for TRMs and in the FSC formations, TRMs have completely replaced M978s. Alpha Company, BSB is currently authorized 5x TRMs, 5x M978s, a HTARS, and 10x 92Fs. Not only is this not enough personnel to simultaneously resupply FSCs while also executing FARP operations, but TRMs can only provide a FARP capability with an additional pump such as a Pump Rack Module (PRM) or the pump that would come in an Advanced Aviation Forward Area Refueling System (AAFARS); additional pump capability is not authorized in an IBCT.

It is clear from the authorization of the HTARS that IBCTs are intended to support FARP operations, but now the LSCO problem set requires the ability to do both ground and air refueling missions simultaneously—for both planned air assaults and contingency situations. 3rd BCT, 101st Div., recommends an equipment MTOE change for Alpha Company, BSB to 5x TRMs with an AAFARS, 5x M978A2s and 1x M969A3, and a personnel MTOE change to 26x 92F, 1x 92L (Petroleum Lab Specialist) and 1x 923A (Petroleum Systems Tech). These equipment and personnel additions would allow Alpha Company to execute both air and ground refueling operations. FSCs have also lost their M978 HEMTT fuelers, which have been replaced entirely with TRMs. Every FSC except for Echo Company FSC is MTOE'd 4x TRMs, but Echo Company is only authorized 3x TRMs which is a significant mismatch to their engineer equipment fueling needs. 3rd BCT recommends each FSC is authorized 4x TRM, 4x M978 fuelers, HTARS, and 8x 92F. The addition of equipping the M978 fuelers back into the FSC formation would allow flexibility at the forward line of troops and would free up the load handling system platforms to transport other necessary commodities such as Class V. Again, in order to keep pace and give commanders options, BCTs must be equipped and manned to refuel both ground and aviation simultaneously in a LSCO fight.

Only when the sustainment warfighting function matches their capabilities to the LSCO fight will there be an enduring culture shift. In

the meantime, the division continues to take a modernized approach to how it extends its operational reach using decisive maneuver and innovative and adaptive logistics to assault the division into the fight. The 101st Div. of 1944 adopted the moniker as a "Band of Brothers" who, like the English of 1415, also jumped into northern France and fought an enemy using adaptive tactics supported by innovative logistics to win the day. Today's Air Assault troopers stand in the shadows of our forefathers ready for our next rendezvous with destiny. We continue to train new tactics, modernize our equipment, and seek innovative ways to operate from a distance to strike!

Brig. Gen. Clair A. Gill is currently serving as the director, Army aviation (HQDA ODCS G3/5/7). He most recently served as Deputy Commanding General (Support) of the 101st Airborne Division, where he was also a company and battalion commander. He is a graduate of the Joint Advanced Warfighting School (JAWS) at the Joint Forces Staff College, and the U.S. Army War College Fellowship at the Central Intelligence Agency (CIA).

Maj. Bridget I. Day serves as the support operations officer for the 3rd BCT, 101st Airborne Division. Her previous assignments include Congressional Fellow and Forward Support Company Commander for Juliet, 2-501 Parachute Infantry Regiment, 1BCT, 82nd Airborne Division.

Featured Photo
U.S. Soldiers with Echo Company, 2-104th General Support Aviation Battalion, 28th Expeditionary Combat Aviation Brigade (ECAB) receive bulk fuel at night at a forward arming and refueling point Oct. 28, 2020, in the 28th ECAB's area of operations in the Middle East. Echo Company Soldiers work 24/7 on the FARP to keep operations running and our helicopters fueled. (Photo by Spc. Jennifer Raley)



The Future Is Now at **JRTC**

Modernizing the Force with Tactical Wheeled
Vehicle Leader-Follower Technology

■ By Capt. Ellen M. Johnson, Capt. Eli D. Rothblatt,
and Donald C. Overton

Semi-autonomous capability for tactical wheeled vehicles is a key element of force modernization for the sustainment warfighting function.

A leader for this effort is the distribution requirements development branch of the Army Futures Command's sustainment capabilities development and integration directorate. Leader-follower capability is a combined developmental effort between the United States Army Tank Automotive Research, Development and Engineering Center and the United States Army Sustainment Center of Excellence.

The distribution requirements development branch is developing a leader-follower tactical wheeled vehicle (LF/TWV) capability as part of the autonomous ground resupply science and technology objective. LF/TWV capability means that a driver/truck commander (TC) two-Soldier crew in a leader vehicle can control the movement of unmanned follower vehicles. The goal is a truck company squad worth of wheeled vehicles controlled by three Soldiers (driver, TC, gunner) in a convoy protection platform (CPP) lead vehicle, such as a joint light tactical vehicle, leading nine fully cargo-loaded palletized load systems (PLS) unmanned follower vehicles.

LF/TWV provides a limited autonomous vehicle capability to tactical wheeled vehicles. The system provides the capability for a designated manned lead vehicle to lead a line of unmanned follower vehicles by using vehicle sensors with sufficient accuracy to operate unmanned safely. Using LF/TWV aims to improve force protection and increase the sustainment throughput of convoy operations. A single robotic mode of driving four to nine trucks with only two Soldiers through a high threat area is accomplished by electronically linking a Soldier driven leader vehicle with four unmanned follower vehicles with current technology – and with nine unmanned follower vehicles with the refined version to be fielded in the 2030s.

With LF/TWV technology, you can run trucks 24 hours a day while allowing Soldiers to man CPPs, get crew rest, and perform other tasks within the tactical assembly area. When these LF/TWV-enabled convoys return from the mission, units will swap out crews. LF/TWV technology is not developed to reduce the number of Soldiers within

truck companies, it is being developed to allow increased force protection and throughput vital for large-scale combat operations.

The distribution requirements development branch focuses initially on PLS truck companies because PLS trucks have a dual mission of line haul and local haul. Line haul is from the theater support area (port and intermediate staging bases) to the division support area. The local haul is from the division support area forward to the brigade support area and to the field train command posts, four to twelve kilometers behind the combat element, and to the combat train command posts one to four kilometers behind the fighting element. Currently, LF/TWV technology capability allows one leader PLS truck to control four follower PLS trucks day and night, in all drivable weather conditions, and over all drivable surfaces (primary and secondary roads, and off road).

Commercial vehicles are only capable of semi-autonomous driving on main roads—hardball surfaces with white lines on the pavement, allowing civilian vehicles to sense when they're drifting out of lanes. Commercial semi-autonomous vehicles will respond with a driver warning, for example, a warning flash of light on the dashboard or a steering wheel vibration. Alternatively, commercial semi-autonomous vehicles will provide driver assist, and the vehicle pulls back into the center of its lane by itself. The PLS LF/TWV equipment uses the same commercially available sensors, including radar and lidar, and has the same paved road semi-autonomous capabilities. However, the military equipment for PLS trucks is unique because it has a specially designed software package utilizing the commercially available sensors for off-road cross-country leader-follower capability. As a result, PLS LF/TWV trucks have already demonstrated the capability to drive on any surface and in any conditions at a one leader truck four unmanned follower truck convoy as if every truck had a full crew operating it.

In September 2020, the distribution requirements development branch began a yearlong operational technical demonstration (OTD) by fielding the LF/TWV equipment to every truck in the 41st Transportation Company (Trans Co) at Fort Polk, Louisiana. The 41st Trans. Co. is one

of two active-duty PLS companies in the Army. PLS companies consist of 60 PLS trucks organized into two platoons of 30 PLS trucks each. Each platoon is organized into squads of 10 PLS trucks. Although the end goal is for PLS LF/TWV capability to allow one leader PLS to move nine follower PLS so that one vehicle crew can move an entire squad of PLS trucks, 41st Trans. Co. has been training with the current capability of a 1:4 leader-follower ratio.

41st Trans. Co. is conducting a normal training cycle with the LF/TWV equipment and developing tactics, techniques, and procedures to incorporate the unique capabilities. Simultaneously, the distribution requirements development branch field team on site is collecting data. This field team uses the data to determine how doctrine, including Army Techniques Publication 4-11, Army Motor Transportation Operation, will have to change. In addition, the OTD field team is determining if any new types of training, including institutional and unit training, will need to be developed.

The 41st Trans. Co.'s mission on Fort Polk is to support the Joint Readiness Training Center (JRTC) rotating units. 41st Trans. Co. isn't normally introduced into the box. Still, during the upcoming late summer/early fall 2021 JRTC rotation, a PLS truck squad from 41st Trans. Co. will be deliberately introduced into the box to demonstrate LF/TWV capability. The PLS truck squad will run 1:4 LF/TWV convoys, half a squad of PLS, to provide support to the rotational unit at JRTC.

In fiscal year 2023 the Army will activate four more active-duty PLS companies in addition to the two currently operating: 41st Trans. Co. at Fort Polk, Louisiana, and the 15th Trans. Co. at Fort Sill, Oklahoma. All six PLS companies will have 100% of their PLS fleet outfitted with the LF/TWV equipment supporting a 1:4 LF/TWV ratio. By the 2030s, that capability will increase to the 1:9 complete PLS squad-size ratio.

However, as early as 2027, LF/TWV capability will be included in the new fieldings of other tactical wheeled vehicles. When the Army starts fielding the new M916 Light Equipment Transporter Tractor Truck, it will have

the ability to accept the LF/TWV kit. Same with all of the Heavy Expanded Mobility Tactical Truck and Family of Medium Tactical Vehicle platforms. The LF/TWV equipment can be fitted on all of the tactical vehicles within the Army wheeled vehicle fleet.

Since World War I, the Army has used trucks tactically on the battlefield and knows how to employ trucks successfully to accomplish any military mission. Tactical trucks have steadily evolved to go farther, be more reliable, and haul ever increasing payloads. The development of semi-autonomous ground distribution systems is a further evolution that provides enhanced freedom of action and more responsive resupply operations. LF/TWV technology gives the Army even greater sustainment throughput capacity, a means to self-secure transportation convoys, and gives commanders additional options for protecting Soldiers in hostile environments.

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Featured Photo
Soldiers from 41st Transportation Company, Joint Readiness Training Center, execute vignette lanes developed by the unit and Army Futures Command that assess the expedient leader follower techniques according to current doctrine and regulations March 1, 2020, at Fort Polk, Louisiana. (U.S. Army photo)



Training the PROFESSIONAL Soldier

Bridging Inexperience and Sophisticated Warfighting Technologies

■ By Lt. Col. Michael Hefti

No matter what is done, no matter what method is used, one should always remember that our wartime recruits are sent into squadrons as into battalion with hasty, incomplete training, and if you give them lances most of them will just have sticks in their hands, whereas a straight sword at the end of a strong arm is both simple and terrible.

—Charles Jean Jacques Joseph Ardant du Picq, *Battle Studies*

As the Army embraces multi-domain operations (MDO), Training and Doctrine Command (TRADOC) must adjust training methods and aids to account for the ever-increasing volumes of information required to maintain increasingly sophisticated weapon systems. Current Army weapon systems already highlight this need. For example, the most recent operator-level technical manual for the M1A2 Abrams Tank consists of four volumes numbering 4,674 pages. Carl Von Clausewitz's timeless treatise On War comprises just one-seventh that number. If the past is any guide, future weapon systems will only become more sophisticated and challenging to maintain with less time to train individual Soldiers.

The individual Soldier's heightened intellectual aptitude has become the hallmark of the all-volunteer force, which leveraged further advancement in technology and adaptation of a training and professionalization culture analogous to licensed practical nurses, licensed industrial technicians, and other skilled tradesmen. This achievement also became the Army's Achilles heel, since organizations cannot train and certify such specialists overnight. If large-scale combat

operations (LSCO) result from the current competitive policies of Russia, China, Iran, or North Korea, the Army will need to already have in place a supportive cognitive environment for training replacements on sophisticated equipment. If TRADOC and the Army Combined Arms Support Command (CASCOM) do not develop a system for rapid transfer of cognitive information, the newly-accessed Soldiers will embody Ardant du Picq's warning about the value of untrained personnel: "...if you give them lances most of them will just have sticks in their hands..."

As part of the existing synthetic training environment, TRADOC's Program Executive Office Soldier began incorporating augmented reality as part of the Integrated Visual Augmentation System, known as IVAS, and plans to field it in 2021. The IVAS uses augmented reality to show weapon optics, Soldier location, friendly and enemy location, night vision capability, and possibly facial recognition and text translation. However, the new IVAS focuses only on battlefield capabilities; it misses the platform's critical application to a disbursed maintenance environment and cross-training requirements for low-density and high-demand technical skill sets.

Two facts should convince CASCOM and TRADOC to accelerate the application and improvement of maintenance training through augmented reality. Augmented reality improves point-of-need training by generating remembered hands-on experiences for Soldiers, a personalized curriculum based on skill level and aptitude, and an accelerated knowledge transfer rate compared to legacy training methods. Second, augmented reality improves training efficiency by increasing Soldiers' motivation to learn, unit training programs' effectiveness, and the acquisition of the technical skills required to repair sophisticated weapon systems.

The Army requires its professionals to possess specialized knowledge. James Kitfield, in his 1997 book *Prodigal Soldiers*, articulated that the U.S. Army was able to draft individuals from 1940 to 1973, but it could not draft experience, a lesson the U.S. Army will relearn in future wars. As the synthetic training environment continues to develop, CASCOM and TRADOC must consider augmented reality as a tool to bridge inexperience and sophisticated weapon system maintenance requirements through point-of-need training and improved training efficiencies.

Training Delivered to the Point-of-Need

U.S. Army institutional schools often trail the operational force in training new warfighting technologies. To address this concern, the 2013 TRADOC commander Gen. Robert W. Cone, in his article, "Building the New Culture of Training," published in *Military Review*, January-February 2013, suggested using emerging technologies to deliver training at the point-of-need, thereby mitigating the lag between institutional schools and the operational force. Augmented reality emerged as one of the most recent technologies that can minimize the knowledge gap between equipment fielding and institutional schools. Augmented reality generates remembered hands-on training for Soldiers, personalizes training based on skill level and aptitude, and accelerates the knowledge transfer rate of technical information compared to legacy training methods, thereby delivering practical point-of-need training.

NCOs currently provide hands-on training to mitigate the lag in institutional training; however, the current systems reduce training quality for new Soldiers. New Soldiers often miss point-of-need training since operator new equipment training (OPNET) and field-level maintenance new equipment training (FLMNET) typically do not align with personnel manning cycles. Even when civilian trainers certify an NCO as a trainer, that NCO rarely remains in place for more than three years. New Soldiers arrive monthly, yet no matter how dedicated, contractor-certified NCO trainers seldom provide the same level of hands-on training provided by the OPNET or

FLMNET teams. Augmented reality, combined with NCO trainers, provides new Soldiers with ongoing hands-on training and instruction instead of manuals or slide presentations left behind by the OPNET or FLMNET team.

Augmented reality software uses image recognition to place technical manual instructions on the heads-up display while generating digital overlays on actual equipment. The overlay of information and instructions reduces the cognitive overload by providing learning through interaction with the real environment instead of being a spectator of an instructor. In 2009, researchers used augmented reality to train Marines inside of a LAV-25 armored personnel carrier. The researchers found that the Marines were 37% faster with maintenance tasks when using augmented reality as opposed to a computer screen or tablet. Like training with an instructor, augmented reality provides an interactive experience at the point-of-need through multiple sensory devices, thereby improving task proficiency.

Personalized training is important since the Sustainable Readiness Model and the new Regionally Aligned Readiness and Modernization Model do not account for individual Soldiers who enter a training cycle at different times with different skill sets and training. Making matters worse, the complexity of new technologies requires so many niche instructors that the Army must rely on the commercial sector for training assistance, which results in broad standardized training and fails to address personal expertise and skill level. Augmented reality fixes this with interactive, personalized,

learner-centric training, and feedback, based on individual skill level and aptitude. Learner-centered training enhances intrinsic motivation and allows Soldiers to progress at their own pace. With augmented reality, trainers increase their ability to track a Soldier's progress, and Soldiers can customize training to their current skill level.

Augmented reality also provides Soldiers the ability to experiment in a virtual maintenance environment and test their technical skill level. Soldiers interact with augmented reality to practice maintenance requirements on a virtual model of the equipment before making the actual repair. Using a virtual model allows the Soldier to manipulate the object in ways that make sense to them individually. The Soldier can change the virtual object's position, size, shape, or even take it apart virtually and reassemble it. This experimentation provides feedback to the Soldier before making a costly mistake and helps the Soldier personalize an approach to the repair.

Additionally, augmented reality accelerates the knowledge transfer rate of technical information, compared to legacy training models. Cognitive psychology measures the transfer of learning by how fast the learning of one task facilitates learning a second task. When related to technical skill training, knowledge transfer measures how much technical training a Soldier applies to the job and how the transfer impacts later job performance. Various studies have measured knowledge transfer through augmented reality with promising results and suggest increased technical skill effectiveness.

Both inexperienced and experienced technicians can improve their cognitive processing skills and knowledge transfer of technical information with augmented reality. In a 2018 study, researchers focused on technicians who maintained a Boeing 737 engine bleed air system. Compared to printed technical manuals, technicians who used augmented reality were 17% faster at assembling the bleed air system and improved 24% in quality by reducing errors. With faster knowledge transfer, Soldiers will complete maintenance requirements faster, reduce errors, and mitigate risk during individual and collective training.

Whether at peace or in conflict, the operational force cannot rely on the generating force to send expert maintenance technicians to the point-of-need. On-the-job training remains a critical component of learning technical skills, which must occur in a future large-scale combat operations environment. Augmented reality provides on-the-job training at the point-of-need while mitigating some realistic training gaps between the generating force and the operational force's maintenance requirements.

Increasing Efficiency

Individual and collective training requirements increasingly constrain today's training environment. In 2015, the Department of the Army G-3/5/7 staff framed the problem by showing there were only 220 days available to generate readiness, but over 366 training days required. Even this attempt to frame the problem showed gross inaccuracy by allocating only 34 days of command maintenance per year. In reality, a single Stryker battalion requires more than

eighty days per year for semi-annual and annual services, not including unscheduled maintenance, commodity weapon services, and communication system services. The required balance of maintenance and mission-essential training highlights the need for methods and aids that cross-train Soldiers on low-density and high-demand technical skill sets.

Although industrial-age training methods work, it is not as effective as information-age methods and tools. Industrial-age training is problematic since it seldom engages or retains the attention of "digital native" Soldiers. The use of printed instruction, diagrams, and other printed schemes lengthens training time requirements and only allows for passive knowledge transfer of technical information. The use of these static materials explains why industrial-age training paradigms historically use extrinsic motivation such as grades, failing a course, or repeating a course to force engagement on the trainee. Information-age training models seek more intrinsic motivation than industrial-age models. If Soldiers enjoy using augmented reality as an aid, they are more likely to self-initiate action. Self-motivation remains critical for Soldiers in a fast-paced environment where direct supervision does not always exist.

In addition to motivation playing an essential role in maintenance effectiveness, augmented reality improves effectiveness by reducing repair time and errors. Reduced errors save the Army money, and faster repair times equates to more collective training. In 2013, General Cone in his article, "Building the New Culture of Training," published in

Military Review, January–February 2013, declared it a foundational imperative for the Army of 2020 to harness technology that enabled faster and more efficient training. Cone believed that TRADOC owed commanders tools to help them train more efficiently in almost any environment while moving beyond the industrial-age paradigms like field tables or 100-slide presentations. Not even a full decade later, the Army has the potential to implement the type of technology that Cone envisioned. Augmented Reality software upgrades to IVAS hardware reduces printed technical manuals and repair time.

Augmented reality also increases assembly speeds. Numerous civilian researchers studied augmented reality, examining similar efficiencies that increased maintenance and assemblage requirements. In one study, participants assembled two-dimensional and three-dimensional puzzles with augmented reality and a different set of puzzles with a computer monitor instead of augmented reality. The trainees using augmented reality assembled the puzzles faster. Another study required seven engineering students to assemble twelve parts of an RV-10 aircraft, of which they had no prior experience. All of them showed a faster assembly time when assisted with augmented reality, compared to traditional manuals.

As the Army increases weapon system sophistication and "black box" technology, maintenance technicians will need to repair complex end items and components rapidly and correctly in a combat theater instead of waiting for a replacement to show up. Numerous studies have shown improved circuit

board repair with the use of augmented reality. One study showed that aircraft motor mechanics were 17% faster and increased 24% in quality assurance. Another study used electrical motherboard assemblies and discovered that participants using augmented reality completed assembly 60% faster than other participants. Finally, another study showed 50% fewer assembly errors, and participants were 20% faster in electrical motherboard assembly. As "black box" technology becomes more pervasive in the Army, it will require faster and higher quality repair in an expeditionary environment.

Conclusion

As the Army Futures Command leaders continue to look at 2035 weapon systems, they must emphasize sustaining the technologies already developed. TRADOC and CASCOM must play a lead role in developing maintenance training and efficiencies in maintenance to support new warfighter technologies. Maintenance requirements in 2035 will likely consist of increased "black box" technology, circuit boards, robotics, and unmanned equipment that requires expeditionary repair forward. Units that cannot repair forward with organic Soldiers lack operational reach, culminate early, and increase risk to operational success, especially with contested supply chains.

Granted, Army leaders must treat new technologies, like augmented reality, with skepticism. As Gen. Donn A. Starry told leaders in 1979 at the Army Command and General Staff College, documented in, "Press On!: Selected Works of General Donn A. Starry," published by Combat Studies Institute

Press, 2009, technology alone will not win the next war and to say so is "pure unadulterated baloney." However, modern war shows that fighting power provides the margin of victory, and today's fighting power is a combination of the Soldier and technology. Senior leaders expect our NCOs to advance their expert knowledge and skills as lifelong learners and professionals. However, those same senior leaders acknowledge in Training Circular 7-22.7, The Noncommissioned Officer Guide, that "...the equipment the modern Soldier carries is more technologically advanced and requires knowledge, care, and skill to employ successfully." Despite ever-increasing skill and knowledge requirements, senior leaders continue to place individual training responsibilities on the team leader, the most junior and inexperienced NCO. As TRADOC and CASCOM leaders focus on MDO, maximizing the human domain will be equally critical, if not more so, than modernization.

Although it may seem like a paradox, technology aids in maximizing the human domain. One reason stems from the rapid growth of technology and the emphasis on the knowledge required for survival on the battlefield in an information-age era. Civilian companies already capitalize on enhancing human capital through technology and leveraged augmented reality as a technological advantage. For example, leadership at Mercedes-Benz USA recently implemented augmented reality in training and technical support at 383 dealerships. Mercedes-Benz mechanics use augmented reality to complete maintenance tasks until they require additional help, at which point they integrate teleconsultation with a technical expert.

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Featured Photo

Spc. Harley Cantu, Foxtrot Company, 3rd Battalion, 16th Field Artillery Regiment, prepares his tools before he begins fixing an armored vehicle in Foxtrot Company's motor pool at Fort Hood, Texas, May 6. 91P Soldiers (Army Artillery Mechanic) supervise and perform unit maintenance and recovery of all self-propelled field artillery cannon weapon systems. (Photo by Spc. James P. Alegria)

Personnel Replacement Operations

Sustaining The Personnel Component of Combat Power During Large-Scale Combat Operations

■ By Lt. Col. Derrick Lucarelli

With the publication of Field Manual (FM) 3-0, Operations, in 2017, the Army acknowledges that the current operational environment presents significantly more dangerous threats in terms of capability and magnitude than those faced in Iraq and Afghanistan. These rising threats, along with the evolution of the current operational environment, have caused the Army to shift its focus away from counterinsurgency operations (COIN) to an approach that is multi-domain and large-scale combat operations (LSCO) centric.

Following the publication of FM 3-0, the Army published a revision of Army Regulation 600-8-111, Army Mobilization, Manning, and Wartime Replacement Operations.

One of the updates within this revision was the Army Enterprise's wartime replacement roles and responsibilities and how wartime replacements would be sourced—with either unit replacements or non-unit related personnel (NRP) (formally known as individual replacements). Similarly, utilizing FM 3-0 as its basis, the sustainment enterprise updated its cornerstone doctrine with the revision of FM 4-0, Sustainment Operations, which annotates how the sustainment enterprise supports LSCO.

LSCO are intense, lethal, and brutal and may produce casualty rates at a scope and scale the Army has not encountered since the Korean or Vietnam Wars. This rise in anticipated casualty rates and the increased demand for NRP replacement operations capacity provides an emerging problem

set for the sustainment enterprise that challenges its ability to "enable freedom of action, create strategic and operational reach, and provide the joint force with prolonged endurance" Field Manual 4-0, Sustainment Operations, that is necessary for mission success in LSCO. Specifically, its ability to support NRP replacement operations to maintain combat power.

FM 4-0 identifies sustainment commands as responsible for reception, staging, onward-movement, and integration (RSOI) as directed by the Army service component command (ASCC). RSOI is an essential task that facilitates the flow of NRP replacements into a theater. Normally "the theater sustainment command (TSC) will be assigned that responsibility and subordinate units of the TSC from an expeditionary



sustainment command (ESC), sustainment brigade, combat services support battalion, down to a movement control team can be assigned specific tasks in support of RSOI.” However, the specific tasks for NRP support operations and those responsible for their execution are not identified within FM 4-0.

To address this gap within sustainment doctrine, the Soldier Support Institute (SSI) researched previous doctrine that might provide a framework for which the sustainment enterprise could use to produce solutions. The resulting research identified FM 12-6, Personnel Operations, used during the air land battle era, as a possible reference. It provides the sustainment enterprise the ability to leverage successful lessons learned and processes used during replacement management in the past and apply them in today’s operational environment, mitigating the risks that would prevent sustainment units from executing its core principles.

FM 12-6 clearly identified the functions that were required during replacement management operations (command and control, billeting, transporting, equipping, medical, feeding, processing, battlefield orientation, personnel accountability, applying manning priorities, and limited essential personnel services) and the organizations at echelon who were responsible for the execution of them. The organizations that executed most of those functions in the joint security area and the corps support area were the personnel replacement battalions and

companies, and the division support commands (DISCOM) in the division support area. When comparing the organizations present during the FM 12-6 era and those available in the Army’s current inventory, the division sustainment brigades (DSB) can replicate the execution of the functions of the DISCOM in the division sustainment area.

However, the personnel replacement battalions and companies are no longer in the Army inventory, and present-day human resources (HR) structure (theater gateway personnel accountability teams and human resources companies) are not viable options to execute these tasks. The lack of an identified and dedicated structure to execute the functions that the replacement battalions and companies were responsible for challenges the sustainment enterprise within the joint security area and the corps support area.

The SSI leveraged FM 12-6, and the concepts found within Army Techniques Publications (ATP) 3-90.20, Regional Support Group, and produced a potential option of addressing this capacity gap. Modeling the replacement flow found within FM 12-6, the SSI worked in conjunction with the sustainment battle lab at Fort Lee, Virginia, during the NRP tabletop exercise (TTX) in February and developed a potential replacement operations framework.

While not an approved solution, this draft framework shows how the Army could execute NRP support operations and regenerate combat power during LSCO. It leverages the regional

support group (RSG) as a potential solution to serve as the organization responsible for the majority of roles and responsibilities of NRP support operations in the joint security area and the corps support area, and leverages the DSB as the responsible agent for the roles and responsibilities of NRP support operations in the division support area.

While this proposal is aligned to the doctrinal mission set of the RSG, it is important to note that the RSG is only an O-6 level headquarters (approximately 70 Soldiers), and does not possess the requisite organic capacity to execute these functions. Rather, it requires extensive augmentation. To provide this capacity, it is essential that the ASCC and TSC plan for this augmentation capacity during their time phased force deployment data and operations plan (OPLAN) development. Additionally, the ESCs must synchronize mission requirements with their supporting RSGs. Even with augmentation, the RSG does not possess the capacity, expertise, and coordination capabilities to execute all facets of NRP replacement support and distribution management independently.

Applying the concepts found within distribution management, this framework provides a course of action that enables NRP replacement delivery at echelon (from the joint security area, to the corps security area, to the division security area, to the brigade security area). However, it also includes a course of action that leverages enablers such as the convoy support centers to facilitate the

delivery of NRP replacements from the corps support area directly to the brigade support area, providing risk mitigation alternatives and methods of capitalizing on speed to regenerate combat power for those units in need within the close area.

Key to the success of this framework is the sustainment enterprise’s ability to coordinate, integrate, and synchronize NRP replacement operations mission requirements across the theater. Integral with this requirement is the constant communication that must occur between the ASCC and TSC. It is the TSC distribution management center’s (DMC) responsibility to coordinate, synchronize, and integrate the ASCC’s mission requirements with its subordinate ESC and sustainment brigade support operations (SPOs) and human resources operations branches (HROBs) within the SPO. The corps and divisions must also replicate this coordination with the units within their echelons.

For the HR community, this new framework carries several points of emphasis that did not exist during modularity. With the creation of the new division special troops battalion (DSTB) SPO and LSCO’s increased demand on the HROBs at echelon, leaders cannot assume risk with underfilling these positions as they have during COIN. Talent management becomes essential to place the right talent with the requisite knowledge, skills, and behaviors to serve and thrive in human resources sustainment centers (HRSCs) / theater personnel operations centers (TPOCs), HROBs, and DSTB SPOs. Failure to do so

will lead to the failure of integrating HR support to replacement operations mission requirements with the sustainment enterprise. Additionally, HR professionals serving in HRSCs/TPOCs and HROBs (subordinate branches of the TSC DMC and SPOs) must attend the SPO Course. They will learn the concepts and designs of distribution management—the key fundamentals of “how” NRP replacements are delivered during LSCO. Lastly, HR professionals must be integrated into the sustainment enterprise and actively participate in the planning events. They have a purpose when the sustainment enterprise is conducting planning events. HR professionals must be prepared to participate in the various boards, bureaus, centers, cells, and working groups (B2C2WG) at echelon, understanding who the key players are within the B2C2WG and the key functions, outputs, and placement of B2C2WGs within the battle rhythm. It is within these B2C2WGs, such as the movement control board, where the majority of the coordination and decision-making for NRP replacement distribution will occur. Failure to nest with the systems and processes of these B2C2WGs will result in HR support to replacement operations failure and the subsequent failure of sustainers and commands to maintain combat power.

LSCO presents an operational environment that challenges the Army’s ability to regenerate the personnel component of combat power and enable the sustainment enterprise to execute its core principles of enabling freedom of action, creating strategic

and operational reach, and providing the joint force with prolonged endurance. It is a capacity gap that the sustainment enterprise must acknowledge and accept full ownership to mitigate. Future TTXs will refine the draft NRP replacement operations framework. FM 4-0 will soon be updated to address NRP replacement operations, and the Combined Arms Sustainment Command is currently developing a new ATP for NRP replacement operations. In the interim, as sustainment units become familiar with NRP replacement operations, the community as a whole must recognize the uncomfortable truth that NRP replacements need to be treated as a commodity (for planning purposes) within the distribution management process. People are the Army’s number one priority and its most critical weapon system, and the sustainment community must balance this within the distribution construct as we organize and execute LSCO.

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Featured Image
Indiana National Guard Capt. Sarah Cline, Master Sgt. Brandon Wood, and Sgt. Wolgan Ramos check a personnel status report during the 38th Sustainment Brigade’s warfighter exercise at Camp Atterbury, Indiana, June 10. The three Soldiers participated in the exercise to test Soldiers in virtual battlefield scenarios so that they can coordinate and communicate in functional tasks such as command and control, movement and maneuver, intelligence, targeting processes, sustainment, and protection. (Photo by Master Sgt. Jeff Lowry)

A photograph showing a group of soldiers in camouflage uniforms standing outdoors. They are looking off to the side, possibly at something or someone not visible in the frame. The background is slightly blurred, suggesting a outdoor setting like a military base or training ground.

SUSTAINMENT at Speed and Range

■ By Lt. Gen. Scott McKean

The character of war has experienced significant changes since the conclusion of the Cold War. After decades of focus on large-scale combat operations (LSCO), culminating with Operation Desert Storm, most of our current forces have trained and deployed for a counter-insurgency environment. The past two decades of conflict resulted in marked changes to the Army's force structure and organizational design. But of all the major military changes, the character of sustainment has not yet evolved. The preferred American sustainment approach to war has long been described with the formula of "P for plenty." From the need for the Red Ball Express in World War II to the force's build-up and "Moving Mountains" required for Operation Desert Storm, the United States military is a mass consumer of logistical supplies. This approach to sustainment support has generally resulted in significant demands for resource management, distribution, and large footprints on the battlefield. Regrettably, the last two decades of war have reinforced this tradition as some could argue we have become a demand-desired instead of demand-needed Army. This article will describe the characteristics of the future battlefield and offer thoughts on the sustainment approach required to enable successful operations against future adversaries.

The Army's Chief of Staff (CSA) has provided his vision on how sustainment will support the Army's multi-domain transformation and extend sustainment support toward the joint force by 2035. The CSA's HQDA Paper #1 clearly

states that, "By 2035, sustainment nodes will be survivable and capable of rapidly moving logistics to enable the joint force. The Army will provide the foundation for the joint force theater sustainment system that is integrated in real-time, enabled by data-informed decision making, and coupled with an anticipatory intuition for Army and joint sustainment requirements." To meet this vision, the Army is challenged to adapt its doctrine to address the evolving nature of peer competition within a multi-domain operational (MDO) environment. A major challenge moving forward toward modernizing the Army is developing and fielding future organizations and capabilities that minimize logistical resupply requirements. This challenge is further compounded by the reality of providing sustainment support to existing legacy equipment that will be retained well into the future. Ultimately, sustaining future LSCO at increased range and speed will require a deliberate and holistic overhaul of existing expeditionary basing, distribution, and storage doctrine.

Sustainment Challenges: Time and Distance

As the U.S. Army moves well into the 21st century, it can no longer be assured of uncontested sustainment operations that benefit from protected lines of communication (LOCs) to include air superiority and uninterrupted access to permissive ports of debarkation.

Strategic competitors, such as China and Russia, are deploying multiple layers of stand-off capabilities in all domains designed to prevent the U.S. military from reaching the fight. With almost ubiquitous sensors and long-

range precision strike capabilities, the ability to maintain the coherence of joint and combined operations will inherently influence how military planners, especially for sustainment, develop future operations. It is reasonable to expect that future adversaries will no longer allow ground forces the time to build combat power. Instead, competitors will now employ threats throughout LOCs, beginning from home stations, industrial support, and forward to deployed forces. Existing and emerging technologies are already impacting future military operations at a rapid pace which include: swarming unmanned aircraft system (UAS) attacks, UAS surveillance and targeting, long-range precision fires, and anti-ship ballistic missiles. The increasing range of enemy systems alone will create contested LOCs, resulting in disrupted operations via lethal and non-lethal effects. Once ground forces are employed, adversaries will likely exploit these same capabilities to further restrict joint and coalition operational reach and freedom of action. These adversary actions will impede essential operational and tactical endurance by disrupting existing sustainment doctrine, composition, tactics, techniques, and procedures.

Given the aforementioned environment, the Army is presented with two fundamental challenges to sustaining the joint force: time and distance. Adversaries understand the expeditionary abilities of the U.S. military and will seek to exploit these challenges against the joint force to rapidly seize objectives before the U.S. can mount an effective response.

Once conflict begins, it is expected that adversaries will attempt to globally contest the U.S. military's ability to deploy. This action creates a stand-off to buy time to consolidate gains and de-escalate crises before U.S. expeditionary forces arrive. The reality of time and distance factors, and the corresponding time required to marshal and deploy forces into a theater cannot be resolved with technological advancement alone. Where domain superiority cannot be assured, sustainment units are required to increase their expeditionary abilities to deploy more rapidly into an area of operations than in previous conflicts. In addition, sustainment formations will be required to support operations at greater ranges, in decreased response times, and in environments with denied, degraded, intermittent, or limited network communications. To achieve this goal, reducing customer demands, improving distribution operations, improving predictive maintenance and anticipatory demand, and exploring alternative power source generation are essential.

Approaches to Solving Sustainment Challenges

The Joint Warfighting Concept and the Joint Concept for Contested Logistics (JCCL) are instrumental in solving the future operating environment's sustainment challenges. The JCCL frames how the Army, including its support of the joint force, sustains combat operations; how the Army will organize to sustain; and what future capabilities will be needed to support future sustainment operations. This conceptual development will help inform decisions concerning the skills

and attributes future sustainment leaders must possess. Insights such as these are also informing the forthcoming Army Futures Command Concept for Sustainment (AFCC-S). The AFCC-S will outline how the Army will sustain operations as part of an MDO force in 2028 and also will support the Combined Arms Center's (CAC's) development of FM 3-0 titled, "The Army in Multi-Domain Operations."

Establishing required supply levels is the most basic fundamental of successful logistical support. Sustainment planning and execution must establish the minimum requirements for units of action and have the means to actively monitor their stockage levels. Tools like the Sustainment Tactical Network are attempting to pursue this monitoring capability; however, we must ensure that the information is secured—for which significant efforts remain. Anticipating needs is another critical factor in maximizing operational reach for units, which can best be accomplished when requirements are codified and understood. Operational commanders can weigh the main effort as required, but supply discipline through required supply rates, controlled supply rates, and other processes will need to be re-institutionalized. Finally, losses must be planned for, making supply placement and protection critical.

Distribution will remain an essential requirement and challenge for sustainment operations. When facing peer competitors, the Army will require more diverse, reliable, and robust distribution modes and nodes

to optimize a commander's flexibility. Additionally, a balanced force structure will also ensure the right capability at the right location—from the strategic support area to the tactical point of need—reducing demand and increasing self-sufficiency. Mobile assets with sufficient endurance will prove essential to address logistical support requirements. Once again, anticipation is a critical necessity—the means to facilitate and target sustainment pushes are being developed, but a holistic accounting is needed. Emerging capabilities are designed to diagnose and repair through redundant autonomous distribution platforms, and the diagnostic capabilities of predictive and prognostic maintenance and logistics serve as a positive example of these pursued initiatives.

As operations increase in speed and range, the Army will need to reduce the resupply demands of new and legacy equipment through critical science and technology investments. This transformational change requires a whole-of-Army approach to educate on resource usage to economize distribution requirements. The operational benefits of demand reduction are significant and include increased operational reach, improved platform and device energy efficiency and endurance, and increased lethality with less dependence on logistics overhead. Pursuing capabilities such as leader-follower initiatives may provide some solutions to these challenges.

While not the sole factor in military innovation, integrating emerging technologies into concept work is essential for improving future

combat effectiveness. Because of the speed at which our adversaries exploit technological advantages, the Army must develop improvements toward incorporating and employing innovative new technologies while pursuing multiple technological improvements and anticipating threat efforts to emulate or disrupt new capabilities. Maintaining the Army's differential advantage over competitors will require continued integration of advanced technologies with skilled Soldiers and well-trained teams.

Planners must also consider how to modernize our processes, especially how we account for and reallocate resources while in the fight. Army leaders must have a common understanding and operational picture of sustainment across the force supported by tools that provide predictable and proactive adjustments during competition, crisis, and conflict. The future Army force requires a dynamic sustainment system that can rapidly reconfigure and reallocate units, weapon platforms, services, and supplies based upon changing conditions within the joint operational area that support the operational commander's priorities.

From Concept to Capabilities

New capability gaps and requirements will require strong analytical underpinning. This analytical underpinning generally results from well-planned and executed campaigns of learning, capability-based assessments, experimentation, and exercises. To achieve validity, future sustainment must be supported by an aggressive and sustained campaign of learning that is based on

understanding the future operational environment, emerging technologies—such as artificial intelligence and machine learning (AI/ML) and autonomous systems—from both red and blue perspectives, concept development, prototyping, iterative experimentation, testing, and Soldier touchpoints. Emerging capabilities that incorporate AI/ML, autonomy, and robotics will have decisive impacts on future sustainment, especially when combined with new innovations such as synthetic biology, quantum computing, energetics, electrification, and advanced manufacturing. These factors will influence the development of new models and simulations to better understand how sustainment planners will employ and deploy future technologies to support the joint force. Project Convergence, the Army's campaign of learning, is an excellent program that offers various opportunities to examine and learn through evaluation and testing of sustainment ideas and future capabilities. Through various learning events, experimentation, and wargames, the Army will be postured to adjust future force designs to deliver essential capabilities needed for 2035 and beyond.

Conclusion

Sustaining operations at speed and range will require both operations and logistics leaders to transform current sustainment planning and execution to succeed in the assessed hyperactive battlefield of the near future. Sustainment leaders and units will be challenged to reassess their ability to enable joint and coalition commanders with necessary operational reach

and freedom of action, providing operational and tactical endurance. Given the unpredictable nature of the operational environment and the increased lethality of threat capabilities, supported formations will become more distributed with highly contested LOCs. Joint and Army concepts, supported by a robust learning campaign, will provide the framework for developing sustainment capabilities that operate at increased speed and range. The next step for concept development is evaluated through a series of experiments and wargames to determine those that should be incorporated into doctrine, organization, training, materiel, leadership and education, personnel, and facilities solutions. Ultimately, the transformation will provide future sustainment formations the ability to conduct independent, distributed, echeloned support from extended LOCs at a pace and consistency that adversaries cannot match during competition, conflict, and crisis.

Lt. Gen. Scott McLean serves as the deputy commanding general for U.S. Army Futures Command and Director of the Futures and Concepts Center. He is a 1990 graduate of the United States Military Academy and commissioned as an Armor Officer. He is also a graduate of the Naval War College. He has served in multiple joint and combined assignments in the Indo-Pacific and Central Command areas of responsibility.

Featured Photo

Lt. Gen. Scott McLean, deputy commanding general for U.S. Army Futures Command and director, Futures and Concepts Center, visited the Joint Warfighting Assessment 21 effort at Schofield Barracks, Hawaii. During his visit, he awarded coins to some of the JMC personnel June 20 who did great work to make JWA 21 a success. (Photo by Spc. Natianna Strachen)

Think JOINT

Consider Sister Services Challenges, Capabilities to Achieve Mission

■ By Maj. Mark A. Yore

A geographic combatant command (CCMD) has many responsibilities and authorities that must be exercised to address joint gaps to solve the complex battlefield geometry CCMD's will inevitably face during large-scale conflict. Each CCMD has unique challenges that require joint solutions and resources to ultimately support our governmental leadership's guidance derived from the National Defense Strategy (NDS). Logisticians at the U.S. Indo-Pacific Command (USINDOPACOM) face several unique challenges to the theater, including the tyranny of distance. Using authoritative documents such as the USINDOPACOM Theater Campaign Plan and Theater Posture Plan, the J4 team is driven to anticipate joint requirements with sustainers from the CCMDs and Joint Logistics Enterprise (JLENT) to identify solutions and advocate for resources. Defining the logistics problem in the USINDOPACOM theater and providing solutions through the commander's decision cycle is difficult and requires a deliberate approach that includes perspectives from every branch of service. To ensure joint equities are considered, and unity of effort is achieved in sustainment operations, the J4 must coordinate with CCMDs, Sub-unified commands, and directorates internal to the USINDOPACOM staff, and leverage reserve augments, maintain a dynamic logistics common operating picture (LOGCOP), and build and sustain partnerships in the Indo-Pacific.

Coordinating Responsibility

The J4's coordinating responsibilities enable the J4 staff to work with CCMDs and sub-unified commands to identify requirements and, if necessary, prioritize resourcing from the JLENT. This prioritization occurs most frequently in a time of crisis. In steady-state operations, the Pacific



Soldiers and Marines embark a U.S. Marine Fire Direction Center with Battery R, 3rd Battalion, 12th Marine Regiment, 3rd Marine Division, III Marine Expeditionary Force, onto Logistics Support Vessel-4 Lt. Gen. William B. Bunker, 8th Theater Sustainment, at Kin Red Beach Training Area Oct. 31, 2020. Orient Shield 21-1 is the largest U.S. Army field training exercise in Japan that tests and refines multi-domain operations. (Photo by Maj. Elias M. Chelala)

sustainment team works together to support the theater posture plan to ensure requirements will be met at the time of need. During a staff academics session at USINDOPACOM, the J4, Brig. Gen. Jered P. Helwig was asked, “when does setting the theater begin?” He responded, “We are setting the theater now.” His point has resonated with the staff and logistics experts across the Pacific. Logisticians understand, given the tyranny of distances and limited organic movement assets, that resourcing requirements must happen now to mitigate the risk of culmination or mission failure. Furthermore, the J4’s

coordinating responsibilities enable the elimination of redundancy to achieve economy and unity of effort when setting the theater.

Boards, Bureaus, Centers, Cells, and Working Groups

As mentioned above, identifying and advocating for resources requires a deliberate approach. The process used in joint commands is formerly known as Bureaus, Boards, Centers, Cells, and Working Groups (B2C2WG), not to be confused with a Star Wars droid. The B2C2WG’s have specific inputs, outputs, and participants

that are defined and approved by the USINDOPACOM chief of staff. Most recently, USINDOPACOM had more than 40 approved B2C2WG’s to ensure the outputs and frequency support the commander’s decision cycle. The J4’s major boards are the logistics coordination board and the joint movement board. Multiple staff directorates and JLNT experts participate in the B2C2WG’s and provide the critical inputs required for the J4 to prioritize efforts and mitigate joint gaps. The B2C2WG’s, or cross-functional events, enable the J4 to synchronize sustainment at the CCMD level and

identify shortfalls to communicate to the joint staff for resource consideration.

Total Force Policy

The Army’s Total Force Policy describes the integration and use of the Reserve and National Guard forces into the operational force. The Army understands it takes the efforts of the entire force to fight in full-spectrum operations with a near-peer enemy. Following the Army’s lead, Helwig charged his staff to integrate our reserve augments—which includes Navy detachments, Army, and Air Force individual mobilization augmentees—during steady state. The integration through multiple training events on drill weekends, video conferencing, and informal touchpoints mitigates the learning curve when mobilized. In the past, integration was focused on exercise preparation. Although still an important element of the integration plan, the focus has expanded to ensure our reserve partners are a part of everyday operations and understand the ongoing logistical efforts in the theater. The time and resources required to maintain a

“one team” policy far outweighs the cost of mobilizing and integrating an untrained and unaware force during a crisis. Additionally, many members of the reserve detachments have served in USINDOPACOM longer than most of the active force and bring valuable experience that bridges the knowledge gap during the active component transition. In a recent exercise at USINDOPACOM, Detachment 401—one of USINDOPACOM’s assigned Navy detachments—provided insights to new leadership that proved valuable in shaping the desired outputs of the exercise. The J4 team understands that

logistics synchronization is vital to any operation and in the largest theater of operations it will take all hands on deck to win.

LOGCOP

In any theater of operations, a LOGCOP informs commanders and staff of capabilities in time and space to inform decisions. However, what is often overlooked is what capabilities are lacking or nonexistent. Knowing the former informs the latter, and logistics experts at USINDOPACOM are focused on identifying the gaps for future requirements. What is in place and moving in real-time is important to know, however without forward-thinking on agreements, access, host nation support capabilities, etc., it may be too late to contract or build requirements rapidly as conditions change during a conflict. The LOGCOP provides information on all service capabilities that enables the J4 staff to think joint to dynamically solve sustainment challenges and leverage our partnerships when required.

Partnerships

USINDOPACOM, similar to other geographic CCMDs, strives to build and maintain strong partnerships with nations across the theater. From disaster relief to combat operations, multinational cooperation has been a cornerstone to success in U.S. military operations. The J4 uses key leader engagements (KLE) to build relationships focused on mutual logistics support. In addition to KLEs, the J4 represents USINDOPACOM as a member of the Pacific Area Senior Officer Logistics Seminar (PASOLS). Since the inaugural seminar in 1971, PASOLS has grown from nine to 30

participating countries in 2020. Amidst a pandemic, PASOLS organizers in the J4 Multinational section utilized the Microsoft Teams platform to ensure valuable logistics discussion continued to enhance relationships across the Pacific. Rather than canceling the seminar, logistics leaders seized the opportunity to discuss the regional, national, and worldwide impact on logistics due to COVID-19.

Conclusion

Serving as the Joint Logistics Operations Center Chief at USINDOPACOM has been a humbling and learning experience. Thinking joint and working outside of my comfort zone of Army logistics is not an intuitive process. Understanding the nuances and traditions of each military service has enabled streamlined and effective communication. As a senior mentor instructed, do not be the “Army” guy. Appreciating what each service brings to the fight during large-scale conflict leads to leaders thinking joint. To fully understand the sustainment challenges in the Indo-Pacific and provide solutions or mitigations, all services challenges and capabilities must be considered. Logisticians across the components are laser-focused on supporting their respective commands’ mission, and it is incumbent upon the J4 team to look forward and synchronize the joint requirement to ensure the overall mission is successful.

Maj. Mark A. Yore is currently serving as the Joint Logistics Operations Center chief in the U.S. Indo-Pacific Command. He has earned a bachelor’s degree in speech communication from Southern Illinois University Carbondale and a master’s degree in global and international studies from the University of Kansas. He is a graduate of the Army Command and General Staff College.

Operationalizing ReARM

A Sustainment Perspective

■ *By Maj. Gen. Kurt J. Ryan and Col. Jin H. Pak*



Over the past century, our Army has made transformative leaps about every 40 years that have required changes in both doctrine and modernized equipment. During World War II, the Army greatly expanded the use of tank warfare and mounted maneuvers. During the Cold War, to offset the numerical advantages of Soviet forces, the Army developed air-land battle, made possible by modernization

in the “Big Five,” consisting of the AH-64 Apache, UH-60 Black Hawk, M1 Abrams, M2/M3 Bradley, and the Patriot Air and Missile Defense systems. These five systems remain the core of the Army’s decisive operational capability today.

Now, 40 years later, the most recent Army modernization strategy aims to field a force capable of conducting multi-domain operations during each of the three phases of competition, crisis, and

conflict, as part of an integrated joint force in a single theater by 2028 and multiple by 2035. Achieving an “Army of 2035” will require major investments in six modernization priorities: long-range precision fires, next-generation combat vehicles, future vertical lift, network modernization, air and missile defense, and Soldier lethality.

The Army is poised at the starting line of a much-needed modernization

effort, but this must be executed while maintaining its current force posture readiness to meet combatant command (CCMD) requirements. To address this challenge, the Army developed a new force management model that focuses on both modernization and readiness through regional alignments with CCMDs. Gen James C. McConville

wrote in an information paper "Army Multi-Domain Transformation" March 16, "The Army cannot transform in a vacuum; we must continue to meet the operational requirements of joint force commanders. The Army's Regionally Aligned Readiness and Modernization Model (ReARMM) is our unit life-cycle model to balance the production of modernized, highly trained, and ready forces for employment."

In short, ReARMM provides the unit life-cycle management model that balances current demand with modernization. Through this life-cycle model, a unit transitions through three phases: modernization, training, and mission, with each phase structured to last eight months. In the modernization phase, units focus on tasks to receive and integrate new capabilities. During

the training phase, units operate these new capabilities as they execute their mission-tailored training at echelon. In the mission phase, units execute various missions ranging from deployments for operations and/or exercises to placement as part of a contingency ready force.

Operationalizing ReARMM from a Sustainment Perspective

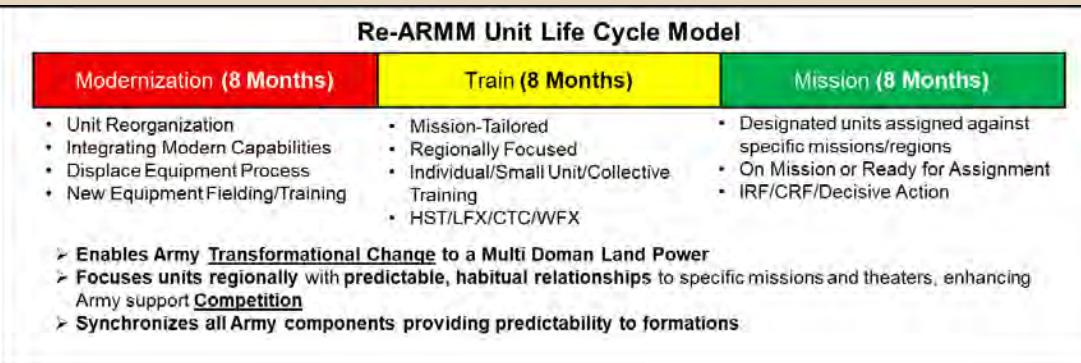
Given the level of transformational change required for the Army of 2035, it's crucial that the Army sustainment community sets the right conditions to ensure continuity of support for ReARMM and Army modernization. The Sustainment Warfighting Function (WfF), executed from the tactical to the strategic level, must support the three principles of ReARMM. Support must be predictable, stable, and synchronized across all enterprises, and sustainment leaders at echelon must focus on three key enabling capabilities: 1) reduce the burden of displacing excess equipment; 2) increase supply chain velocity and accuracy; and 3) establish a strong and enduring culture of maintenance excellence.

Sustainment Enabling Capabilities in ReARMM

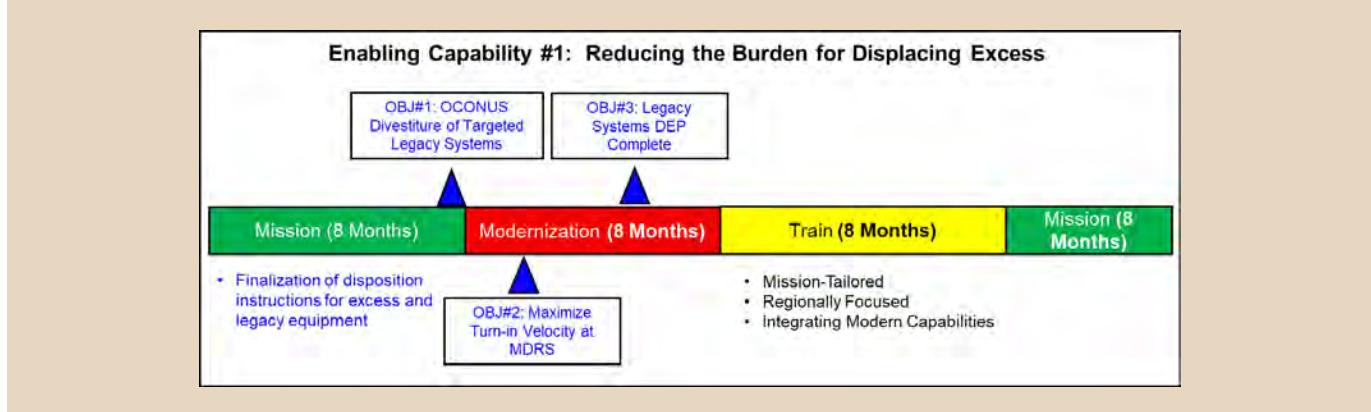
Enabling Capability #1: Reduce the burden for displacing excess equipment so units have time to field, train, and integrate new capabilities. To accomplish this, three objectives are crucial during the mission and modernization phases of the ReARMM unit life cycle model:

- Objective #1: Turn in selected legacy systems outside the continental U.S.(OCONUS) before redeployment
- Objective #2: Maximize velocity of turn-in at the modernization displacement and repair site (MDRS)
- Objective #3: Displace legacy systems and associated spares, tools, and test equipment

Enabling Capability #2: Increase supply chain velocity and accuracy in order to ensure that units are well supported during the training phase of ReARMM. To set conditions for this, the following three objectives will greatly help a unit transition from the modernization to training phase:



Regionally Aligned Readiness and Modernization Model unit life cycle.



Enabling Capability #1: Reducing the burden for displacing excess.

- Objective #4: Common authorized stockage list (CASL) review and change implementation
- Objective #5: Optimize shop stock to the CASL
- Objective #6: Initial shop stock fielded as part of new equipment fielding (NEF)

Enabling Capability #3: We must establish a strong and enduring culture of maintenance excellence to ensure that our systems are ready for units navigating through ReARMM:

- Objective #7: Ensure Soldiers are properly certified to perform preventive maintenance checks and services (PMCS) and operate the systems
- Objective #8: Establish robust command oversight
- Objective #9: Provide reliable and ready access to interactive electronic technical manuals (IETMs) with "How-To" videos

Reduce Burden for Displacing Excess Equipment

Excess equipment is a drain on readiness. Like death by a thousand cuts, every piece of excess or obsolete

equipment in our formation causes us to bleed out valuable human and fiscal capital needed for the Army's modernization effort. Our units are struggling under the heavy burden of excess property that has accumulated over decades of conflict. It is absolutely essential to shed this burden in order to clear our motor pools; arms rooms; nuclear, biological, and chemical rooms; and other unit areas of excess and obsolete equipment. Given the relatively narrow eight-month modernization windows in the ReARMM model, we must displace the existing excess faster with a streamlined and hassle-free process that builds velocity and momentum while preserving resources.

Forces Command's (FORSCOM)

modernization model requires units to displace excess equipment before total package fielding. Displacement must occur before new equipment training and NEF to unclutter commands so they can focus on integrating new capabilities.

To address this backlog, our Soldiers and leaders need to take full advantage of the newly established MDRS developed by Army Materiel Command (AMC) in partnership with FORSCOM.

In just six months, AMC established MDRS sites in 14 different installations across the continental U.S. and Hawaii. Each site simplifies equipment turn-in for units by serving as a one-stop-shop regardless of whether the item is destined for an Army depot, a Defense Logistics Agency (DLA) activity, to fill a foreign military sales requirement, or laterally transferred to other units to fill shortages. These sites provide immediate property relief from the losing unit upon turn-in at the site, and the MDRS site can then assume responsibility for executing the final disposition of the excess item, including second-destination transportation. The sites also have the capability to conduct repairs for items that are required to meet 10/20 disposition instructions on a reimbursable basis.

To further increase the maximum velocity of turn-in at MDRS sites, FORSCOM partnered with AMC to coordinate with units' turning

in equipment overseas as part of redeployment. For selected legacy systems, the redeploying unit transfers property accountability to AMC before uploading onto redeployment vessels. The equipment then transits it straight to depot bypassing delivery to home station. This reduces the amount of excess to displace at a home station, sets conditions for completing turn-in requirements during the modernization phase, and provides depots with weapon systems that are ear-marked for upgrades.

Additionally, finalizing disposition instructions of all identified excess as early as possible sets the conditions necessary to expedite the entire process. It is essential that units request the disposition of excess equipment during the mission phase so that they can execute turn-in to their supporting MDRS before and during the modernization phase.

Improve Supply Chain Velocity and Accuracy

In 2017, the Army began transforming and standardizing authorized stockage lists (ASLs) into CASLs to ensure

that combat units are stocked with the correct maintenance parts to improve supply availability and readiness while ensuring field expedience and mobility. These CASLs undergo an annual review process, managed by AMC, to ensure that ASL requirements satisfy unit demand.

Hand in hand with CASL review is unit shop stock optimization, now referred to as—optimized shop stock lists (OSSL). Units must take steps to shape and influence their own readiness by stocking those spares that are critical, in high demand, and reduce non-mission-capable time. For ReARMM, the units should conduct the necessary inventory, demand analysis, and re-plenishment activities of both CASL and OSSL before the modernization phase to ensure they are fully optimized as new equipment is fielded to the unit.

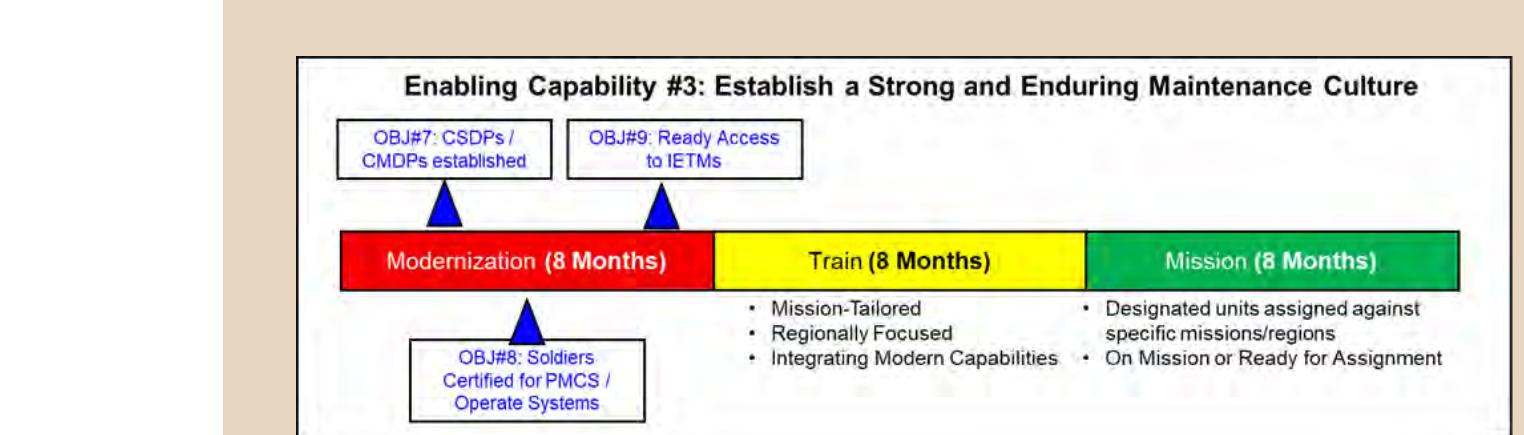
Lastly, a key component of setting the right supply chain during the modernization phase is the fielding of initial stockage items to a unit's CASL and OSSL by the program executive office to ensure these stocks

have the parts needed to sustain newly fielded systems. They should be fielded as part of each NEF during a unit's modernization phase in sufficient quantity to meet sustainment requirements for both the training and mission phase of the unit's life-cycle. Over time, as units rotate through the life-cycle model, initial shop stock requirements would more accurately reflect demand and potentially save cost, as subsequent units field new equipment based on their designated modernization level.

Establish a Strong and Enduring Culture of Maintenance Excellence

In September 2020, FORSCOM created a Ground Readiness, Evaluation, and Assessment Training (GREAT) team to provide oversight and an external review of the maintenance, supply, and deployment programs of brigade combat teams (BCTs).

The GREAT team has already conducted five BCT evaluations: two Armored, three Infantry, and one Stryker. The program was further codified in the most recent Army resourcing and synchronization conference where the team evaluations



Enabling Capability #3: Establish a strong enduring maintenance culture.

were scheduled for fiscal 2022. To operationalize the GREAT team within ReARMM, these evaluations are targeted to occur during a unit's modernization phase.

Observed trends from these evaluations are that our operators and crews struggle with identifying deadline faults during PMCS. This is due to an ineffectively-executed PMCS certification program, a lack of operator/crew attention to detail, minimal updated technical manuals on hand, and inconsistent supervisor maintenance and materiel management expertise. Command Maintenance Discipline Programs (CMDP) and Command Supply Discipline Programs (CSDP) are currently lacking and will require focused oversight at every echelon.

For ReARMM, the three objectives of establishing robust CMDP and CSDP programs; certifying Soldiers to PMCS and operate the systems; and ensuring reliable access to IETMs should occur before transition to the training phase.

Conclusion

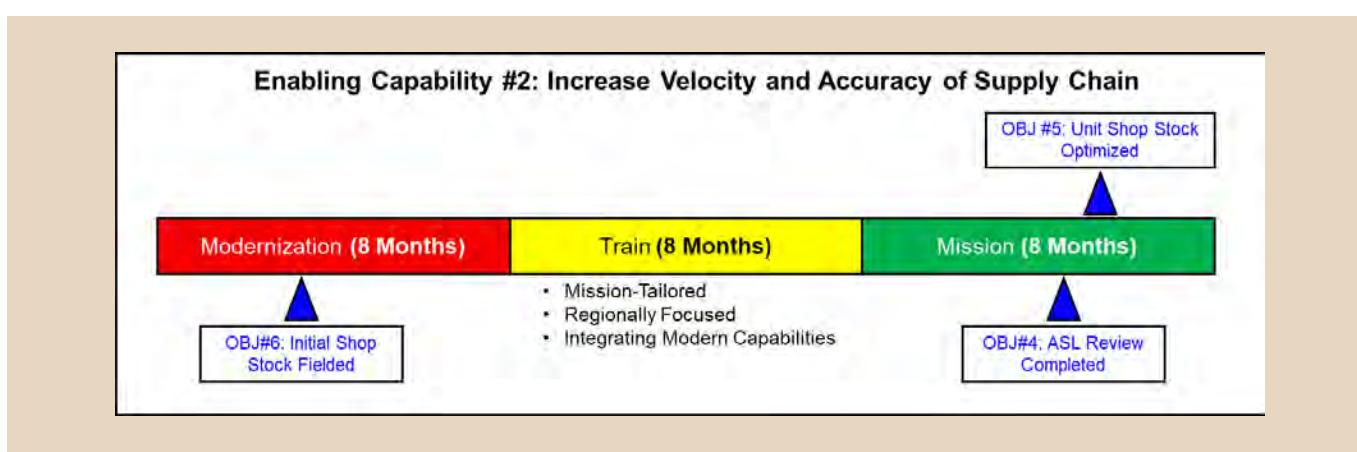
The Army is poised at the starting

line of a truly transformational pace of modernization. How well our units incorporate these new technologies will depend in large part on whether key conditions are set from a sustainment perspective. The sustainment enabling capabilities outlined in this article are conceptual in nature, however, their practical objectives, overlaid across ReARMM phases, will help units successfully navigate across their unit life-cycle phases.

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Col. Jin H. Pak is currently serving as the assistant deputy chief of staff, G-4, for FORSCOM. Pak holds a master's degree from the Kennedy School of Government and Joint Advanced Warfighting School, and a bachelor's degree from the United States Military Academy.

Featured Photo
Soldiers prepare a vehicle for turn-in at the Modernization, Displacement, and Repair Site (MDRS) at Joint Base Elmendorf-Richardson. The MDRS is a single location dedicated to receive excess equipment from units. It is the one-stop-shop that receives, accounts for, repairs (if necessary), and conducts necessary onward transfers to gaining units, Army depots, or transfer to the Defense Logistics Agency for equipment disposition. (Photo by Katie Nelson)



Enabling Capability #2: Increase velocity and accuracy of the supply chain.



America's Arsenals Fuel Modernization

Depots and Ammunition Plants for the Future

■ By Lisha Adams

The Army's organic industrial base (OIB)—23 arsenals, depots, and ammunition plants that manufacture, reset, and maintain Army equipment—provides critical materiel and sustainment support to warfighters across the joint force. While the OIB is essential to meeting current needs and national defense strategy requirements, it must modernize now to meet the needs of the future force in a multi-domain operations (MDO) environment.

OIB modernization directly aligns with the Army's priorities of people, readiness, and modernization and postures the Army to respond to the evolving demands of future warfare. However, modernization does not happen overnight—as with an oak tree, planting a seed is the first step in the years of care and development needed to reach full potential. Through a 15-year OIB modernization plan nested with the Army's modernization strategy, Army Materiel Command (AMC) is planting that seed and modernizing facilities, processes, and people to bring the OIB into the 21st century, infuse industry best practices and refine human resource management structure to maximize the skills and capabilities of our workforce.

Time to Modernize

As Army Chief of Staff Gen. James McConville said last October, “the time has come for transformational change to build the Army we need for the future, [because] winning matters.” The Army has set 2035 as its goal to transform into a MDO-capable force. The time is now to modernize our OIB facilities, processes, and people to institute the transformational change needed to support the future force. We must prepare ourselves now to surge or risk being late to need when called upon.

We are focusing our modernization efforts on projects that are most critical to support current readiness and posture capabilities to remain relevant for the Army of 2035 and beyond. To do this, we developed a 15-year OIB modernization plan that focuses investments on the most critical projects that will yield the right effects in the OIB and ensure our facilities and workforce are ready to meet the needs of the future force.

The plan looks holistically across the OIB and uses a four-phase approach to identify, evaluate, analyze, and develop a schedule to incorporate emerging technologies into our facilities, from industrial operations to installation and cybersecurity,

energy and power resilience, and more. The end state is a comprehensive OIB investment plan that sustains the artisan workforce, maintains pace with the Army's modernization of weapon systems, and enables surge capacity for large-scale combat operations. Today's decisions are setting the course for the OIB over the next 40 to 50 years in support of the Army's modernization efforts.

Transformational Change

To move the OIB into the 21st century, we need persistent and purposeful modernization, not incremental updates, to achieve transformational change across our facilities, technology, and data. The OIB modernization process seeks to leverage commercial innovation and cutting-edge science and technology to achieve the right results.

Staying integrated with the Army's modernization priorities is essential to the OIB. We must resource and modernize the OIB today to provide capabilities that will support and sustain the next generation of equipment. We are responsible for developing the industrial base that will support the platforms Army Futures Command is bringing to fruition over the next 5 to 20 years, and we cannot wait until after they arrive.

At Watervliet Arsenal, the installation has already installed new machines to increase cannon production capacity in support of long-range precision artillery and future requirements. This is a good first step that must be replicated across the OIB. Maintenance bays at Corpus Christi Army Depot (CCAD) must be fitted and ready to maintain future vertical lift aircraft. Ammunition plant production lines must be prepared to produce the right size and scale of ammunition for the next generation squad weapon. Across every modernization priority, our OIB must be ready.

Modern Facilities. The OIB consists of more than \$30 billion in facilities and infrastructure, much of which was built more than 70 years ago. These older facilities are not designed for modern best practices, and the increased workload of the last 20 years accelerated the aging of facilities and equipment, especially in our ammunition OIB. To modernize the facilities, we are developing an end-to-end list of required improvements, considering the entire workflow process, prioritizing each OIB's core competencies, and understanding the requirements to meet a future surge. Throughout this process, we are also focused

on and committed to protecting our critical capabilities and reducing single points of failure.

We are reassessing the area development plans to the master development plans in a totally modern approach by incorporating 21st-century industry standards, balanced against planned funding, then investing in consistent and persistent modernization efforts. Our goal is to have flexible, multi-purpose facilities with lines that have the capacity to do different functions, meet the evolving needs of the Army and ensure the safety of our workforce. For example, CCAD uses available technology such as robotics and automated blue light scanning to develop multipurpose assembly and disassembly lines. At the Crane Army Ammunition Activity, the workforce has successfully tested a robotic arm to demilitarize out-of-service ammunition like anti-personnel rounds.

New facilities and upgrades also will address the complex and diverse problem of climate change by improving energy resiliency, particularly electricity and water consumption, saving energy and money for the Army.

Tobyhanna Army Depot is working with industry to eliminate oversized steam boilers, adding cooling system improvements to expand its utility monitoring and control system to provide enhanced monitoring and control capabilities. These efforts are projected to reduce the depot's energy consumption by 20.6% and water consumption by 8.3%.

Modern technology. Advanced manufacturing and the use of modern technology is necessary to enable the maintenance and fielding of these modern systems. To meet the needs of a 21st-century Army, we must use 21st-century technology. Through advanced manufacturing, AMC enhances the supply chain, establishing internal capabilities to rapidly respond to Soldiers' and units' equipment and repair parts requirements at the point of need. In 2018, AMC established an Advanced

Manufacturing Center of Excellence at the Rock Island Arsenal Joint Manufacturing and Technology Center. The center came online in May 2019 and currently includes 25 3D printers and equipment. More than 2,000 parts have been printed to date, including much-needed personal protective equipment and medical repair parts to help the whole-of-government response to combat COVID-19. AMC brings these capabilities closer to the point of need via a digital thread database that links parts available for 3D printing into our Army business systems, including the Logistics Modernization Program and Global Combat Support System-Army. We are also rapidly 3D scanning parts and working with Army, industry, and education partners to develop the digital twin of a UH-60L at Wichita State University.

Our goal is to have flexible, multi-purpose facilities with lines that have the capacity to do different functions, meet the evolving needs of the Army and ensure the safety of our workforce.

Data-driven decisions. Logistics data provides the decision support tools and the data visualization Army decision-makers need to effectively support readiness and modernization initiatives. Data allows us to see ourselves across the OIB to help streamline processes, increase productivity and maximize our support to warfighters while minimizing costs. We will leverage robotics, maintenance analytics, and predictive sensors on equipment, and continuous process management to increase production capability and improve quality throughout the OIB. Artificial intelligence and machine learning will help anticipate demands for new systems and build flexibility to meet new requirements and those for legacy systems. While utilizing processes like shop floor digitization allows us to better see our equipment usage and help us know when machines need to be serviced. To do this, we ask ourselves, are we looking at the right metrics and do we understand what the data means, working with data scientists and data analysts to make predictive and informed decisions.

The Army is also modernizing and streamlining sustainment business processes to increase the velocity and fidelity of

decisions on the battlefield. Through Enterprise Business Systems Convergence, Enterprise Resource Planning system users will be able to ultimately use a single platform to access mission-critical data and analytics, enabling rapid delivery of effects on the battlefield and beyond.

People are Key

Our workforce is where the rubber meets the road; they provide the best equipment the world has ever seen, and it is their dedication that lets a warfighter know when they take a piece of equipment on the battlefield, it will survive enemy contact. In view of the challenges ahead, to retain readiness and drive modernization, we must focus on our people and empower our workforce. Simply put, we are in a war for talent, and we need the best people to work for the Army and AMC.

Trained and Ready Workforce. Along with our facilities and processes, the Army must modernize and improve the recruitment, development, and retention of its civilian workforce to maintain relevance and compete in the 21st century. We can accomplish this by leveraging new technology, modernizing talent management, and transforming workplace planning, enabling civilians to be more resilient and adaptive. Ready civilians are vital to the Army's success as they fulfill critical needs across hundreds of occupations, side-by-side with uniformed service members to achieve a strategic advantage in a complex world. They make a difference by exercising their abilities, skills, and knowledge to create innovative solutions.

Artisan Workforce. Across the OIB, about 19,500 employees work in more than 240 different job fields, ranging from aircraft mechanics, machine tool operators, welders, and machinists. These artisans are the backbone of the OIB. To meet the Army's future needs, we need to ensure we are hiring, developing, and retaining the next generation of artisans, and as with modernizing our infrastructure, we must identify and prioritize the jobs and skill sets needed to repair the Army's future equipment. We have gaps in our internal knowledge, we must address those today to bring in the right subject matter experts to help inject those fine skills and training into our workforce.

Safety. Safety is a top priority for the industrial artisans and professionals in our OIB facilities, many of whom work on assembly lines, operate heavy machinery, or handle hazardous materials. This is especially the case in our ammunition OIB,

which includes a workforce of more than 11,000 skilled artisans working at 16 plants, centers, and depots to produce, store, distribute, surveil, and demilitarize conventional ammunition for the joint force. The inherent risks in producing explosive materials can vary depending on the specific materials or the stage of the production process. For some of the highest-risk steps, the best way to protect people is to keep them at a safe distance. This is where engineering controls can be implemented. The power of engineering allows us to adapt our way out of potentially more severe incidents during energetics manufacturing and create a safer environment for our operators. For example, the new and modernized nitrocellulose facility at the Radford Army Ammunition Plant uses this approach to provide safer conditions for the operators, increased precision, and a more environmentally-friendly operation. Operators are now further away from the operation in this modernized facility, and they can now sit behind a control screen where they can manage and supervise the process in real-time. Our envisioned end state is state-of-the-art manufacturing processes and machinery with built-in safety standards across the industrial base.

Conclusion

We are at an inflection point and must accelerate our modernization plans for the OIB—facilities, processes, and people—to meet the needs of a 21st-century MDO-capable Army. While these facilities are successfully meeting our current requirements, we must continue to invest in modernization to drive change and ensure our ability to meet future requirements in competition, crisis, and conflict. Investing in the future force relies on timely, adequate, predictable, and sustainable funding in every budget cycle, in concert with a focused plan, to build the irreversible momentum needed to achieve persistent modernization. As the Army transforms, AMC and the sustainment community will be ready to support our warfighters now and in the future.

Ms. Lisha Adams currently serves as the executive deputy to the commanding general of AMC. She has earned her Bachelor of Arts degree in economics from Birmingham-Southern College and received her Master of Business Administration degree from the Florida Institute of Technology.

Featured Photo

A 155mm artillery tube enters a heat treatment furnace at Watervliet Arsenal, in New York as part of a process called "austenitizing." Watervliet is one of 23 depots, arsenals and ammunition plants managed by AMC that make up the Army's organic industrial base. (Photo by John B. Snyder)

Surface Exchange of Services

Coalition Building While Multiplying Transportation Capabilities

■ By Aubrey Irvin and Rhonda Pitt

Located in the Netherlands, in the thriving metropolis of Eindhoven, amongst industrial complexes and sparse thickets, lies the headquarters for the Movement Coordination Centre Europe (MCCE). Here, in a room awash with differing camo patterns, along with a smattering of plain-clothed civilians, is where the bulk of the MCCE activities take place. The individuals who work in this room are empowered to match transportation lift capabilities against movement requirements. To a U.S. Army transporter, booking transportation is business as usual, but this is anything but usual. The MCCE consists of 28 member nations (including the U.S. military) and has 32 national posts manned at the small headquarters. Two embedded U.S. military representatives spearhead the U.S. MCCE efforts in the European theater. This unique and international transportation-focused organization coordinates and facilitates movement requirements between partner nations by matching lift capability.

In the late 1990s, the United Nations and NATO identified a deficiency of strategic lift capacity and coordination of strategic lift assets. To address this issue, nations worked in concert to resolve the shortfalls and established the European Airlift Center (EAC) and the Sealift Coordination Center (SCC). In July 2007, these entities merged to form what is now known as the MCCE. The U.S. joined the MCCE on June 27, 2008.

The MCCE vision is to "be a world-class center of expertise in the international multimodal defense

movement arena, coordinating members' strategic movement requirements and offers in the most effective and efficient manner." The MCCE, manned 24/7, aims to foster international cooperation and coordination, to facilitate member-nation strategic movement goals by utilizing air, land, and sea transport assets owned or contracted by national militaries of the members or supported agencies.

In 2017, United States European Command (USEUCOM) appointed U.S. Army Europe and Africa (USAREUR-AF) as the lead for accession to the Surface Exchange of Services (SEOS) program. Through interagency cooperation between USAREUR-AF, the MCCE, and USEUCOM, USEUCOM's legal branch submitted a legislative proposal for SEOS participation to

the U.S. Congress. This proposal was incorporated into the fiscal 2021 National Defense Authorization Act, which now authorizes the U.S. military to pursue formal and complete participation in the MCCE's SEOS, covered in section 1202: participation in European program on multilateral exchange of surface transportation services. Following this passage, the Department of Defense, with the concurrence of the Department of State, may formally authorize the Department of Defense involvement in the program.

SEOS provides a framework to facilitate mutual support in surface transport for military activities through the exchange of services instead of financial payments. It supports services to be rendered based on the providing nation's capacity, including road transport, railway transport, inland waterways, and sealift. The U.S., an initial founding member of the MCCE, has pre-approved membership to the SEOS program and has been a participating member of the air transport and air-to-air refueling exchange of services (ATARES) since January 2017.

ATARES includes air transport, air-to-air refueling, and other air-related activities. The U.S. has benefited in being able to offer and receive services with member nations, building alliances, and pooling resources.

Currently, the U.S. military employs the MCCE inland surface transportation cell services through cash payments by acquisition and cross servicing agreements (ACSAs). From 2018 to 2020, the U.S. submitted 321 movement requests and, through ACSAs, spent approximately €34.5 million or, roughly,



A semi tractor-trailer carrying a low-mobility tactical vehicle drives out of the secure gate at the Port of Vlissingen, Netherlands, Oct. 14, 2019. Coordinated by the 598th Transportation Brigade and 838th Transportation Battalion, line-haul is one of four transportation methods used to move the equipment across Europe in support of Atlantic Resolve. Moving equipment through multiple transportation modes is one way of reassuring NATO allies and partners of the United States' continued commitment to rapidly deploying combat credible forces across the region. (Photo by Sgt. Kyle Larsen)

\$41.8 million for surface services coordinated by the MCCE. However, some MCCE member nations will not accept ACSAs or cash payments, meaning the U.S. is unable to access the capabilities of the MCCE fully. Fully participating in SEOS will provide a wider range of services not currently available to the U.S. military. As we enter the official membership into the SEOS program, we will lessen the monetary transactional processes of ACSAs and selected transport missions will be sustained through the exchange of the surface equivalent units (SEUs) by keeping record of debits and credits, much like a barter system.

In the simplest terms, the MCCE's operating concept works as follows: Nation A has a requirement to transport 90 widgets from point X to point Z by a desired delivery date. The requirement is submitted to the MCCE, and the operational cells will issue the request to all of the member nations. In return, the member nations will submit offers based on their strategic availability and assets to support the request. Nation A selects nation M, based on nation M being able to fulfill nation A's requirement. Both nations reach an agreement of the specified SEU to exchange debits and credits for services rendered. These debits and credits are accrued or reduced based on the mission, distance, cargo and mode of the movement. Nation M then completes the mission, gaining the agreed upon credit while nation A incurs the debit upon acceptance and completion of mission.

Scenarios for movements can get complex, and requests are never exact.

The movements can be multi-modal with various types and quantities of cargo and varying routes. These complexities are where the MCCE staff officers excel at calculating and negotiating the SEU credits and debts incurred by the participating members.

If the U.S. military has sufficient assets in the European theater, why go through the hassle of negotiating credits? Well, having sufficient assets does not necessarily translate to the correct assets, or the correctly positioned assets, or more significantly, the permanence of its current asset portfolio. One of the greater benefits of utilizing the MCCE is leveraging transportation through testing and improving interoperability with allies. Now, the greatest benefit of this program will be an expansion of interoperability by diminishing the lack of limitations of other member nations to exchange cash by using this barter system.

a location with an empty load, less-than-truckload, or vice-versa, which additionally reduces our environmental impact and costs. By assisting one nation without expecting a due cost, we foster alliances while still effectively executing our missions. The SEU system allows us to provide services while consuming services in which we are deficient.

The U.S. military has a very visible presence in the European theater, and the MCCE will help to foster international cooperation and goodwill. The U.S. military's membership and participation in SEOS provides distribution capabilities of 27 member nations. Full participation will help to build and strengthen international partnerships. By expanding our theater distribution capabilities, the U.S. military will increase agility, build alliances, and optimize theater positioning.

For more information on the MCCE visit: <https://www.mcce-mil.org/>.

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SEOS and ATARES allow the U.S. Army to use prepositioned, contracted, and partner-nation assets; we are no longer required to drive to

SUSTAINMENT OBSERVATIONS

Forward Support Companies Undergunned for Decisive Action

■ By Capt. Nicholas DeLissio



During 3rd Armored Brigade Combat Team (ABCT), 1st Armored Division's recent National Training Center (NTC) rotation in November 2020, sustainment leaders learned that there is a significant capability gap in the forward support company's (FSC) ability to conduct survivability in a 21st-century large-scale combat operations (LSCO) with near-peer adversaries.

In the fall of 2019, Delta FSC began its training cycle in preparation for 3rd ABCT's NTC rotation the following year. One of the conversations held among company leaders at the time was how the company would train and employ its security assets against a most likely enemy course of action (MLECOA) and a most dangerous enemy course of action (MDECOA). The case was made that the MLECOA would be a small-arms near enemy ambush or an interaction with light enemy armor, for

which the company's assigned M240B medium machine guns and M2 .50 caliber machine guns were suited. When considering options to defend against the MDECOA, unanimously decided as a decisive engagement with enemy armor, there was no weapon system authorized or in the arms room effective against tanks or armored personnel carriers. Leaders pondered over the next year if an FSC would withstand the MDECOA, and if not, how would it impact sustainment operations?

Delta FSC was shown just how lethal and disrupting enemy armor could be to sustainment operations during their NTC rotation in the fall of 2020. The first discovery of this capability gap occurred on training day four of the force-on-force training. 2nd Squadron, 13th Cavalry Regiment's combat trains command post (CTCP) was situated approximately seven kilometers from the brigade's front-line trace, with a ridgeline obscuring the northern and western avenues of approach, and a pass that led directly from the opposing force's (OPFOR) area of operations to an open plain behind the brigade's echelon trains. One of the cavalry squadron scout troops were tasked with over-watch and securing this pass. After a decisive engagement with OPFOR armor, a lone enemy infantry fighting vehicle, a Boyevaya Mashina Pekhoty (BMP), survived. That BMP was able to make its way through the pass and assault the CTCP. Soldier's scrambled to fighting positions and crew-served weapons, but M240Bs and M2 .50 caliber machine guns cannot penetrate the BMP's 35mm of armor. With no anti-tank capabilities present, the sustainers and support staff there suffered one-hundred percent notional casualties within minutes of being engaged by the lone BMP. In a similar real-world scenario, this could significantly affect the squadron's prolonged endurance and could force adjacent sustainment units to take on additional requirements.

The second discovery of this capability gap occurred on training day six. The distribution platoon logistics package (LOGPAC) convoyed to a scheduled logistics release point (LRP) to deliver Class I food and water, Class III bulk

petroleum, and Class V ammunition to another one of the cavalry squadron's scout troops. The squadron S-4 had coordinated the LRP to occur during an hour of the day that was known to be a lull in the battle period, to best mitigate threats to the LOGPAC. However, the enemy gets a vote. As the convoy reached its objective, OPFOR employed a simulated chemical attack on the LRP. Before the scout troop or the squadron tactical operations center could be notified, a brigade staff officer found the convoy and informed them that the OPFOR initiated a large-scale counter-attack with armored columns and the convoy was in the middle of their objective. The convoy had no capability to defend itself from armor, and it could not move to nearby alternate LRP sites without knowing where the enemy limit of advance would be. With no immediate guidance from higher echelons, the convoy decided to return to the CTCP before it could resupply the scout troop. In split-second moments on the battlefield, when battalion- or brigade-level sensors cannot communicate the presence of enemy threats to vulnerable units in time, sustainers have to execute disciplined initiative to prevent disruption to sustainment capabilities.

In both of these scenarios, anti-tank weapon systems would have provided Delta FSC with the capability to ensure their survivability on the battlefield and to have more decision points to execute from. In the first scenario, the CTCP would have been secured from direct enemy armor threats and potentially won a decisive engagement. In the second scenario, the LOGPAC convoy could have suppressed the enemy while bounding back to an alternate LRP

and secure from there. The FSC is not optimized to engage enemy threats decisively, however, anti-tank weapons allow sustainment elements to suppress and break contact. Both alternate outcomes would have provided Delta FSC the opportunity to continue their mission and provide uninterrupted logistical support.

Enemy air capabilities pose the same kinds of threats that enemy armor does to ill-equipped sustainment units. Further, the ABCT FSC is not authorized anti-air capability. During Delta FSC's NTC rotation, friendly air assets and air defense artillery were available nearby and often. If, however, they were defeated or not present, sustainment units would be continuously vulnerable to enemy air threats.

Brigade support areas (BSA), primarily secured by the brigade support battalion (BSB), face similar threats and challenges in LSCO environments as the FSC. Near-peer enemy armor and air pose significant dangers to brigade-echelon sustainment functions located in the BSA. The BSB is not properly equipped to deal with these threats, similar in the way the FSC is not. While additional attachments to the BSA can provide a wider selection of security assets, this topic merits further exploration into how to organically equip an ABCT BSB to secure the BSA from enemy armor and air threats.

History is full of examples of Fabian warfare, in which the enemy exploits logistical vulnerabilities to disrupt offensive or defensive capabilities. Most notable was the British and French armies' use of irregular or guerrilla

warfare to disrupt each other's supply trains moving between forts deep in the wilderness during the French and Indian War (1754-1763). Regular sustainment forces of both armies who were not accustomed to the North American frontier tactics were unprepared and defenseless against raids and ambushes along rocky and foliated terrain. Native Americans and colonial militias would wield these tactics to affect confidence in sustainment capabilities on the battlefield directly. Such tactics would then directly influence Gen. George Washington during the American Revolution. As long as ground forces have the capability to penetrate and deliver deep strikes against supply lines, there will be a need to aggressively secure logistical nodes and trains.

The sixth principle of sustainment laid out in the 2019 publication of FM 4-0, Sustainment Operations, is Survivability: "A quality or capability of military forces to avoid or withstand hostile actions or environmental conditions while retaining the ability to fulfill their primary mission ... Hostile actions and environmental conditions can disrupt the flow of sustainment and significantly degrade forces' ability to conduct and sustain operations."

Per the fiscal 2020 modified table of organization and equipment (MTOE), an ABCT's cavalry squadron forward support company is authorized 21 M2 .50 caliber machine guns, two Mk19 grenade launchers, eight M240B medium machine guns, four M320 grenade launchers, and 18 M249 squad automatic weapons. All other FSCs in an ABCT have MTOE authorizations that are nearly identical.

The FSCs in an ABCT are not authorized anti-tank weapon system capabilities. Unless they are provided these capabilities from the line companies, they must operate and self-secure in a LSCO with near-peer adversaries, where enemy armor is likely to be present.

As demonstrated by the vignettes above, it is clear FSCs suffer from shortfalls in anti-armor capabilities in LSCO with near-peer threats. Future Army equipping discussions should strongly consider integrating into the ABCT FSC, at a minimum, two M98 Javelins, two AT4s, two FIM92 Stingers, and two vehicle-mounted M41 TOW-ITAS systems with accompanied M1167 or joint light tactical vehicle gun platforms. This will effectively give the FSC the ability to protect its LOGPACs and command post elements simultaneously from potential enemy armor and air threats, thus achieving the sixth principle of sustainment, survivability.

Knowing that the timeline for procuring and distributing new equipment to units will be unspecified, the following is recommended to ABCT FSCs that are on the glide-path to their next combat training center rotation: Train and utilize any anti-tank capabilities that may already be available and liberally employ them at the CTCP and on LOGPACs. Battalion planners should consider options that would dedicate excess anti-tank capabilities from their line companies to their FSCs, if so available. According to task numbers 071-060-0003 through -0007, the training requirements for a M98A2 Javelin include approximately one day

of preliminary knowledge and skills tasks and one day of simulator or live-fire training. The return on investment will reveal itself during the battle when line companies will not need to request emergency resupplies because their regularly scheduled and dedicated echelon trains have been cut off.

If the brigade support area is the heart of the brigade, and the line companies are the muscle, then the FSCs are the arteries that deliver the much-needed blood and nutrients to continue the fight. If one is severed, it will strain and weaken the redundant support systems in place. If multiple FSCs are taken out of the fight Soldiers will not eat, tanks will not have fuel, and bullets will not fly. As the forward-most sustainers on the battlefield, FSCs must have the organic capabilities to fight and protect themselves so that they may continue their mission and provide operational reach, freedom of action, and prolonged endurance to U.S. ground forces.

Capt. Nicholas DeLissio is currently attending the Logistics Captains Career Course at Fort Lee, VA. He is a graduate of the Pennsylvania State University with a bachelor's degree in international politics, and pursuing graduate coursework in supply chain management.

Featured Photo
Washington Army National Guard Soldiers, assigned to India Company, 3rd Battalion, 161st Infantry Regiment, 81st Stryker Brigade Combat Team, pull security while transporting supplies to the forward operating base in "The Box"—a massive training area within the National Training Center—on Fort Irwin, California, March 13. India Co. is the forward support company responsible for providing resupply, equipment maintenance, and food service to companies at the front line during combat missions. (Photo by Sgt. Adeline Witherspoon)

Historical LOGISTICIAN

Learning Lessons From the Past Creates Better Leaders

■ By Capt. Derrick Fiedler



Operation Warden, Day 2, beach landing at Oecussi, September 1999. (Photo by Australian Defence Force)

The rapid pace of technological advances and the exponential increases in the complexity of global logistics forestall any naïve comparisons of military logistics in past wars to our current logistics doctrine and practice. However, if logisticians learn and apply the historian's method of analysis and inquiry, the benefits to individual logistics leaders and the units in which they serve would be a windfall, both immediately and in second and third-order effects. The key facets of historical inquiry that I will focus on here—which is my own prioritization of a much broader field of historiographical topics—are: the dual explanatory frameworks of agency and structure, the related frameworks of contingency and determinism, and the types of historical explanation.

If we accept that we cannot uncritically graft historical logistics lessons learned directly onto our present concerns, we need to understand what kind of inquiries will be of value for practical application today. Logisticians at all levels need to be operational artists to effectively advocate for the serious consideration and integration of logistics principles—rather than merely the data, forecasts, and tables—into operations planning. Unfortunately, too few logisticians (especially in the National Guard) can attend the resident Command and General Staff College, much less the School for Advanced Military Studies, so it becomes our implied task to develop these skills independently.

On the level of leadership, the study of biography is well suited to deepening our understanding of the context in which individuals think and act. By seeing the social, economic, cultural, and political structures and dynamics within which leaders are shaped and must act, we will gain insight into the forces that act on our own personal development. In addition,

we will enhance our appreciation for the opportunities and constraints afforded by those structures and dynamics. Such an ability to recognize the “markers” inherent to these across historical periods and cultures enables one to orient to the situation more rapidly and accurately, formulate more adequate courses of action, and act more effectively on sound judgments. Self-awareness and self-development are exponents of agency, while situational awareness of social, political, and economic forces—as they relate to yourself and your field of action—is a factor of structure.

We need to study detailed monographs of battles and campaigns at the tactical and operational levels, with an eye towards logistics dimensions. While there are noteworthy monographs devoted specifically to analyzing logistics, there is also much to be learned from studying the conventional maneuver histories through the lens of logistics. Indeed, when we appraise tactical history from the maneuver perspective, critically applying our trained logistician's skillset, interrogating the text for logistics problems and implications, we achieve a dual purpose: first, we learn more about how logistics fits into the operational concept, and, second, we broaden our understanding of warfighting functions beyond logistics. To become proficient in operational art and effectively advocate for logistics in operational planning, we need to have a solid foundation of unified land operations across multiple domains.

Although the materiel, technology, tactics, techniques, and procedures of the past may radically differ from ours, the astute reader will recognize that the problems are, often as not, analogous in their germane respects. Through studying in detail the logistical problems of past wars, and the more or less successful courses of action that past logisticians implemented to address them, we can glean general tactical and operational principles that remain relevant today. We can assess past solutions to logistical problems in terms of the principles of logistics (integration, anticipation, responsiveness, simplicity, economy, survivability, continuity, and improvisation), how they were incorporated into battle plans and campaign design (basing, culmination, lines of communication/operation, end state, center of gravity, decisive points, tempo, phasing and transitions, operational reach, and risk), and their effectiveness in support of unified land operations (freedom of action, operational reach, and endurance).



Landing Ship Tanks unload personnel and equipment on Red Beach one day after the amphibious landings on Inchon, Korea, Sept. 15, 1950, during the Korean War. (U.S. Navy photo)

At the strategic level, we need to focus on those corresponding larger themes of the business of war. We gain perspective by studying the relationships between industry/contractors and the War Department/Department of Defense, funding and procurement, distribution networks, organizational culture, inter-service cooperation, research and development, mortuary affairs, and strategic leadership. As stated above, the specifics from one period to another will vary widely, but the fundamental problems persist. And while we cannot use past solutions as blueprints to current problems, we can and should study past military professionals to learn

their modes of thought, their approaches to grappling with and resolving impediments, and their successful principles of organization and leadership. I contend that as you ascend the levels of war from the tactical to the strategic, concerns with logistics, materiel, and personnel overtake maneuver in respective prominence. We need to know how our tactical missions are nested in the broader operational and strategic concept to foster shared understanding.

As a serious student of history, I've learned that there are myriad "theoretical" issues with which one needs to engage.

I recommend, first, that anyone who pursues history in anything beyond a casual way read something about the historical method; that is, how historians ask questions and the techniques they use to find and evaluate evidence to answer those questions. Additionally, it is valuable to study the historiography of the war or period you're researching. Historiography is the history of the historical writings about a subject, period, event, etc. This allows the student to understand the context of a given book and the overarching questions, themes, problems, and arguments within that field. For example, when studying the Civil War, it is vital to have a grasp of the Lost Cause mythology if you are reading Douglas Southall Freeman's Lee's Lieutenants and want to draw sound conclusions from it. Historical understanding fluctuates from one generation to the next, but we can gain valuable knowledge from the best historians of every generation with historiographical context.

Nested within method and historiography are a few other considerations I want to highlight. First, chronology is important. Today, it is common in academia to eschew chronology as pedantic and elevate a more analytical, social scientific approach. But when explaining events, processes, and causes the sequence of things matters a great deal. Likewise, the narrative should not be discounted. History, as it happened in the past, is infinitely complex. The surviving evidence historians use to reconstruct that history is paradoxical. There is a paucity of it relative to the actual complexity of the past, yet there is (depending on the period and subject matter) such an abundance of it that no single historian can read enough of it to capture the whole of any given topic of research. This is partly why historians emphasize the centrality of precise questions to render the enormity of evidence manageable. Since historical reality is so dense and complex, the narrative is very well suited to historical explanation because it affords the kind of thick description, sequencing, and layering of explanatory elements.

Anachronism is one of the principal mental traps to which both amateur and professional historians are susceptible. For most people, the intuitive default is to judge the decisions of historical actors in terms of our own perspective, with the knowledge of how things turn out and a much broader field of view. One way to counter this is to train ourselves to

read forward in history, not backward. When we approach history with the sole intention of understanding an outcome and work our way backward to find the key turning points, our judgment will be skewed. If, instead, we first try to understand how the people in that time and place understood their circumstances, their motivations and goals, and how they decided upon and implemented courses of action, we will discover the immutable contingency of events. When we have this kind of appreciation and empathy, we can then combine it with the advantaged position of posterity to juxtapose it with the long-term structures that circumscribed their agency and determined the possible framework.

Finally, I would recommend that we take a long view of our historical studies. In my view, deep immersion in one period or war over an extended time will reap greater benefits than haphazard dabbling without focus. It is the difference between an amateur and a dilettante. By focusing on, say, World War I for a year, the student can read in greater depth, detail, and the context in a manner that consolidates the knowledge gained, facilitates connections between events and actors, and reinforces explanatory insights. Logistics and history are both complex subjects. One way to become a better professional in the former is to become a serious amateur in the latter.

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Alan Stadel, a U.S. Army Communications-Electronics Command sensor logistic assistance representative provides troubleshooting assistance on radar systems during a July 2020 rotation at the National Training Center, Fort Irwin, California. (U.S. Army Photo)

NEW FACE to the Field

AMC's Division Logistics Support Element Replaces Brigade Logistics Support Teams

■ By Maj. Matt Schade

Our Army is changing, and Army Materiel Command (AMC) is changing with it. In particular, the Army's tactical focus has shifted—and continues to shift—from the employment of modular brigade combat teams (BCT) in counterinsurgency operations to division-centric operations supporting large-scale combat operations (LSCO). AMC no longer employs brigade logistics support teams (BLST) integrated with BCTs either at home station or in the field. Instead, AMC integrates support at the division level through divisionally aligned Army field support battalions (AFSBn) at home station, which deploys a division logistics support element (DLSE) to provide forward support to divisions in LSCO.

The purpose of this article is to describe the doctrinal purpose of the DLSE, and to explore the application of this doctrine during major training events, including combat training center (CTC) rotations, division and corps warfighter exercises (WFX). The analysis in this article is based on current doctrine in Field Manual (FM) 3-0, Operations, and FM 4-0, Sustainment Operations, compared with the author's experience in multiple DLSE exercises.

Doctrine

Army operations in large-scale combat, as defined in FM 3-0, Operations, imply levels of violence and operational tempo not experienced since WWII. We assume the highest risk in LSCO will occur forward of the division support area (DSA). While

FM 3-0 assumes the enemy will target the DSA and areas further to the rear, the enemy will likely focus their main effort on isolating and destroying American forces at the BCT level and below. Given these assumptions, the employment of AMC civilian logistics assistance representatives (LAR) and field service representatives (FSR) would be infeasible forward of the DSA. This situation corroborates AMC's decision to disband BLST that integrated AMC civilians into the BCT formation to favor a new construct that integrates AMC civilians at echelons above the BCT.

Today, the DLSE is now the forward echelon of AMC support to Army forces on the battlefield and is described in FM 4-0, Sustainment Operations, as follows:

The AFSBn deploys a division logistics support element operational control (OPCON) to the division to which it is allocated and coordinates support with the forward-stationed AFSB. The composition of the division logistics support element depends on operational variables but generally includes AFSBn senior leadership and the life cycle management commands (LCMC) senior service technical representatives. The remaining portion of the continental United States (CONUS)-based AFSB delivers materiel readiness, force generation, power projection, and mobilization force generation installation. The division commander may OPCON the DLSE to the division sustainment brigade (DSB).

Like the BLST of old, the DLSE is a task force of AMC and the Assistant Secretary of the Army, Acquisition, Logistics, and Technology (ASA/ALT) personnel organized to support a specific mission or operation. Unlike the BLST, the DLSE is commanded by an AFSBn commander and operates in direct support of a division headquarters and/or DSB. The DLSE provides command and control of all AMC and ASA/ALT personnel within the supported division's area of responsibility. This may include LARs and FSRs assigned to LCMC and OPCON to the DLSE, forward repair activities (FRA), and Logistics Civil Augmentation Program capabilities. Any AMC or ASA/ALT capability within the supported division's area of responsibility goes to the DLSE for accountability, direction, and administrative support.

The DLSE also provides reach-back to additional AMC and ASA/ALT

capabilities controlled by the corps logistics support element—commanded and staffed by a corps-aligned AFSB—and the theater-aligned AFSB. The DLSE forms a continuous line of communication from the tactical division to the Army's organic industrial base.

DLSE in Practice at Major Training Events

There are currently three major training events that provide opportunities to exercise the DLSE: CTC rotations, division and corps WFX, and Defender Europe/Defender Pacific exercises. Each type of event presents unique opportunities and limitations for exercising the DLSE.

Combat Training Centers

CTC rotations are the most common major training exercise for the DLSE. A typical CTC rotation includes a full BCT as the primary training audience, enabled by an aviation battalion task force and division sustainment support battalion (DSSB). The rotational BCT and enablers are commanded and controlled by the CTC operations group, replicating a division headquarters. The BCT's assigned division headquarters also usually provides a division support element (DSE) to facilitate the BCT's deployment and redeployment, and support the BCT's senior mentor (assigned commanding general or deputy commanding general), who ensures the BCT meets the assigned division's training objectives.

Divisionally aligned AFSBns deploy a DLSE to support the CTC rotational brigade and enablers (aviation task force and DSSB). On the surface, the DLSE

appears to replicate many of the former functions of the BLST. However, unlike the BLST, the DLSE integrates at the division level, coordinating with the operations group, support brigade or support operations cell (SOC), and the home station DSE. The DLSE can support the rotational BCT through all phases of the operation, beginning with deployment from home station through reception, staging, onward movement, integration, execution of training, regeneration, and redeployment. During deployment and redeployment, the DLSE assists the rotational BCT and enablers through coordination with its installation capabilities.

Scale is the primary limitation of the CTC in terms of integrating the DLSE, which manifests in two ways. First, CTC rotations focus on a single BCT. As a result, the DLSE tends to behave more like a BLST. The DLSE support operations and staff attend all relevant BCT battle rhythm events and develop relationships down to the battalion level. While this approach maximizes support to the BCT (typically the division's main effort during CTC rotations), it does not replicate the scale of support required for a full division-size operation.

Likewise, the headquarters for the BCT is not a full division and sustainment brigade headquarters. Instead, the CTC provides an ad-hoc division headquarter described above. While the DLSE benefits from integrating with the operations group, SOC, and DSE, these headquarters elements are focused on training and evaluating a single BCT, not planning and prioritizing the efforts of multiple BCTs and enablers like a full-size

division headquarters. Nonetheless, the CTCs are still the largest full-scale maneuver exercises routinely executed in the Army. The DLSE benefits greatly from supporting and observing the large-scale maneuver of armor, infantry, and Stryker formations.

Warfighter Exercises

Compared to CTC rotations, the WFX series provides the inverse set of opportunities and limitations for exercising the DLSE. Unlike CTC rotations, the WFX is the capstone training event and external evaluation for the entire division and sustainment brigade headquarters. Accordingly, the DLSE can fully engage with the division and sustainment brigade staff executing command and control of multiple BCTs and enablers. The DLSE typically integrates with either the division support area command post, or the sustainment brigade headquarters. The DLSE participates in all sustainment planning at the division level, focusing on the integration of AMC enablers such as LAR and FSR support and FRA that enhance the division's ability to regenerate combat power.

While WFX provides the full extent of DLSE headquarters integration, the key limitation is that the exercise is a simulation. While the division and sustainment brigade headquarters are fully deployed to the field, the subordinate BCTs and enablers are roleplayed by response cells, and all combat operations exist in a constructed environment. The simulations provided by the mission command training program have improved significantly over the last year to replicate the impact of sustainment on maneuver forces

(to include AMC capabilities like the FRA). Still, they cannot fully replicate the intricate details of real-world sustainment. As a result, the DLSE's planning and synchronization efforts are not fully grounded in real-world requirements.

Defender Europe and Defender Pacific Exercises

The Defender series of exercises have the potential to exercise the full capability of the DLSE. Both Defender Europe and Defender Pacific (DE/DP) are large-scale deployments of a corps headquarters with multiple subordinate divisions and brigades in either United States European Command or United States Indo-Pacific Command. These exercises allow the DLSE to participate in combined and joint planning efforts at the division level, and to command and control a wide range of AMC and ASA/ALT enablers in support of actual BCT formations dispersed over a wide geographic area. For headquarters coordination, DE/DP exercises also provide the DLSE with the opportunity to integrate with the corps logistics support element (provided by an AFSB) and the theater AFSB. Further, the DE/DP exercises occur outside of the continental United States (OCONUS), adding the realistic challenge of managing long logistical supply lines back to the CONUS industrial base.

The one significant limitation of DP/DE exercises is the lack of full implementation due to various national and international factors. The exercises are governed by complex international agreements with overseas partners, limiting the size and maneuver capacity of formations at the BCT level and

below. In the past 18 months, both Defender Europe and Defender Pacific were also significantly constrained by the worldwide COVID-19 pandemic, which understandably required international partners to constrain the numbers and movements of U.S. forces operating in their sovereign territory. Budgetary constraints (both national and international) can also limit the size and scope of DE/DP exercises. However, these limiting factors are temporary; as the COVID-19 pandemic recedes and international economies reenergize, the DE/DP series of exercises hold great promise as the ultimate opportunity to employ the DLSE.

Conclusion

The DLSE concept represents the future of AMC's "face to the field." Taken individually, various exercises described in this article each provide different challenges and opportunities for DLSE commanders and staff to command and control AMC capabilities in support of various combat formations. The CTC, WFX, and DE/DP exercises collectively form a continuum of training opportunities, providing a comprehensive picture of how to employ AMC enterprise capabilities in LSCO on the modern battlefield.

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IMPROVED SUPPORT

A Consolidated Support Operations Cell Can Improve Battalion Ops

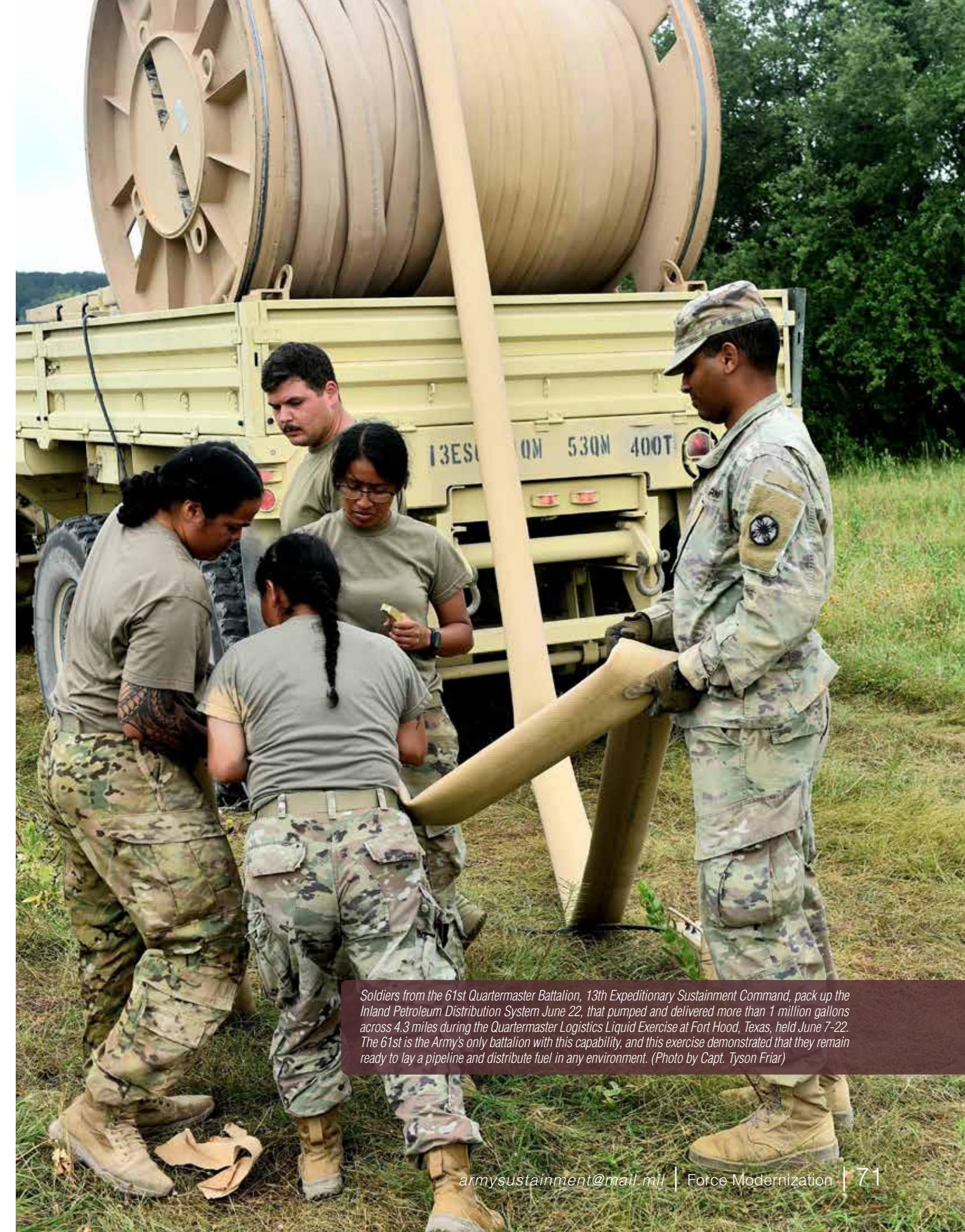
■ By Maj. Jason Phillips

Logistics units are the square peg to the Army's round hole, repeatedly hammered into an operations process developed for maneuver and fires units. Logistics units have several organizational constraints imposed on them by the current force structure and doctrine. The first is that support battalions lack a field grade S-3 and operations sergeant major (SGM). Instead, these units rely on a captain and master sergeant who may or may not have had company command and first sergeant time. Second, support battalions have two separate operations cells, the orders producing S-3 section mentioned above and the non-orders producing support operations section lead by a major as

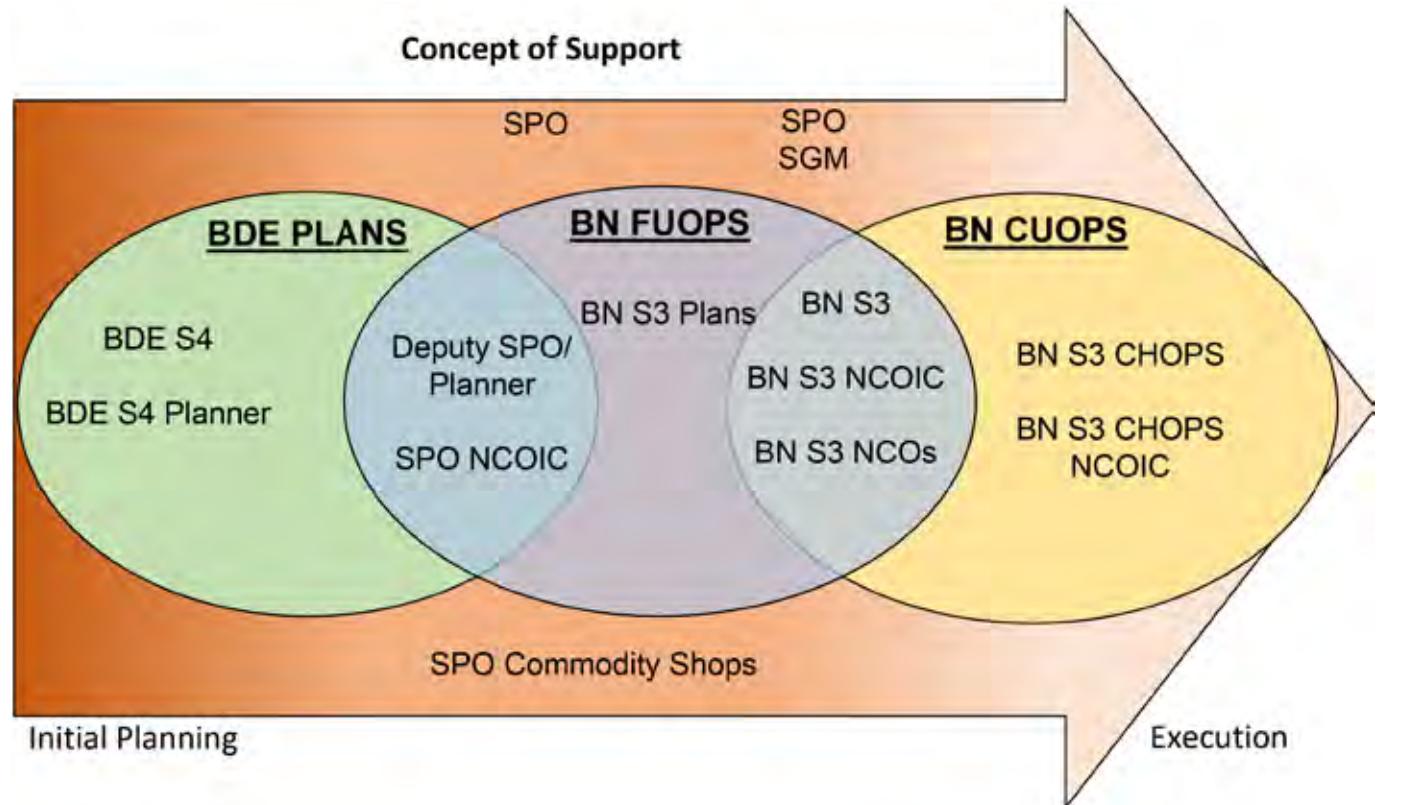
the support operations officer (SPO) and another master sergeant as the NCOIC. This can lead to a disjointed operations process where companies conduct actions communicated to them through logistics support requests generated by the SPO team. At the same time, the S-3 is unaware of these actions, resulting in overtasking as the S-3 continues to generate internal battalion tasks. Support battalion operations would be better understood and executed if there were a consolidated operations cell led by a field grade officer with support from an operations SGM.

Placing the correct people in the correct job and ensuring stability is an excellent way to solve any organiza-

tional friction. This process has led to units establishing cycles where field grade officers remain in position for one year before rotating to a new position, many times in the same battalion. Current doctrine does not support this construct in support battalions. Human Resources Command does not fill this position directly and does not track it as a key developmental position. The result is many captains coming directly out of stressful company commands do not see the S-3 as a worthwhile job. Based on move cycles, the S-3 may rotate several times a year and at times must be filled by a pre-command captain. Furthermore, no matter how senior, these captains are not Command and General Staff Officer Course graduates and not adept at the military decision-



Soldiers from the 61st Quartermaster Battalion, 13th Expeditionary Sustainment Command, pack up the Inland Petroleum Distribution System June 22, that pumped and delivered more than 1 million gallons across 4.3 miles during the Quartermaster Logistics Liquid Exercise at Fort Hood, Texas, held June 7-22. The 61st is the Army's only battalion with this capability, and this exercise demonstrated that they remain ready to lay a pipeline and distribute fuel in any environment. (Photo by Capt. Tyson Friar)



Author's view of the support battalion operations process beginning with the support operations office and transitioning from brigade support battalion current operations. (Contributed Figure)

making process (MDMP), a process they are supposed to lead.

The problem of having a junior officer in the S-3 position is not different from the NCO perspective. While a master sergeant possesses more experience, the position suffers the same longevity issues as the S-3 in that the NCO is generally awaiting a first sergeant billet. The S-3 NCOIC lacks experience with MDMP, operations at the battalion level or higher, and is not a graduate of battle staff. These factors lead to turmoil and varying levels of expertise, causing the support battalion operations process to remain crude and in constant turmoil.

In a maneuver battalion, there is a single operations officer who is

responsible for directing all the actions of subordinate units to meet their battalion commander's intent. In a support battalion two such officers exist; one to support the battalion commander's intent and one to support the brigade commander's operations. Many times these two priorities require extensive resources to synchronize. An example could be if A Company needs to run a small arms range to maintain proficiency. Simultaneously, a line battalion requires fuel support and augmentation of several additional M978 fuel trucks to support an exercise, this action is in line with the brigade commander's intent and results in a logistics support request published by the SPO. Ideally, these operations are nested and synchronized, but there is no formal process to ensure the two sections communicate.

The SPO is the heart of support battalion operations and can readily absorb the day to day operations of the battalion utilizing the S-3 as a subordinate staff officer. Currently, the SPO is tasked with planning, coordinating, and synchronizing sustainment in the brigade's area of operations. Doctrine acknowledges that the S-3 is separate from the SPO but should closely coordinate with them as the SPO is "fundamentally part of brigade support battalion (BSB) operations." Army Techniques Publication (ATP) 4-90, Brigade Support Battalion, states, "The SPO and his staff develop significant portions of the BSB operation, warning, and fragmentary orders. The SPO provides information to support the development of the BSBs

mission and execution paragraphs to include commander's intent, concept of operations, scheme of movement, and tasks to subordinate units." This is essentially all of paragraph 3 of the operations order, which is akin to how the operations process works in maneuver battalions.

The 3rd BSB tackled this problem in a twofold manner addressing both process and people to integrate the operations process. First, the command had to solve the personnel issue, which through quick action and a little fortuity was solved when the 3rd Infantry Division received several prepositioned SGMs directly from the Sergeants Major Academy. The command was able to have a SGM sent to the battalion who was placed in the battalion support operations cell. Second, the command took the opportunity to unite the two operations cells into a single entity where the SPO, a major, became responsible for all internal and external unit operations.

This combination was not without issue initially and cycled through several iterations before solidifying (see figure). Once the correct people were in place, the unit was able to develop a coherent orders process that enabled the battalion to execute operations with minimal disruption caused by three separate S-3 and two S-3 NCOIC transitions in an eight-month period.

By focusing on personnel placement, the battalion commander ensured the support battalion's operations process was refined and codified. This further enabled him to utilize the SPO's more than two years of schooling and division-level experience to ensure

the orders process was streamlined while still meeting the brigade commander's and his intent. This was done by utilizing the SPO planner as de facto deputy responsible for plans and developing brigade concepts of support to be published in brigade orders. These concepts of support were then passed to the battalion S-3, who acted as a future operations officer, and integrated the battalion internal operations into the concept of support before finally moving to the current operations officer (CHOPS). The CHOPS and the SPO SGM became an integral part of the process to ensure all plans and immediate requirements were incorporated into daily tactical fragmentary orders.

It is the author's assertion that support battalion operations can be better understood and executed across the Army if the two changes tested by the 3rd BSB are adopted into the current doctrine and force structure.

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SPO should already be viewed in this manner.

By focusing on people and processes the support battalion can whittle some of the corners from the square peg and better fit into a maneuver centric operations process. The inclusion of a field grade officer and operations SGM is invaluable in providing currency at the brigade level and stability in the heart of the battalion's operations process. By combining the two operations cells into a single entity, the unit gains a coherent process with fewer miscues and canceled training due to overlapping tasks and miscommunicated priorities. By streamlining the orders process, the support battalions can enable subordinate companies more predictability in their training calendar and enable company commanders to better support both battalion and brigade training objectives.

Force Projection



Soldiers from the 17th Ordnance Company and Korean national ammunition inspectors conduct Class V receipt operations recently on Camp Kwangsari, Korea. (Contributed photos)

Class V Operations in Korea

■ By Capt. Mike E. Houston and Mark S. Lawrence

The ability to rapidly project combat power to any location on the globe and execute large-scale combat operations (LSCO) has been one of the distinct advantages of the U.S. Army throughout history. Joint Publication 3-0 (JP 3-0, US DOD), Joint Operations, defines force projection as “The ability to project the military instrument of national power from the continental United States or another theater, in response to requirements for military operations. Force projection operations extend from mobilization and deployment of forces to redeployment to the continental United States or home theater.” This force projection capability is a complex and perishable skill that we as an institution must maintain to ensure that we have a ready force.

Large-scale deployment exercises like DefenderPacific, executed in the U.S. Indo-Pacific Command (USINDOPACOM) area of responsibility (AOR), replicate this

task’s scope, scale, and requirements. It is important to understand that force projection is not just the ability of an individual unit (or units) to mobilize and deploy from point A to point B, but the full spectrum of systems, assets, and organizations that synchronize to facilitate operational success. With future threats being unknown in LSCO, the ability to mission command a division-size element as it mobilizes, deploys, and executes combat operations in the USINDOPACOM AOR constitutes a clear training priority.

When asked about the importance of the 6th Ordnance Battalion’s (6th OD BN) mission, Mark Featherston, 6th OD BN chief of surveillance, said, ‘Fight Tonight’ is the mantra that drives all Eighth Army actions, and 6th OD BN takes it to heart. To that end, the (unit) provides a full litany of services for the ammunition and explosives stored in the ROK. Ultimately, Soldiers need viable ammunition to complete their missions, and 6th OD BN’s whole purpose is to ensure they have it.”

The Korean peninsula is an area of operations where U.S. force projection is crucial to maintaining lethality and American interests in the region. With two near-peer militaries in close proximity, the readiness of the Eighth Army, 2nd Infantry Division, and the 19th Expeditionary Sustainment Command is paramount. A key part of this readiness is the ability to support force projection into the Republic of Korea (ROK) AOR. The decisive element for Class V operations within the Korean theater of operations is the 6th OD BN.

The three critical areas for enabling Class V force projection capabilities in the Korean AOR are the U.S. Korean partnership; Army prepositioned stocks (APS) draw training, maintenance, and retrograde activities.

The Battalion's Mission and Partnership in Korea

The 6th OD BN performs Class V operations (issues, turn-ins, inspections, ret-rograde, and storage) for all U.S. titled ammunition supporting Eighth Army units. This formation is unique in that it is the only ammunition-specific battalion in the Army. It is a subordinate unit of 19th Expeditionary Sustainment Command (ESC) and Material Support Command Korea (MSC-K). The 6th OD BN also provides direct support to Counter Fire Task Force, Theater Ballistic Missile Defense, brigade set combat load draw, combined/joint reception, staging and onward movement, and combined Joint Task Force 8 mission sets.

The 6th OD BN works closely with the ROK Ammunition Support Command to support the Eighth Army ammunition mission. ROK Army (ROKA) installations store all U.S. Class V stocks and the 6th OD BN workforce consists of 210 Korean national (KN) workers and Korean service corpsmen that complement the unit modification table of organization and equipment. The host nation support dynamic is critical to the sustainment enterprise as it allows access to ROK sustainment assets, personnel, and critical infrastructure to support the ammunition mission requirements in theater.

Chief Warrant Officer 2 Darius Nabaa, the BN ammunition warrant officer, said "Due to the importance of 6th OD BN's Class V mission on the peninsula, it is vital that

Soldiers and KNs maintain a tight-knit working group. By doing this, we ensure ROKA is constantly synced in with 6th OD BN's Class V operations to maintain timely issues, turn-ins, receipts, shipments, inspections, storage, and retrograde while sustaining Eighth Army's 'Fight Tonight' combat readiness."

Dispersed throughout the Korean peninsula are the battalion's three subordinate ordnance companies. The 17th Ordnance Company (OD CO), located on Camp Kwangsari, manages multiple ammunition supply points with civilian quality assurance specialist, ammunition surveillance (QASAS) personnel and KN ammunition inspectors. The 52nd OD CO located on Camp Humphreys manages ammunition depots (ADs) with QASAS personnel, and KN ammunition inspectors. The 84th OD CO, located on Camp Carroll, also manages ADs as well as operations conducted at Chinhae Pier with QASAS personnel, and KN ammunition inspectors.

Force Projection Training and Lines of Effort

Critical to force projection in the region is the APS IV. APS is a cache of equipment and ammunition ready for any warfighter to fall in on in order to enable the "Fight Tonight." The prepositioned stocks hold the stored combat loads that will outfit a unit designated to support the Korean peninsula during contingency operations on a prepare-to-deploy status. U.S. Forces Korea builds proficiency at rapid force projection through receiving deploying personnel, supporting prepositioned stocks issued to deployed units, and supporting the employment of those armaments by a brigade combat team.

Army units conduct training rotations to Korea to meet these objectives. This is a joint exercise with the 2nd Infantry Division and the designated rotational unit known as Operation Warrior Raider Strike. 6th OD BN serves as the primary manager of the U.S. Class V stocks for 19th ESC. The training event is a useful real-world training opportunity because it replicates the reception, staging, onward movement, and integration actions that would be conducted during contingency operations. The battalion must rapidly provide munitions to support the customer units as they build combat power in the south and prepare for onward movement north in response to any demonstrated hostilities by an adversary.

The 6th OD BN has a unique mission command role that is essential to executing the theater Class V mission during contingency operations. The battalion is the connecting joint for Korean service corps companies and the prepare-to-deploy tasked modular ammunition companies assigned to the battalion during wartime operations. In a matter of weeks, the formation will more than triple in size as it assumes responsibility for the distribution of munitions from the southern tip of the peninsula to the ADs in the south and central regions and the ammunition supply points (ASPs) in the north.

The battalion supports Class V management from the southernmost port to the northernmost ASPs via supply point distribution. The 84th OD CO operates the theater receiving pier with ROK ASC soldiers and manages the transportation of inbound stocks forward to ammunition depots utilizing host nation rail assets. The 52nd OD CO receives the munitions at strategically dispersed ammunition depots across the peninsula. At these locations, bulk stocks are broken down, stored, and requested munitions are moved to the northern ASPs operated by 17th OD CO. The theater Class V enterprise structure fully supports the receipt of an inbound force and can sustain support to provide prolonged endurance to the maneuver elements.

Maintenance and Retrograde

The munitions aspect of force projection is not just providing combat loads to incoming units. The ammunition maintenance and retrograde operations are two critical shaping efforts that help ensure that the warfighter has instant access to serviceable and ready munitions. The 6th OD BN higher headquarters, MSC-K, understands that this aspect of theater readiness is paramount to lethality and rapid force projection.

Maintenance of prepositioned stocks is important to supporting theater readiness and force projection. The three subordinate ordnance companies conduct the prioritization, scheduling, and execution of all ammunition surveillance programs. This includes ensuring that the ammunition combat load inspections and technical assistance visits are scheduled and completed as required. The visits and inspections play a large part in ensuring the serviceability and overall health of the stocks are adequate to support

warfighter lethality during LSCO. This is just one of the many requirements that go into U.S. force projection support. Surveillance personnel conduct risk decision inspections on the various munitions storage locations to maintain personnel safety and assess the risk, collateral fallout, and mitigations for any munitions related incident.

The 6th OD BN also conducts multiple retrogrades of expiring munitions each year to Japan and the U.S. for refurbishment or demilitarization. This wide berthing logistical effort leverages the host nation, ROKA, capabilities and personnel, commercial seaports and vessels, Japanese partner coordination, and transportation oversight and support by Surface Deployment Distribution Command.

Conclusion

At the conclusion of training exercises Defender Pacific and Warrior Raider Strike, the USINDOPACOM force will be better prepared to support force projection in the AOR. With this increased proficiency, the Army is one step closer to maintaining our military position on the globe.

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Mark S. Lawrence is currently employed with the Department of the Army as a quality assurance specialist of ammunition surveillance (QASAS). Since July 2015 he has been assigned to Camp Carroll, Republic of Korea, first as a QASAS with the 84th Ordnance Company then as the deputy chief of surveillance for the 6th Ordnance Battalion. He holds an associates degree from the Community College of the Air Force in Munitions Systems Technology.



Sierra Army Depot materiel examiner and identifiers screen excess repair parts at Fort Hood, Texas, March 1, 2018, to ensure that only serviceable items are shipped to Herlong, California. (Photo by Capt. Michael Smith)

OPINION:

Units will have to fill gaps MDRS program doesn't address

■ By Capt. Michael S. Smith

In 2014, the 3rd Combat Aviation Brigade had \$1.2 million in credit reversed because they did not order one-for-one replacements for UH-1 Huey helicopter engines. The reason replacement engines were not ordered is that Hueys were modernized in favor of UH-60 Blackhawks 15 years prior.

Under a new initiative led by Army Materiel Command (AMC), Soldiers can turn in old equipment more easily at Modernization Displacement and Repair Sites (MDRS). In Samatha Tyler's February 2021 article, "Initiative unencumbers units, supports Army modernization," published in Army.mil, Gen. Ed Daly said "This is one of the most important things AMC will do to support Army readiness in the next five years." AMC's divestiture team lead added that aging legacy equipment is like a boat anchor, weighing the Army down.

As it stands, the mission of most MDRS sites will be limited to major

end items. This places the burden to process the turn-in of legacy repair parts on supply sustainment activities (SSA). It is the functional equivalent of AMC taking the boat anchor and leaving units to deal with the associated chain. The chain is bespoke to the anchor, meaning it is only useful when the links are stored at the national level for redistribution or with the unit using the anchor.

Fleet modernization increases the workload for SSAs due to the need to turn in legacy inventory and receive spare parts for the new fleet. Dependency on the steady-state SSA reverse logistics pipeline is a high-risk enterprise-level management decision.

The Army can minimize the burden placed upon SSAs by reserving the reverse logistics process for materiel listed on a unit's overaged repairable items list and items with authorized serviceable credit. During fleet modernization, most of the repair parts units have on hand to service legacy equipment

will not be authorized for serviceable credit. Therefore, the logistics enterprise should implement a process that has the objective of maximizing turn-in velocity.

A proven way to maximize unit compliance and turn-in velocity when collecting legacy repair parts is to integrate materiel examiners and identifiers (MEIs) from Sierra Army Depot in California, installation Qualified Recycling Programs, and Defense Logistics Agency (DLA)-Distribution Services.

The role of Sierra Army Depot MEIs is to collect serviceable repair parts for reutilization by the Army. During three collection exercises at Fort Hood from 2016-2018, MEIs packed and shipped 11 containers of aviation repair parts worth \$19.5 million and an additional 50 containers of tracked and wheeled vehicle parts. The presence of Sierra's experts at Fort Hood was a win-win for their organization because they optimized how the containers were



Sierra Army Depot materiel examiner and identifiers pack and ship 11-containers of aviation repair parts worth \$19.5 million and an additional 50-containers of tracked and wheeled vehicle parts April 7, 2017, Fort Hood, Texas. (Photo by Capt. Michael Smith)

packed, enabling faster processing at their facility in Herlong, California. Additionally, they were able to minimize unserviceable and obsolete materiel that was shipped.

Qualified Recycling Programs (QRP) can accept unserviceable materiel that does not require demilitarization. Fort Hood's QRP participated in two of the three exercises on Fort Hood and collected enough scrap metal to fill 2-Olympic sized swimming pools, equaling 638,000 pounds of scrap metal, returning \$58,760 to Fort Hood's Morale Welfare and Recreation program.

From a network design perspective, MEIs and installation recycling programs save labor by reducing inspection times and eliminating paperwork requirements for the SSA's reverse logistics process. The three Fort Hood exercises saved a minimum of \$2 million in labor costs.

DLA-Disposition Services, the DOD's demilitarization experts, is an integral part of the MDRS team because they are authorized to redistribute serviceable repair parts which the Army no longer requires to other government agencies. Preparing turn-in documentation is not a trivial task, by eliminating this requirement, a team of experts at MDRS sites can remove a significant burden from units and increase turn-in velocity.

Integrating Sierra Army Depot, QRPs, and DLA-Disposition Services at MDRS sites aligns with the Army's 'People First' main effort and reduces risk to deployed units by reducing supply lines.

During a 2017-2018 Operation Atlantic Resolve rotation, an aviation battalion transported 2,273 lines of repair parts that were readiness drivers for aircraft no longer in their fleet from Fort Hood to Germany in 18 containers.

While the deployment to Europe

wasted money, it could have cost lives in combat as improvised explosive devices killed 2,640 U.S. Soldiers in Iraq and Afghanistan between 2011 and 2020. Reducing the practice of relocating obsolete or unnecessary parts shortens the supply line and eliminates the need to transport equipment through hostile territory.

Finally, in addition to the human risk noted, the Army has a fiscal responsibility to the American taxpayer and a duty to the Soldiers and their families to focus upon legacy repair parts in the MDRS mission.

Capt. Michael S. Smith is the chief of data fusion for the Air Force Rapid Capabilities Field Support Unit. He received a Master of Engineering in Supply Chain Management from MIT in 2020 and a Bachelor's of Science in Systems Engineering from West Point in 2011. This article is based on the author's experience commanding the 62nd Quartermaster Company and leading Fort Hood's 2016 and 2017 Unit Equipping and Reuse Working Group-Expanded events.

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