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Transforming and Converging Sustainment Warfighting Systems

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ON THE COVER

This issue's theme is Transforming and Converging Sustainment Warfighting Systems. Sustainers must embrace new ideas and technology to stay on top of their ever-evolving role and mission. Cover design by Sarah Lancia.

This medium is approved for the official dissemination of material designed to keep individuals within the Army knowledgeable of current and emerging developments within their areas of expertise for the purpose of enhancing their professional development.

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Mission: *Army Sustainment* is the Department of the Army's official professional bulletin on sustainment. Its mission is to publish timely, authoritative information on Army and Defense sustainment plans, programs, policies, operations, procedures, and doctrine for the benefit of all sustainment personnel. Its purpose is to provide a forum for the exchange of information and expression of original, creative, and innovative thought on sustainment functions.

TRANSFORMING SUSTAINMENT

TO DELIVER COMBAT READY FORMATIONS

■ *By LTG Christopher O. Mohan*

Today's operational environment has shown that the speed and complexity of large-scale combat operations (LSCO) are unlike anything we have experienced in the Army's 250 years. In this light, the Army sustainment enterprise must think differently about how it does business to support the Army, the joint force, and our allies and partners around the world, both now and in the future.

The Army sustainment enterprise must deliver what our warfighters need, when and where they need it, at the speed of war in a contested environment. While this concept is not new, we are finding innovative ways to leverage new technology, from both factory-to-foxhole and foxhole-to-factory, using current operations and exercises to learn, anticipate need, and prepare theaters.

The war in Ukraine has presented the Army with opportunities to leverage forecasting techniques and algorithms to estimate repair parts and ammunition ahead of real-life wartime requirements. Advanced analytics allows Army leaders to see the bigger picture: how continued LSCO affects readiness, not just of systems, but of units. For example, our Army can now map transportation networks and joint interior lines starting at the joint strategic support area to the point of delivery. The Army is working to implement lessons learned to enhance capabilities at echelon, across the force.

Meanwhile, remote maintenance solutions allow logisticians well above the tactical level to provide real-time diagnostics and reduce equipment downtime for Soldiers, partners, and allies on the front lines and around the world. This minimizes the impact of maintenance on warfighters regardless of their location, from the widespread Pacific Islands to the vast forests of Eastern Europe.

Advanced manufacturing is also a game-changer for our maintenance capabilities — a true disruptor of traditional supply chains — mitigating delays and empowering Soldiers to efficiently solve maintenance problems at the point of need. Army Materiel Command (AMC) is working across the sustainment enterprise to deliver a repository of advanced manufacturing data that is easier to access and more intuitive to use, enabling a new, faster process for repair parts to be produced and certified. Together, we are building irreversible momentum, keeping our weapons systems in the fight until the supply chain can catch up.

The Army is also making significant strides to simplify, streamline, standardize, and unify business operations while improving auditability. Enterprise Business Systems-Convergence (EBS-C) is set to start piloting a modern ammunition management capability this year. This program is aligned with our warfighting system transformation, enhancing sustainment through improved software and data access. EBS-C also has the potential to improve predictive logistics and reduce contested logistics risks, benefiting nearly all warfighting domains.

It is critical that we ensure that units have the highest level of operational readiness as they leave training rotations to head into deployment. Through AMC's operational readiness program, we use data and analytics to predict equipment that is most likely to fail. We do this while units are training and then deploying fly-away teams from our depots so we can fix that equipment and train Soldiers how to better maintain it. In addition, we are selectively swapping out the dogs at the fleet with 10/20 assist from the organic industrial base. While forward mobile teams are not necessarily new, we are adapting the way we do business to codify a process that uses data to make smarter decisions about where best to position our sustainers. This will inform the future of maintenance and how we will fight and win wars.

Continuous transformation enables our Army to remain dominant against rapidly evolving and emerging threats. As the Army continues to modernize, predictive sustainment and analytics are the future of our enterprise. We cannot afford to cease advancements. Changing how we do business today is necessary to keep up with the speed of Army modernization and to best support our warfighters now and in the future.

LTG Christopher O. Mohan currently serves as the deputy commanding general and acting commander of U.S. Army Materiel Command. He also serves as the senior commander of Redstone Arsenal, Alabama. He was commissioned into the Army from Appalachian State University in Boone, North Carolina, where he graduated as a Distinguished Military Graduate with a Bachelor of Science degree in criminal justice. His military education includes the Ordnance Officer Basic Course, the Combined Logistics Officer Advanced Course, the Naval College of Command and Staff, and the Army War College. He holds a Master of Science degree in national security and strategic studies from the Naval War College and a Master of Science degree in military strategy from the Army War College.

The war in Ukraine has presented the Army with opportunities to leverage forecasting techniques and algorithms to estimate repair parts and ammunition ahead of real-life wartime requirements.

Enabling Logistics in Contested Environments

Resilient, Distributed, and Predictive

■ *By LTG Robert M. Collins*

The Army operates in complex operational environments and faces unprecedented challenges that create adversity for sustainment capabilities. Evolving threats, contested logistics, and the tyranny of distance require innovative approaches to ensure we remain ready, resilient, and adaptable. This demands not only the seamless execution of logistics, but also the ability to anticipate and preempt sustainment challenges through advanced predictive logistic enablers. By leveraging data and analytics, predictive logistics enables the Army to anticipate sustainment needs and address them proactively, supported by a robust, data-enabled supply chain.

Central to this transformation are three key initiatives: supply chain risk management (SCRM), item unique identification (IUID), and the Regional Sustainment Framework (RSF). These initiatives address critical sustainment needs across the life cycle and enable predictive logistics by creating a data-driven ecosystem. These efforts ensure resources are available when and where they are needed. These frameworks provide a foundation and are actively being developed and integrated into the Army's day-to-day operations. The framework is continuously refined and adapted to remain relevant based on evolutions in threat, technology, and operational realities.

The Army collaborates across a spectrum of professionals within the acquisition, sustainment, intelligence, and defense industrial base communities to align sustainment strategies with operational realities. The Office of the Assistant Secretary of the Army for Acquisition, Logistics, and Technology; Program Executive Offices; and program managers collaborate with logisticians and other key stakeholders to implement policies and strategies that ensure capabilities are effectively delivered to the warfighter and address their unique challenges in the field.

Predictive logistics forms the backbone of this effort by using advanced analytics, machine learning, and artificial intelligence. These technologies enable the Army to forecast maintenance needs, anticipate supply chain disruptions, and allocate resources proactively. This shift from reactive to proactive sustainment is critical for maintaining operational tempo in contested environments where traditional logistics models may falter.

For example, during a high-tempo operation in the U.S. Indo-Pacific Command (USINDOPACOM) theater, predictive models were used to analyze operational data from deployed systems. These models identified components at high risk of failure, enabling sustainers to prioritize their maintenance and replacement. By addressing these issues preemptively, commanders avoided costly delays and ensured the availability of mission-critical equipment.

SCRM

SCRM supports these efforts by playing an early and preemptive role in addressing vulnerabilities inherent in the current, vast, and interconnected supply chain. SCRM spans the entire life cycle of Army systems, from initial production through packaging, handling, storage, transportation, and operational use. Global supply chains offer efficiencies that also expose the Army to risks, such as reliance on adversarial sources, counterfeit components, and disruptions. The Army's comprehensive SCRM approach emphasizes early risk identification, diversification of supply sources, and collaboration with allies and industry partners. SCRM promises to mitigate risks and enhance supply chain resilience by incorporating proactive measures at every stage in the life cycle.

For instance, data-informed logistics enables the SCRM framework and aids in the identification and mitigation of bottlenecks and vulnerabilities. During high-tempo operations, predictive tools alert sustainers to potential shortages of critical components, enabling timely corrective actions. The war in Ukraine has underscored the importance of having strong, reliable supply chains. The Army's approach to SCRM has already shaped key investment choices, like the $69 million allocated in fiscal year 2024 to boost domestic production of boron carbide. This effort helps guarantee a steady supply of advanced body armor, cutting down dependence on foreign sources and reducing the risk of supply disruptions caused by adversaries. Similarly, SCRM analysis informed expanded domestic production of 5000-series aluminum ingots, directly benefiting programs such as the M10 Booker and the Armored Multi-Purpose Vehicle.

SCRM spans the entire lifecycle of Army systems, from initial production through packaging, handling, storage, transportation, and operational use.

IUID

IUID complements the increasingly secure supply chain by ensuring precise tracking of individual assets throughout the life cycle. As a globally unique identifier, IUID provides visibility into the location, condition, and usage of equipment. While the tags themselves may not measure condition directly, the data systems with which they integrate can aggregate maintenance records and usage patterns to inform sustainment decisions. For example, in the USINDOPACOM region, IUID data revealed recurring issues with specific vehicle components. Identifying these patterns allowed sustainers to prioritize repairs and prevent failures, ensuring mission-critical equipment remained operational.

Beyond its role in predictive logistics, IUID enhances transparency to support the Army's accountability and readiness so that assets are accurately recorded as ready for prioritization and distribution. Additionally, IUID integrates with systems like the Global Force Management Data Initiative, improving resource allocation and decision making across the sustainment enterprise.

RSF

The RSF builds on the foundations laid by SCRM and IUID and represents a strategic shift in sustainment operations. Recognizing that traditional, centralized logistics models are vulnerable to disruption, the RSF decentralizes sustainment and brings maintenance, repair, and overhaul (MRO) capabilities closer to the warfighter. This framework leverages partnerships with allies, regional facilities, and industrial bases to create a distributed network of sustainment capabilities. These include region-specific solutions, such as watercraft sustainment, that reduce reliance on retrograde operations and minimize repair times.

RSF supports forward-deployed sustainment by positioning resources closer to operational theaters. The RSF leverages advanced data analytics and enhances readiness by ensuring resources are available when and where they are needed.

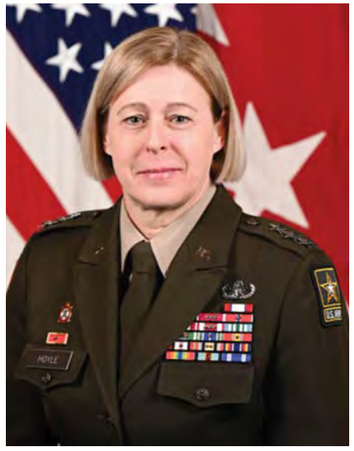
For example, pilot programs are validating the RSF's capabilities in contested environments such as USINDOPACOM. These pilots demonstrate how decentralized MRO capabilities, combined with predictive logistics, minimize downtime and enhance operational tempo. This integration also informs policy development and implementation, ensuring the success of the RSF.

Together, SCRM, IUID, and RSF strengthen a more cohesive strategy for addressing the sustainment challenges of modern conflict. These initiatives are part of a broader vision to create a data-enabled, resilient supply chain that anticipates and responds to the needs of the warfighter. By embedding advanced technology, data-driven insights, strong partnerships, and collaborative approaches into its sustainment strategy, the Army ensures its ability to maintain operational effectiveness, preserve strategic advantage, and meet the demands of contested logistics in modern warfare.

LTG Robert M. Collins currently serves as the Principal Military Deputy to the Assistant Secretary of the Army (Acquisition, Logistics and Technology) and as the Director of the Army Acquisition Corps. He commissioned as an Armor officer through the Shippensburg University ROTC program in 1992. He previously served as Army's Product Manager for Warfighter Information Network-Tactical; Army's Project Manager for Distributed Common Ground System-Army; assistant to the Program Executive Officer for Intelligence, Electronic Warfare and Sensors (PEO IEW&S) and later as the PEO IEW&S; Program Executive Officer for Command, Control, Communications-Tactical; and Deputy for Acquisition and Systems Management. He has a Master of Arts degree in computer resources and information management, a Master of Science degree in human relations, and a Master of Science degree in national resource strategy. He is a graduate of the Eisenhower School of Strategic Studies, Combined Arms Services Staff School, Command and General Staff College, the Armor Officer Basic Course, Signal Advanced Course, and Systems Automation Course.

THREE YEARS LATER

What Have We Learned from Ukraine?



■ *By LTG Heidi J. Hoyle*

Recently, I have done a lot of thinking and reflecting on the war in Ukraine. As the war moves into its fourth year, it is important for us to ask ourselves tough questions about how we can better prepare our Army for future conflicts, not just in Europe but globally. The Russia-Ukraine War serves as a powerful reminder that we must be diligently committed to strengthening the global industrial base. Likewise, we must ensure we are truly an expeditionary Army capable of projecting anywhere in the world at a time of our choosing. Finally, we must have the cooperation and mutual respect of our allies and partners, and a clear and synchronized strategy with them across the globe.

Maintaining international security and military readiness is a cooperative and global endeavor.

A Global, Expeditionary Industrial Base

America's industrial base enables us to leverage support for Ukraine. Over the last three years, we have seen a renewed investment in both the organic industrial base (OIB) and the larger defense industrial base not seen in decades. Certainly, the shoring up of our arsenals, depots, ammunition plants, and manufacturing capacity across the U.S. is critical to our success in any future conflict. However, I submit that we must think about the industrial base globally. Gone are the days where we can simply move every item back to a depot in the U.S. for repair, because we will be contested.

We must be able to leverage the robust capability of the aforementioned arsenals and depots on a global scale at the point of need. Over the last three years, we have seen inventive ways to accomplish this.

We have seen an explosion of tele-maintenance operations that bring the expert (often in the U.S.) to the mechanic (often only a few

The year 2040 is not a distant future but an imminent reality, and with it comes the need for innovative, forward thinking strategies to ensure our Soldiers are equipped, supplied, and supported in the most efficient and effective manner possible.

kilometers behind the front lines), which has allowed repair of forward equipment and rapid return to the battlefield. We have modernized this maintenance method, which has existed for decades, to leverage modern tools (e.g., chat rooms, video recording/streaming, real-time language translation, etc.).

More recently, we have watched Army Materiel Command (AMC) force project maintainers and subject matter experts from the OIB to deploy forward to unit motor pools across the globe to perform depot-level repairs on site, thus eliminating the need to evacuate the equipment and returning readiness to the unit. While we cannot do this for every piece of equipment, we must continue leveraging this exquisite capability to our advantage. We should also explore opportunities with our defense industry partners to forward project their capabilities to achieve the same benefit.

Force Projection While Globally Contested

In last year's contested logistics-focused issue, we posited that contested logistics is already impacting our Army, even though we are not fighting a large-scale combat operation (LSCO). One need only look at our military aid to Ukraine to see this phenomenon in action. Of the more than $65 billion in equipment that the U.S. has provided over the last three years, nearly all required swift transportation to Europe to get into the fight quickly. Through the hard work of Military Surface Deployment and Distribution Command and U.S. Transportation Command, we moved a staggering amount of equipment in support of Ukraine while also reassuring our allies throughout the world. Thankfully, no adversary has kinetically contested these moves.

However, have no doubt that our adversaries seek to contest us in non-kinetic ways across multiple domains to disrupt this vital flow of equipment, even while we are in a period of strategic competition. Now, take a moment and imagine an LSCO environment where we must force-project the Army from the continental U.S. We must expect that we will also be contested through multiple domains in these operations. The lessons learned while supporting Ukraine serve as a model we must study as we prepare ourselves for LSCO operations. Notably, we must recognize that the homeland will not be a sanctuary, and we will be contested at every step of the way.

We *must* build resilience into our force projection plans to overcome this fact.

Interoperability and Interchangeability with Allies and Partners

In the three years since Russia invaded Ukraine, nearly 60 countries have provided military aid to Ukraine. While nearly half of this equipment has come from NATO countries, where we spent decades during the Cold War moving toward interoperability, the Armed Forces of Ukraine have received a myriad of equipment with different maintenance and repair parts requirements. Additionally, as we renewed our NATO commitments, we relearned the importance of interoperability with our partners and allies. This is a lesson we must not take lightly. After all, the U.S. has partnered with allies in most conflicts over the last 250 years.

We achieve interoperability through exercises and training with our partners and allies. The scores of multinational exercises that we participate in globally are excellent opportunities to work with our allies to determine whether we can function together.

Importantly, we cannot forget about the sustainment warfighting function when we conduct these events. A nation that thinks of logistics strictly as a national responsibility misses the opportunity to leverage relationships globally that enhance its logistics capabilities. I challenge you to continue to conduct sustainment operations with our allies, and do not be afraid to try new ways of doing business. Through training, we learn how to become more interchangeable.

We must also think about the roads, rails, and ports that will allow us to operate in a theater of operation. I encourage you to look at these not only through our current lens, but to also view them in terms of what might be. One only need look at the European Deterrence Initiative to see how millions of dollars of investments in infrastructure have led to a more capable theater. The U.S. and our allies simply could not have sustained NATO and provided military aid to Ukraine if we had not begun investing in renewing Europe's infrastructure in 2014 shortly after Russia invaded Crimea.

Last year, the Under Secretary of Defense for Acquisition and Sustainment, the Honorable William A. LaPlante, signed the Regional Sustainment Framework (RSF), focused on increasing our maintenance, repair, and overhaul (MRO) interchangeability with our allies and partners. The RSF seeks to "establish a distributed MRO ecosystem that remains viable in peacetime and meets surge requirements during crises and conflicts." The Army's initial RSF endeavor supports Army watercraft maintenance operations and leverages the ship repair capabilities of our allies. RSF is essentially a more robust, national-level fix-it-forward concept.

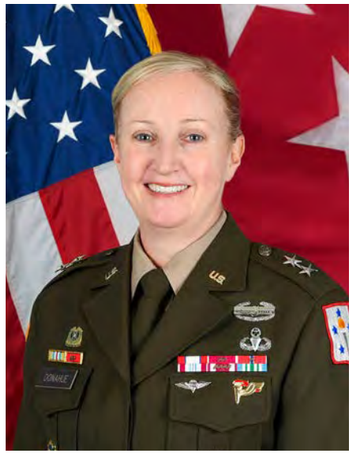
In fact, the Army recently completed the first ever on-condition cyclic maintenance (OCCM) operation on a logistics support vessel (LSV) in the western Pacific. Historically, the Army has conducted LSV OCCM at U.S. West Coast repair facilities. However, using the Republic of Korea's robust shipbuilding and repair capacity, AMC completed all the LSV's maintenance requirements ahead of schedule and on budget. Moreover, conducting maintenance in Korea saved nearly 40 sailing days to the U.S. West Coast, which kept the LSV available for operations. One might think of our RSF effort as another way to make the industrial base more expeditionary.

As we move through our 250th year, it is important that we reflect on our past as an Army. As we think back on our history, we must juxtapose it with our contemporary operating environment. Certainly, the technology and capabilities of our Army have changed and grown throughout our history. However, the Army's story is replete with examples of operating with our allies, leveraging the robust capability of our industrial base, and ensuring we can force-project anywhere in the world. Determining how we will operate in LSCO where the very character of war is changing will ensure that Soldiers have access to the critical sustainment resources necessary to achieve operational superiority in multi-domain operations, regardless of the theater or the austerity of the environment.

This We'll Defend!

LTG Heidi J. Hoyle currently serves as Headquarters, Department of the Army, Deputy Chief of Staff, G-4, and oversees policies and procedures used by Army logisticians. A graduate of the U.S. Military Academy, she has a Master of Science degree in systems engineering from the University of Virginia and a Master of Science degree in national resource strategy from the National Defense University. She is a graduate of the Chemical Officer Basic Course, Combined Logistics Officer Advanced Course, United States Army Command and General Staff College, and the Eisenhower School of National Security and Resource Strategy.

Sustainment Enterprise Analytics Modernization with Microsoft Power BI



■ *By MG Michelle K. Donahue, MAJ Apoorv Vohra, and Jay Rieger*

These opening lines of the Army Data Plan of 2022 are comprehensive. Army operations must adhere to this guidance within all operations. The rapid transformation of data into information, which reduces decision time and risk, is essential for sustainment in large-scale combat operations.

The U.S. Army Combined Arms Support Command (CASCOM) Sustainment Center of Excellence (SCoE), in its role as the force modernization proponent for sustainment, is leveraging the sunsetting of the Commander's Actionable Readiness Dashboard (C@RD) to develop a single enterprise-wide analytics tool connected to authoritative data sources. Today, over 100,000 Soldiers and civilians rely on C@RD for their data visualization needs. C@RD connects near-real-time to the Global Combat Support System-Army (GCSS-Army) and provides dashboards for equipment and operational readiness, and fleet and repair part management. However, as an early adopted technology, C@RD is significantly limited in data processing speed and volume. With a heavy focus on maintenance, C@RD cannot view all sustainment operations, including medical materiel, personnel, and training readiness.

The CASCOM commander directed the Enterprise System Directorate (ESD) to look beyond a C@RD replacement, for a solution providing next-generation capabilities and cost effectiveness using best-of-breed solutions. Capabilities of different tools were assessed, and complexities and learning curves were identified. ESD focused on finding the right software and architecture strategy to overcome the known shortcomings of C@RD while keeping pace with emerging technology, ensuring the software was easy to understand by even novice users.

From the beginning, Microsoft Power Business Intelligence (BI) emerged as the most viable solution. Its ability to ingest data from a variety of sources and easily create and present visualizations has made it a preferred tool throughout the Army. Included in the Microsoft A365 software package, Power BI available to all Army users with an A365 license. Seamless integration with other Microsoft products makes it intuitive and easy to use. Sustainment Soldiers and Civilians already count among the millions of Power BI users as they seek to manage data across their commands. Advanced data visualization and BI capabilities provide real-time insights, artificial intelligence (AI), and predictive capabilities through Microsoft Copilot.

Once the command settled on the software, the real work began. ESD worked with the U.S. Army Communications-Electronics Command Software Engineering Center's Army Shared Services Center (Army-SSC) at Aberdeen Proving Ground, Maryland, and Microsoft to develop an initial proof of concept, connecting Power BI in real-time to the GCSS-Army database. The proof of concept validated the selection of Power BI and demonstrated the capabilities and efforts required to reach full operational capability.

Understanding the Army Data Plan SO 2 guidance, "Decreased Time to Field Software and Decision Analytics to Outpace Any Adversary," MG Donahue gave ESD 12 months to complete the first two phases of the plan. Phase I began in October 2024 and will conclude in April 2025 with the conversion of all existing C@RD dashboards to Power BI. In the following six months, Phase II will convert approximately 100 GCSS-Army BI reports. Phase III will integrate more advanced capabilities and features. These include cloud data staging, which will enable integration of additional authoritative data sources and AI integration for data modeling, which in turn will enable more rapid analytics development. In March 2025, CASCOM pushed the first four dashboards out to the force: Equipment Readiness, Fleet Management, Class IX Repair Parts, and My Materiel Tracker.

As Phase I quickly gains speed, three key advantages have emerged. Each supports multiple strategic objectives of the Army Data Plan:

Increase the velocity of the decision cycle in all environments and echelons through faster calculations and visualizations (Army Data Plan SO 1). As a comparison, C@RD's equipment status report (ESR) for a brigade-sized unit rendered in 14 seconds. The new Power BI ESR renders in less than one second. Drilling down to level-two detail reports is nearly instantaneous, whereas C@RD struggles with this task, taking between 20 seconds to four minutes. Cloud data staging (Army Data Plan SO 7) will further enhance performance and accessibility during disconnected operations (Army

The digital Army will be fueled by data and data analytics. The right data, at the right time, at the right place will enable faster and better decisions at echelon — to outthink and outpace any adversary.

Data Plan SO 6). Preliminary tests also reveal that the new Power BI solution can handle 10 times more data than we presently have in GCSS-Army. This makes it an ideal future-ready solution that will easily accommodate the next-generation enterprise resource planning that will replace GCSS-Army.

Cost avoidance is achieved by leveraging existing Microsoft licensing (Army Data Plan SO 5), reducing development time and labor because Power BI is easier to develop and sustain. Further cost avoidance has been achieved by using the existing C@RD data models and formatted data. The Army spent nearly $60 million on C@RD dashboards and key process indicators, including filters and input controls. The Power BI-based approach surpasses current performance at a fraction of the cost.

Introduction of AI to assist in the creation of new data models (Army Data Plan SO 2) further reduces cost and development time. AI is key to offering refined user search options and help features but must be done in conjunction with the Artificial Intelligence Integration Center (AI2C) to remain nested with Army efforts and to ensure the Army's ownership over the solution.

A scalable solution through cloud data staging will provide a high-level understanding of operational and strategic combat power by integrating additional authoritative data, such as personnel availability, casualty reporting (Integrated Personnel and Pay System-Army), and training readiness (Digital Training Management System) (Army Data Plan SO 8).

CASCOM/SCoE leans in on fulfilling the need described in the first lines of the Army Data Plan: use data to put the right sustainment capability at the right place, at the right time. This is supported by a single enterprise-wide analytics system connected to authoritative data sources. The current development path maximizes the value of existing resources and maintains control over the Army's intellectual property associated with data and data rights. Integration of an intuitive software familiar to our community reduces the number of disparate efforts from units across the Army, saving resources and improving data accuracy. As sustainment enterprise analytics modernization continues, early integration of AI in dashboard development is a focus to facilitate predictive capabilities going forward. Involving AI2C becomes imperative to sustain and refine these AI models long term to suit the needs of the Army and tailor it for our use cases. It leverages AI2C to write predictive algorithms for the sustainment community.

CASCOM is not in this alone. ESD builds an ever-growing coalition across the Army: Department of the Army G-4, Army Enterprise Systems Integration Program Hub, Army-SSC, Enterprise Business System Convergence Multi-Functional Capabilities Team, and Army Materiel Command, in addition to AI2C. We appreciate their continued support.

The points of contact for this project are MAJ Apoorv Vohra (apoorv.vohra.mil@army.mil) and Mr. Jay Rieger (jay.rieger.civ@army.mil).

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MAJ Apoorv Vohra is the project lead and is an analytics subject matter expert. He assumed duties as the data scientist and technical architect at U.S. Army Combined Arms Support Command in January 2024. He entered the Army as a major under the direct commission program. He holds a Master of Business Administration with a concentration in finance and has an SAP Global Certification in finance & controlling. He has 16 years of experience as a data scientist and data engineer. He worked as a vice president in technology operations at Morgan Stanley, IBM, and Accenture.

Jay Rieger serves as the branch chief at U.S. Army Combined Arms Support Command Enterprise Systems Directorate, heading the sustainment enterprise analysis modernization effort. He is a retired colonel who served 33 years in the Army as an air defense artillery and quartermaster officer. He has been a senior program manager in Army training information system software development and in the Joint Capabilities Integration and Development System for operational contract support. He authored the Information Systems - Integrated Capabilities Document for Predictive Logistics while working as a capability developer.

DELTAS IN THE DATA

How to Close the Gaps

■ *By CPT James Palmer*

The Greek letter delta (Δ) refers to the differences between two data points or parameters. Warfighters throughout human history have wrestled with the pervasive presence of deltas between data reporting and data reality. Deltas in data have perennially hindered the ability of commanders and staffs to maintain accurate understanding to make well-informed decisions. They can pop up anytime in the collection, processing, storage, or transmission of data, and can ultimately ruin a commander's operations by degrading the unit's common operational picture and decision-making process.

The Army's personnel are its most vital asset in warfighting, underscoring the importance of its human resources (HR) and sustainment processes that track and support warfighters. Accurate data are the lifeblood of those processes. Deltas in data that arise from disconnected data storage, latency in data transmission, and other similar friction threaten those processes.

Data accuracy and consistency are operational necessities in contemporary warfare. These necessities became the mothers of several inventions that aimed to streamline data storage and transmission and create seamless system interoperability.

In 2023, the Army released the Integrated Personnel and Pay System-Army (IPPS-A) to all of its components: the Regular Army, Army Reserve, and National Guard. It gave HR professionals a system of unified HR-related processes. The

Deltas in data have perennially hindered the ability of commanders and staffs to maintain accurate understanding to make well-informed decisions.

new consolidated system allowed numerous legacy systems to be phased out. Data, once scattered across disconnected systems, became seamlessly connected, interdependent, and visible to HR professionals and command teams at every level on a single platform. HR professionals could support their command's information advantage efforts by providing high-quality data that accurately reflected their operational situation.

It is a frightening thought for a sustainment warfighter to realize that their data may be erroneous and misleading. It is not overly dramatic to suggest that winning and losing, and even life and death, hinges on the consistency and accuracy of data. Consider requests for information such as: Do we have replacements? What is Bravo Company's strength? How are they doing on ammunition? Where are our medical treatment areas? How many patients are there? Now, imagine these situation reports and the decisions they lead to being corrupted by misinformation created by deltas in data from data management systems.

The sustainment community must do everything it can to ensure that data are interoperable and exchanged between systems rapidly and efficiently. The Army's sustainment software enterprise is taking this user-centric approach to give sustainment warfighters the data they need in near-real-time. These software changes are not palleted ideas sitting idly at the division supply area. Modernization efforts are underway.

The Army is implementing the Unified Data Reference Architecture (UDRA) strategy for both existing and upcoming software. UDRA focuses on applying data-driven design principles rather than system-driven ones. Many software applications in the Army were developed in silos, prioritizing system performance over communication with other systems.

Commanders and decision makers deserve easily discoverable, system-agnostic data products with visible, accessible, understandable, linked, trusted, interoperable, and secure data. Compliance with UDRA is a priority for upcoming software programs.

In the logistics community, the reliable-but-complex user interface of the Global Combat Support System-Army will be replaced by the Enterprise Business System-Convergence (EBS-C). EBS-C will also replace the Army Enterprise Systems Integration Program.

For HR professionals, IPPS-A is charged with replacing 21 legacy software systems within the HR business mission area over the next several years. However, the Army mandates that business process reengineering (BPR) be performed before developing a software replacement. The BPR process goals include removing redundant data elements, consolidating disparate data sets into lucid ones, and optimizing processes that require swivel-chair data entry and exchange.

An example of ongoing BPR and partner coordination is the Army's G-3/5/7 partnering to build the Global Force Information Management Operational Environment (GFIM-OE). GFIM-OE will implement the Global Force Management Data Initiative, in which all units, positions, pieces of equipment, and relationships have a unique global force management identifier (GFMID).

The first phase of GFIM-OE development is Define the Future Force, which is scheduled to replace vital management systems such as the Force Management System and the Army Organization Server (AOS). Today, sustainment warfighters use these systems to check their modified table of organization and equipment and table of distribution and allowance documents. Sustainment warfighters who help with unit status reports are intimately familiar with these documents and systems.

Just as a manual tracker differs from a Joint Battle Command-Platform chat at the tactical level, the strategic level also encounters challenges with inconsistent data sources that are meant to provide the same information. Currently, IPPS-A obtains its force structure data from AOS, while other systems in the HR business mission area use the personnel management and authorization document (PMAD) produced by the Personnel Authorizations Module (PAM).

Notably, U.S. Army Human Resources Command uses the PMAD to distribute personnel across the force, which introduces the risk of deltas between AOS and PMAD data. Discrepancies must be alleviated through extensive manual work completed by HR professionals. To create a common operational picture across all Army components, Army staff is working to ensure that all of the Army's systems consume and display the same force structure data.

Some of the solutions and capabilities include:

- Temporary billet (templet) management geared toward reducing the quantity and type of templates across all three components.
- GFMID retention rules to reduce the probability that service members become orphans in IPPS-A — a phenomenon where a service member's position number and record become inactive due to the loss of the inbound position identifier (the GFMID).
- Leveraging GFIM-OE-produced data elements to drive HR data elements, such as a unit status code driving a military component category. Another example of this is the location of positions adopting the location of the unit to which they are attached.
- Optimizing data exchange format, frequency, and method to ensure that data from the two systems are shared rapidly and efficiently. Some systems depend on IPPS-A, a G-1-operated system, to relay force structure data, which are authoritatively sourced from a G-3/5/7 system. Ensuring that IPPS-A receives and accurately represents the data generated by GFIM-OE reduces complexity and provides a unified view.
- The future operations and functionality of the PAM are scheduled to sunset, but the system provides G-1 with critical functionality to develop a seven-year manning program by skill and grade.

Since standing up in December 2024, working groups focused on these solutions have achieved significant progress and synergy toward fixing strategic-level inefficiencies that have trickle-down impacts on tactical-level sustainment warfighters. The problem of deltas in data will not be solved overnight. However, strategic-level employees and contractors are vigilantly working to ensure command teams, decision makers, and sustainment warfighters have high-quality and highly accessible data to enable data-driven decision making from the office to the tactical edge.

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TRANSFORMING ARMY SUSTAINMENT
THROUGH ADVANCED MANUFACTURING

By MG Gavin Lawrence and MG Michael Lalor

The sound of large, World War II-era machinery is being replaced by the soft hum of 3D printers as the Army embraces innovations in advanced manufacturing across the force.

Advanced manufacturing uses new technologies to create or improve products or processes. It includes use of additive manufacturing, also known as 3D printing, subtractive manufacturing, robotics, artificial intelligence, and composite materials.

Advanced manufacturing is not the future of Army sustainment — it is here now, and it is already giving us a tactical advantage on the battlefield. From allied trade technicians that use their authorized metal working and machining shop set to produce parts in unit motor pools, to the second largest 3D printer in the world located at the Joint Manufacturing and Technology Center (JMTC) at Rock Island Arsenal, Illinois, advanced manufacturing improves readiness and provides game-changing technology for our expeditionary force.

The Army is committed to integrating advanced manufacturing into our sustainment regimen and is empowering the Army sustainment enterprise (ASE) to create the vision for how we will enable Soldiers to innovate while also streamlining supply operations.

To be clear, advanced manufacturing cannot entirely replace the Army's supply system, nor should it. But if almost three years of supporting our partners in Ukraine has taught the ASE anything, it is that just-in-time logistics will not work in a large-scale combat environment. If industry cannot keep up with demand, the Army needs a backup plan, equipment, and a highly trained workforce to keep our weapon systems fighting until the supply chain catches up.

Advanced manufacturing efforts of the Army's organic industrial base (OIB) and at the unit level already show us how they can provide relief for addressing some of the obsolescence issues we see in our older platforms.

At the OIB, we are on the precipice of 3D printing titanium parts as big as a vehicle hull, allowing us to bring tactical vehicles off the deadline report and getting them back to the fight more rapidly than ever. Closer to the tactical edge, our Soldiers are experimenting with 3D printing small parts to assist combat missions and training. The data they collect will help us make more informed decisions about supply, reduce costs of repair parts, and provide quicker delivery to the warfighter.

We are learning how we can increase collaboration and synergy when using advanced manufacturing techniques through implementation of standardization and governance. The Army meets with every stakeholder to understand how we can lead the charge of implementation from the OIB to the motor pool. We call on our life-cycle management commands (LCMCs), our Service partners such as the Defense Logistics Agency (DLA), our original equipment manufacturers, and our tactical units to help us build a digital repository of parts that can be manufactured anywhere. We recently held an advanced manufacturing war game to bring these stakeholders together to share challenges and best practices on how to leverage this technology.

Advanced manufacturing is not the future of Army sustainment — it is here now, and it is already giving us a tactical advantage on the battlefield.

Army's Advanced Manufacturing Strategy Takes Shape

As technology and warfare continue to evolve, the ASE must also adapt. Advanced manufacturing will be a key piece of our plan to transform in contact for sustainment.

Increased global competition, a spike in operational tempo, and the launch of the 15-year, $18 billion OIB modernization plan have dramatically reshaped the defense landscape. There is more urgency than ever behind integrating the full spectrum of advanced manufacturing capabilities across the force.

Senior Army leaders and subject matter experts from around the world gathered at JMTC to share ideas, discuss obstacles and successes, and see modern machinery up close at the first-ever advanced manufacturing war game.

We used the war game to kick off a critically important task: the creation of an advanced manufacturing strategy for the Army.

In recent years, the publication of various national, DoD, and Army strategic documents have illustrated a broad understanding of the importance of advanced manufacturing. The plan being developed will consider capabilities and responsibilities across echelons, data sharing and management, resourcing, and other vital areas. The end goal is a strategy that is agile enough to adapt to advances in technology and enables our Soldiers to use new methods to keep their weapon systems fighting until the supply chain catches up.

At the beginning of the decade, the COVID-19 pandemic magnified fragilities in the ground systems supply chain. Diminishing demand led some defense suppliers to cease operations or move to different sectors. Delays — and frustration — mounted.

The supply chain system was emerging from that turbulence when Russia invaded Ukraine in February 2022. The multibillion-dollar U.S. military assistance effort to Ukraine sparked additional pressure and strain on our motor pools.

Though it has been incrementally improving, the need for the Army to be able to augment our supply chain has come into sharp focus.

Advanced manufacturing went from a dream to a reality in the last fiscal year through the Battle-Damaged Repair and Fabrication (BDRF) initiative. Launched in early 2024, the program encompasses engineering, manufacturing, and testing of 3D-printed temporary replacement parts. The parts can be created in just days or hours and are often shipped to customers within a week.

Units have used BDRF components to bring everything from tanks to light wheeled vehicles back to being mission capable. Four BDRF parts outperformed their original equipment manufacturer counterparts in material strength tests. As a result, the DLA looks to the Army's LCMCs, rather than the commercial sector, to potentially source those parts in the future.

BDRF manufacturing occurs at JMTC's Advanced Manufacturing Center of Excellence. Established in 2018, the center serves as a hub for innovation and collaboration across the Army. Its collection of high-tech tools includes a bank of 3D printers that can make parts from polymers, metals, and other materials.

JMTC's traditional foundry and advanced manufacturing operations intersected in a remarkable way in 2024. Workers poured a 7,125-pound pintle system for a lock and dam for the Army Corps of Engineers, the largest part produced at the arsenal in at least two decades. The mold for the casting was made of 16 sand-printed pieces. It was a historic achievement that showcased advanced manufacturing's power and potential.

The work being done at JMTC is only a taste of the Army's capability in this space. We empower LCMCs such as the U.S. Army Tank-automotive and Armaments Command, the U.S. Army Communications-Electronics Command, and the U.S. Army Aviation and Missile Command to serve as a catalyst for change and to demonstrate our ability to produce and deliver readiness with greater volume, speed, and depth.

Larry Ralph Lewis Clemons, a machinist apprentice at the Rock Island Arsenal-Joint Manufacturing and Technology Center, stands over a 3D printer at the Advanced and Additive Manufacturing Center of Excellence explaining its capabilities and the product it's making, July 14, 2023. (Photo by Kendall Swank)

A newly produced Battle Damaged Repair & Fabrication part produced at the Advanced Manufacturing Center of Excellence inside the Rock Island Arsenal-Joint Manufacturing and Technology Center, Feb. 27, 2024. (Photo by Kendall Swank)

Looking Ahead

The character of warfare evolves rapidly. Conflicts occur over larger, more distributed areas. Unmanned aerial systems and cyber weaponry pose new threats.

With nothing less than national security at stake, we must push toward the seamless, secure flow of data and materiel capabilities across the enterprise, improving readiness from the strategic level to the tactical edge.

Advanced manufacturing will be an invaluable tool in multi-domain battle maintenance. It will greatly speed up design-to-production timelines, enable on-demand manufacturing at the point of need, and help the Army achieve its modernization goals. In short, advanced manufacturing is almost certain to revolutionize how the Army preserves readiness and ensures that our maintainers can operate in any environment.

MG Gavin Lawrence currently serves as the Deputy Chief of Staff for Logistics and Operations, G-3, U.S. Army Materiel Command. He oversees the requirements process for the command, including programming, operations, and analysis. He is a graduate of the U.S. Military Academy where he was commissioned as a second lieutenant in the Army Quartermaster Corps. He has a Master of Arts degree in national security and strategic studies from the U.S. Naval War College, Rhode Island, and a Master of Arts degree in strategic studies from the U.S. Army War College, Pennsylvania, where he successfully completed the Advanced Strategic Arts Program. He has also completed the Massachusetts Institute of Technology Seminar XXI program and University of North Carolina's Institute for Defense & Business LOGTECH Executive program.

MG Michael Lalor serves as the Commanding General of U.S. Army Tank-automotive and Armaments Command. He previously served as the Chief of Ordnance and Commandant of the U.S. Army Ordnance School. He also led the Army Medical Logistics Command, and he was the Executive Director for the Enterprise Business Systems, Multi-Functional Capabilities Team. He has master's degrees from Louisiana State University, the School of Advanced Military Studies Command and General Staff College, and the U.S. Army War College.

Transforming In Threes

The Three-Cluster Light Brigade Combat Team Sustainment Concept

■ *By CPT Kevin Adler*

Execution of a redundant three-cluster concept in lieu of a massed brigade support area (BSA) significantly increases survivability, flexibility, and responsiveness. A comprehensive training plan and a modernized signal infrastructure are required to successfully implement this concept, but this is possible for all future brigade support battalions (BSBs) as they transform.

On April 2, 2024, 225th BSB transformed in contact to a light support battalion (LSB). This new unit was tasked to support the 2nd Light Brigade Combat Team (LBCT) (Prototype), a new construct that prioritizes mobility and lethality. The LSB's new structure grew from four companies and 400 personnel to seven companies and over 800 personnel, all while maintaining its original allocation of staff.

This rapid and forceful transformation and the division's culture of experimentation opened opportunities to rethink the structure of BSAs. How does the LSB transform to better face the pacing threat in the U.S. Indo-Pacific Command (USINDOPACOM) area of responsibility? As it stood, the BSA was simply too large and centralized. It was a large target, not easily tailored for non-contiguous operations, and it did not fall in line with the essence of being light.

The answer is a redundant three-cluster support area coined as light logistics clusters distributed geographically in a light support area. After 28 days of training on cluster operations, the battalion was able to validate the cluster concept during the brigade's capstone training, Joint Pacific Multinational Readiness Center (JPMRC) 25-01.

The Benefits

Survivability — The pacing threat in theater can disable, if not destroy, a unit arrayed in a traditional BSA configuration. With its large, dense footprint, a BSA can be easily targeted. Splitting the BSA into three smaller, geographically distributed clusters reduces the enemy's payoff and the friendly signature; it also increases the suitable land available to establish positions in favorable terrain features. Planners must no longer identify large swaths of land suitable for a BSA — something quite rare in the constricted jungle or island fight.

Furthermore, sustainment culmination in USINDOPACOM is a real concern. The tyranny of distance between sustainment nodes can be thousands of miles. Enemy anti-access/area denial capabilities may further degrade abilities to rapidly reinforce sustainment assets. This new structure must be survivable. Sustainment nodes in the future fight can easily be part of the enemy's decision matrix to unmask our enemy fires if the ensuing payoff decimates the brigade's sustainment capacity. It is too risky to array friendly sustainment assets in a BSA. Geographic distribution and signature reduction are a must to survive and support the light fighters.

Flexibility — The 225th LSB task-organized each cluster for survivability and redundancy. Each cluster must be able to individually command and control (C2) both the battalion fight and brigade sustainment. If one cluster is disabled or destroyed, sustainment will still continue.

The first cluster is designated as the slow cluster and is arrayed farther to the rear. This cluster has the majority of the supply support activity and maintenance assets. The battalion executive officer (XO) is the cluster officer in charge (OIC), responsible for overall C2, and the B Company (Co.) commander is the cluster commander, responsible for all cluster internal actions and security.

The second and third clusters have the Role 2 split, most of the distribution assets, and enablers as required. The support operations (SPO) OIC and S-3 OIC are the cluster OICs, with general support company (GSC) and headquarters and headquarters company (HHC) leadership as cluster commanders respectively. The battalion commander is free to occupy any cluster.

The cluster concept is inherently flexible because each cluster can displace, conduct C2, sustain higher echelons, and task-organize independently.

Operationalizing this concept results in the following sequence: The LSB first deploys and occupies the initial staging base in a geographic configuration like a BSA occupation. The area is occupied by a cluster and

The 225th Light Support Battalion cluster conducts displacement operations during Nakoa Fleek 2024, the brigade-level training before Joint Pacific Multinational Readiness Center 25, at Kahuku Training Area, Oahu, Hawaii, June 6, 2024. (Photo by CPT Kevin Adler)

is divided into thirds on a clock face. At this point there is one battalion C2 element, and security is organized like a traditional BSA. Upon receipt of the first warning order and the initiation of the military decision-making process, the SPO team is tasked with refining cluster composition while the battalion staff identifies suitable jump locations for each of the clusters. Key assets are moved between clusters as the composition is finalized. At end state, there are three refined clusters task organized to suit the brigade's mission.

As the brigade expands, and lines of communication are extended, each cluster jumps from the initial staging base and establishes itself as required. During this process there is at least one cluster in full operational condition and capable of supporting any sustainment contingencies.

As the fight progresses, the LSB can jump a single cluster each day as survivability moves or in response to changing battlefield conditions. Consequently, each cluster jumps every three days. This enhances survivability and balances support requirements. This concept also organically develops non-contiguous island capabilities by training three nodes that can operate in different locations.

Responsiveness — A cluster is inherently more responsive than a BSA. Due to the smaller footprint, setup and teardown are much quicker and simpler. Displacement times are significantly reduced as well. It took 90 minutes to fully displace a trained cluster 2 kilometers in a survivability move compared to hours with a traditional BSA. Having redundant clusters arrayed on the battlefield enables the battalion commander to comfortably assume more risk and deploy clusters closer to the forward line of own troops, a concept like that of a forward logistics element. Consequently, ground lines of communication to the supported unit are further reduced.

Training

The battalion had six months to develop, test, and become trained on this concept before validating it at JPMRC 25-01. The battalion started off with a 14-day battalion field training exercise (FTX) crawl, followed by a 14-day walk for the brigade FTX. Tactical communication was the largest friction point because each cluster required a comprehensive amount of tactical communication equipment to function as three separate command posts. This friction point was alleviated by the new integrated tactical network equipment, multiple mobile broadband kits, Wi-Fi pucks, and the availability of a Starshield at each cluster for high-bandwidth communication.

The brigade's mantra of being as light as possible also paid dividends to the sustainment enterprise. Tents other than individual tents and the Role 2 were barred. Sleeping in vehicles and cots was discouraged. Soldiers deployed to the field with a rucksack and an assault pack and were required to keep their gear always packed and ready to jump unless on a rest cycle. These policies effectively enabled the rapid displacement of formations while also forcing a lean and sensible approach to fieldcraft.

Staffs and commanders had a significant number of new concepts to learn and execute. Each cluster had to be trained as a separate command post. This consequently had the secondary effect of developing three times the teams capable of C2 than would have otherwise existed in a BSA construct.

While each cluster was a battalion C2 node, a company commander was assigned in each cluster to be the cluster commander. Typically, it was the HHC, B Co., and GSC commanders who were the cluster commanders. These cluster commanders were responsible for everything that occurred inside the cluster, such as security, accountability, and the base defense operations center. All other company elements reported to the cluster commander via a company representative. This freed up the A Co. command team to focus on distribution operations, and the C Co. command team to focus on medical operations. The GSC commander had all their distribution elements shift operational control to the maneuver task forces and therefore had the bandwidth to be a cluster commander.

The most challenging aspect of applying this new concept is training the formation in a wholly new way of organizing tactical formations in the field. First, the biggest question was how to identify these three clusters. Over many iterations Red, White, and Blue was identified as the most effective way to name each cluster. On the intra-battalion net, each cluster hailed as each color, including the subordinate commands. For example, the BN C2 node in the Red Cluster was Red Main, while the C2 node for our Alpha Company, Aztecs, in the red cluster was Aztec Red. Whichever cluster C2 node in the Dragon Battalion had the fight defaulted to Dragon Main, when reporting to the higher echelon and to subordinate clusters. Only the cluster with the fight reported to the brigade headquarters.

All three clusters fed a common operational picture (COP) synchronized via Microsoft Teams. Analog trackers that mirrored the digital COP were maintained and updated concurrently at each battalion C2 node. Each staff section was spread as evenly as possible across the clusters. Typically, Red Cluster defaulted to the main because the battalion S-3 assigned to it and the battalion commander typically co-located (although it was designed so that the battalion commander was free to occupy any cluster). White Cluster had the SPO OIC and the majority of the SPO team. The Blue Cluster had the battalion XO and a mix of primary and alternate staff.

Conclusion

A three-cluster configuration simply makes sense in the USINDOPACOM LBCT construct. The benefits of survivability, flexibility, and responsiveness are immense. These benefits can only be reaped with extensive training along with modernization of communication platforms. A one-size-fits-all concept across the sustainment enterprise simply will not suffice as new chapters of the sustainment handbook are written.

CPT Kevin Adler is the operations officer (S-3) for 225th Light Support Battalion, 2nd Light Brigade Combat Team (Prototype), 25th Infantry Division. He is a graduate of the Jungle Operations Course, Air Assault Course, and attended the Cavalry Leaders Course. He holds a Bachelor of Science degree in environmental policy analysis and planning from University of California-Davis.

Featured Photo
A load-handling system of the D Field Support Team, 2nd Squadron, 14th Cavalry Regiment, moves into the Pohakukoa Training Area to establish a field trans command post while supporting the opposing force battalion at Joint Pacific Multinational Readiness Center 24, Nov. 3, 2023. (Photo by CPT Kevin Adler)

The >GENERAL< SUPPORT COMPANY

Rewriting the Playbook on Sustainment for Infantry Battalions

By CPT Kevin Davies

Remove multiple forward support companies (FSCs) from their respective infantry battalions, consolidate them under a single company, and task that company with sustaining and managing support for the multiple infantry battalions within a brigade. This is the mission of the general support company (GSC). Consisting of combat logistics platoons (CLPs), combat repair teams (CRTs), and field feeding sections, the GSC is a leaner, more flexible solution designed to meet the logistical needs of infantry units with greater agility and access, providing more forward sustainment than has been provided by legacy sustainment platforms. GSC packages are tailored to specific mission requirements and attached to battalions when needed, providing responsive and adaptable sustainment without the footprint of traditional FSCs.

The transformation to GSCs is primarily driven by the Army's renewed focus on large-scale combat operations (LSCO), where divisions are expected to be the primary unit of action. Headquarters, Department of the Army, Execute Order 138-24 pushed the transformation in contact (TiC) initiative, with the primary line of effort being to drive organizational change. The U.S. Army Combined Arms Support Command's efforts were nested within TiC and drove the designing of prototype structural changes to accelerate organizational, material, and doctrinal innovation. These new brigade combat team designs needed to be lighter and more mobile, and to create a smaller sustainment footprint.

One of the infantry brigade combat teams (IBCTs) selected for TiC was the 2nd IBCT "Warrior Brigade," 25th Infantry Division (ID). In response to these requirements, the Warrior Brigade has adopted this shift, converting into a prototype light brigade combat team (LBCT). Changes include the reorganization of a cavalry battalion into an infantry battalion, the integration of new equipment (such as infantry squad vehicles and drones), and the establishment of new units such as cross-domain effects companies. Most notably, the shift also entails the conversion of the traditional brigade support battalion into a light support battalion (LSB), which subsumes FSCs into a GSC structure, with CLPs and CRTs providing tailored logistical support.

The transition to the GSC model marks a departure from the FSC structure, which became standard during counterinsurgency (COIN) operations. During the war on terror, the modularity of FSCs proved ideal, allowing battalions to maintain organic sustainment assets tailored to frequent deployments by brigades and smaller units. In LSCO, however, where divisions are the focal point of operations, this localized sustainment structure is less effective. GSCs provide flexibility at the division level to allocate resources as necessary. As the Army shifts its focus from COIN to LSCO, GSCs are emerging as the modern solution to sustain the future divisional warfighting units of action.

The underlying concept of the GSC model is to consolidate sustainment assets previously dispersed among FSCs, enabling the LSB to provide flexible, tailored support. Consolidating personnel and equipment allows the LSB to efficiently scale its resources in response to evolving mission demands, deploying only what is necessary while weighting the brigade commander's priorities. This approach enables the LSB commander to direct sustainment resources precisely where they are needed through the support operations (SPO) officer.

While FSCs provided battalions with immediate, on-hand sustainment, this convenience sometimes led to inefficiencies. Some units grew accustomed to instant access to resources, and sustainment planning began to shift from battalion staffs onto FSC commanders. As FSC commanders and their units shouldered these responsibilities, other leaders, such as executive officers and S-4s, often became less involved in sustainment planning. The GSC structure rebalances these roles, prompting S-4s and SPO officers to collaboratively manage logistics planning and execution. With sustainment assets centralized, the LSB can now dynamically allocate resources, optimizing the placement and use of logistics elements to avoid the delays and obstacles that sometimes accompany distributed FSC assets. This consolidation of sustainment capabilities enhances the LSB commander's ability to prioritize and direct resources precisely, particularly during high-demand periods or critical points of need.

The flexibility of the GSC structure was demonstrated during the last Joint Pacific Multinational Readiness Center (JPMRC) exercise. The GSC effectively sustained three infantry battalions, accomplishing all that three traditional FSCs would accomplish, but with fewer Soldiers, less equipment, and reduced logistical resources. This leaner streamlined approach allowed for a more forward-focused sustainment effort. The GSC's versatility was further evident when it supported not only its assigned infantry battalions but also various enablers, including a fourth element that provided comprehensive sustainment (covering all classes of supply and field feeding) to the Japanese Defense Force, Marine Corps, and security force assistance brigade attachments.

Additionally, the GSC demonstrated its adaptability by cross-leveling equipment to create a lightweight package suitable for airlift to Pohakuloa Training Area in support of the 1st Battalion, 27th Infantry Regiment "Wolfhounds."

Such achievements would not have been feasible if sustainment assets were fragmented among individual battalions rather than unified under one company. Under the traditional structure, the light assets that were necessary to support Task Force (TF) Wolfhound would have belonged to each FSC and would have required sacrifice and cooperation across these battalions to support another's mission over their own. Because of the terrain and airlift requirements, the legacy sustainment platforms (load-handling systems, tank rack modules, water tank racks, etc.) could not have penetrated the jungle terrain and adequately supported the Wolfhounds' maneuver. To support this, numerous light medium tactical vehicles (LMTVs), Humvees, water pod systems, and water buffalos had to be collected and traded among the three CLPs.

This flexibility allowed for all battalions to sustain their maneuver. In the GSC structure, analysis was conducted by the SPO officer, missions were prioritized, and equipment was allocated from one company rather than across three or more companies from three or more battalions.

During the JPMRC exercise, the GSC conducted resupply operations via aerial delivery, sling loads, caches, logistics release points, supply points, throughput, and unit distribution, ensuring uninterrupted momentum for all supported TFs. Feedback from the infantry battalion commanders affirmed that sustainment met mission demands without disruption and was a non-issue. This is the gold standard for any sustainment organization during such an exercise.

"Based on the mission sets and threats in COIN, most maneuver battalions were able to rely largely on their FSCs to conduct all types of sustainment operations without much regard to protection and survivability. And battalion commanders grew accustomed to owning most, if not all, the logistics equipment and personnel they would need to conduct these operations internally without much outside assistance. Therefore, these FSC footprints grew larger and larger. In the current LSCO fight, as proven during our JPMRC exercise, protection is paramount. The CLP and CRT provide a much smaller package that is more streamlined, mobile, and responsive for the LSCO fight. I believe this is the best way to protect your sustainment assets and keep them in the fight."

The underlying concept of the GSC model is to consolidate sustainment assets previously dispersed among FSCs, enabling the LSB to provide flexible, tailored support.

– LTC Adam F. McCombs, commander, TF Rattlesnake, 2nd LBCT (Prototype), 25th ID

My company, Nightmare Company, as our team is known, was tasked with a daunting problem set: standing up the first GSC and making it capable of supporting three infantry battalions. This mission, though incredibly ambitious, was achieved through extensive collaboration and innovation at every level of the organization.

The company's structure included a headquarters section, three CLPs equipped with distribution assets, three field feeding sections, and CRTs that were consolidated under the Bravo maintenance company and attached based on the infantry battalion's requirements. To foster integration, CLP platoon leaders attended infantry battalion planning meetings and coordinated closely with each battalion's S-4 on sustainment requirements.

As the GSC commander, I worked closely with the SPO officer to allocate assets and resources effectively, balancing them across time and space. I prioritized planning, personnel, readiness, supply, and training, taking on most meetings, administrative requirements, and coordination efforts, freeing up the CLP platoon leaders to focus solely on informing sustainment requirements and execution.

Consolidating all field feeding resources improved personnel management, equipment maintenance, speed, and flexibility. Supporting an LBCT, Nightmare Company shifted focus from the expansive containerized kitchens to more mobile assault kitchens. Designed to serve up to 250 Soldiers per meal, the assault kitchens have consistently supported over 450 personnel per meal across four battalions, enablers, and internal base clusters within the LSB.

We achieved this by leveraging distribution assets within the CLPs, along with additional field feeding equipment and training operators to deploy efficiently — even at night. The addition of field feeding assets also enabled our CLPs to strategically allocate lighter equipment (Humvees, LMTVs, water pod systems, water buffalos, etc.) for forward operations, while heavier legacy sustainment equipment (load-handling systems, water tank racks, forklifts, shop vans, wreckers, etc.) was used in rear positions. This flexible allocation allowed the lighter packages to penetrate more deeply into Hawaii's jungle terrain, while the heavier assets absorbed any supply chain disruptions from the rear.

Maintenance efforts have also been streamlined through this consolidation. CRTs, which now fall under the Bravo maintenance company within the LSB, become operational control to infantry battalions during war or training events as needed under the CLPs. This arrangement consolidates maintenance resources in the rear while allowing us to surge needed equipment forward, minimizing downtime and the operational footprint. Excess CRT equipment and personnel, when not forecasted to be a mission requirement, are available to assist with internal and pass-back maintenance within the LSB and to bolster defense capabilities.

The success of this model is due to strong collaboration between infantry battalion S-4s, company executive officers, the GSC commander, and CLP platoon leaders, with SPO staff overseeing the big picture. SPO planning efforts have increased and now include recurring logistics synchronization meetings to ensure all units are aligned and operating efficiently. While we have seen considerable gains, there remains room to grow. We are continually refining personnel and equipment configurations to further enhance Nightmare Company's capabilities and, by extension, those of future GSCs.

In today's rapidly evolving operational landscape, the GSC model offers a glimpse into the future of Army sustainment. It balances efficiency with flexibility, empowering leaders to direct logistical resources with precision and adaptability while keeping the force undetectable, agile, and responsive on the battlefield. The GSC represents a significant shift in sustainment that aligns with the Army's vision for LSCO, enabling efficient, scalable, and mission-focused support across dynamic operational environments.

CPT Kevin Davies currently serves as the first commander of the Army's first general support company, 225th Light Support Battalion (LSB), 2nd Light Brigade Combat Team, 25th Infantry Division (ID). His previous assignments include support operations transportation officer in charge, Headquarters and Headquarters Company, 225th LSB; S-3 operations officer for the 87th Division Sustainment Support Battalion, 3rd Sustainment Brigade, 3rd ID; and executive officer for the 135th Quartermaster Company, 87th Division Sustainment Support Battalion. Before joining the Army, he was a Marine infantryman in the 1st Marine Division. He has deployed throughout U.S. Central Command and U.S. Indo-Pacific Command. He holds a Bachelor of Science degree in supply chain management from Arizona State University.

Featured Photo
A heavy expanded mobility tactical truck (HEMTT) tanker assigned to Alpha Company, 725th Brigade Support Battalion, 2nd Infantry Brigade Combat Team (Airborne), 11th Airborne Division, conducted a wet wing fuel operation with a C-17 Globemaster III from the Air Force's 517th Airlift Squadron at Fairbanks International Airport, Alaska, as part of Joint Pacific Multinational Readiness Center 25-02 on Jan. 22, 2025. (Photo by SFC Ian Morales)

TRANSFORMATION IN CONTACT

The Impact on Human Resource Operations

By 1LT (P) Nathania Nuño

This article describes the impacts and challenges of the transformation in contact (TiC) initiative for the 225th Brigade Support Battalion to the 225th Light Support Battalion (LSB). Outlined in Headquarters, Department of the Army (HQDA) Execute Order (EXORD) 138-34, the reconfiguration of our brigade's support entities and its prototype status created systemic constraints in human resource (HR) operations. Without solidified and official modified tables of organization and equipment (MTOEs), our systems of accountability and ability to provide optimal customer service were negatively affected. Though we found temporary solutions, we continue to face the crippling effects of our inability to provide accurate services and to perform in our warfighting function.

MTOE

Since the transformation was labeled as a prototype, the S-1 team was not provided with an official MTOE that outlined the new positions and companies that we received. This very quickly became a challenging task to accomplish, because we were expected to build our own MTOE from scratch and to maintain accountability of Soldiers in positions that did not yet exist.

With the guidance outlined in HDQA EXORD 138-34, we were able to build an MTOE that temporarily assisted with the organization of our Soldiers and those we gained. Our battalion composition went from an authorized number of 340 personnel (without forward support companies) to 755 Soldiers. With this new brigade concept, we organically possessed all forward support companies, the signal company, and the headquarters and headquarters company brigade (BDE) with its three new platoons (the chemical, biological, radiological, nuclear reconnaissance platoon; the unmanned aircraft system platoon; and the electronic warfare platoon). As a part of the 225th LSB, we are responsible for the accountability and administrative needs of almost 800 Soldiers, making us the largest battalion in our brigade.

Essentially, we were expected to perform our operations at the same bandwidth despite our battalion nearly tripling in size and our staff section remaining unchanged. Although the team managed HR tasks and services without the extra assistance, the prototype status of our unit and brigade later became a larger issue with our system of record, the Integrated Personnel and Pay System-Army (IPPS-A).

The initial concept has evolved since its transformation on April 2, 2024. In addition to receiving our forward support companies back to our organic personnel, we had several new positions added and received other support companies to our organic structure. As we continue testing the light support concept, we expect several more changes to occur, including our battalion transitioning under an entirely new brigade.

IPPS-A

The most difficult challenge that we faced and are still facing is the accuracy of our accountability and HR processing system, IPPS-A. When we initially received our new Soldiers, we had no available positions to slot anyone under their new companies. Bravo Company more than doubled in size. We established the Army's first general support company (GSC). Incoming Bravo Company and GSC Soldiers were spread across three unit identification codes (UICs) with no accurate way of knowing which Soldier belonged to which company. In addition, the signal company and brigade headquarters had to be realigned under our battalion hierarchy in IPPS-A. Though we maintained analog methods of accountability and administrative processes, this very quickly became problematic. Soldiers were unable to route any administrative actions to us, and company leadership was unable to view any of their new Soldiers' information. No other Army system, such as the Digital Training Management System, was able to accurately reflect our battalion's data because IPPS-A, our main system of record, was inaccurate.

Our initial push to move personnel into the correct UIC was not successful. We did not have enough positions available under each respective company. We received pushback from higher echelons when it came to building new positions into the system. The argument was that there was no updated MTOE in place that outlined the transformation. Thus, it was expected that we maintain the same systems and processes while we physically were in a different formation. This was a major setback. We were forced to maintain all analog products with no way of using our system of record for accountability or administrative actions.

Despite the pushback, we were able to use the few empty standard excess positions we had available and move them to the UICs that needed the additional slots. This meant that all new personnel fell under standard excess rather than their actual duty title and position. In the future, this may become an issue with each of these Soldier's talent profile and promotion boards. However, at the time, the goal was to obtain an accurate system of accountability in which every Soldier physically present in the formation was under their correct company. Despite our efforts to use all the available templates, even with the existing positions used, we were still short billets in each company.

Eventually, the U.S. Army Pacific Command G-1 team agreed to create new standard excess positions for our entire brigade to assist with the TiC. The brigade received 469 additional templates, 260 of those belonging to 225th LSB and 74 belonging to the brigade headquarters.

Our battalion received more than half of the new brigade positions in IPPS-A. After repeatedly trying to move service members in batches under their respective companies, IPPS-A did not support this transfer method. Thus, the team had to individually move all 334 personnel into each position. The team was able to move all personnel within a span of five days. However, despite our efforts to create and maintain an accurate system of processing, we still face issues with IPPS-A.

Because of our prototype status, the Army continues to view us under our old battalion composition. This means that we still receive personnel under our inactive UICs and must continuously move Soldiers into their correct company. We are now at a point where we run the risk of running out of standard excess billets under each company and are requesting additional positions to be built.

Our current solution to this issue is to do a detailed scrub of each company and remove personnel who may be filling critical positions. This task is very time consuming. It requires that each Soldier under each inactive UIC be moved individually. With each personnel move in the system, there are several steps that require approvals of the assignment being built, thus adding to the length of the task. On average, we receive 10 to 12 incoming personnel each week. Though we include this task as part of our weekly battle rhythm, it is difficult to maintain accuracy within the system because we continuously receive new personnel who require new assignments to be built.

JPMRC

Accountability — Our light support concept was validated for the first time during our JPMRC 25-01. This was also our first attempt at our light logistics cluster (LLC) composition. This concept differed from the brigade support area (BSA) way of supplying equipment, food, and fuel to the fight. The cluster concept involved splitting our battalion into three groups (red, white, and blue), in which each cluster had the same capabilities to support any forward element. From the HR perspective, this meant that we not only had to take accountability of the battalion but also understand in which cluster each Soldier was located. This was challenging. It became even more difficult when each cluster began to displace to different areas of the island. To ensure that accountability remained as accurate as possible, we divided up the S-1 team into each LLC. Our main course of action was to maintain analog products for two main reasons: One, to ensure that we could continue our operations if we had no connectivity or communication with each cluster. Two, IPPS-A was not reliable. We did not want to run the risk of searching for a Soldier and having their company location be inaccurate. If we were to use this concept in a deployment setting, an official MTOE would have to be released to ensure that our systems were 100% accurate.

In addition, we had outside support units attached to us during the exercise. This increased our

numbers to almost 500 boots on the ground. Another limiting factor with IPPS-A involved the ability to view any of the attached Soldiers' information. IPPS-A viewing privileges are dictated by the level of access one has in the system. This can become problematic when building an attached Soldier's casualty packet or in any emergency. With IPPS-A still an evolving system, it is imperative to consider how this would affect future training settings or deployments.

Replacement Operations — Our cluster composition created complexity in replacement operations. With the original BSA concept, the location of the mortuary affairs collection point (MACP) and Role 2 (BDE support medical company and patient hold) was constant. Both facilities were co-located with the BSA, even with any movements. On the other hand, with the cluster concept, the MACP was assigned to White Cluster, and Role 2 was split into the Role 1+ and Role 1-, each facility with its own independent movements. Not only did this make the replacement process more difficult, but accountability of wounded Soldiers across the brigade became very challenging. This was our first time running replacement operations as a light brigade combat team and LSB. Several problems in the administrative and patient-moving process for casualties emerged that must be addressed.

First, it is imperative that the brigade S-1 team maintains a close relationship with both Role 1s. As a battalion S-1, it became difficult to keep track of the location and number of casualties within our unit. It is important that we not only know who is wounded but also our military occupational specialty strength to request critical shortages. Though a tracker was established in the latter half of the exercise, this must be a system that is emplaced before any exercise. Administratively, we leaned heavily on the use of the Nonclassified Internet Protocol Network (NIPR) for the routing of all casualty packers and personnel replacement requests. NIPR was reliable, but we should have used other methods of communication to train for situations where we suffer a network breach or a loss of NIPR connectivity.

Final Observations

Though TiC is a very promising concept that we made work, the lack of support and structure to TiC has made it increasingly more difficult for the staff sections and Soldiers to fully immerse in the process. The additional work detracts from the ability to accurately test and validate the light support concept. As we continue to assess and improve the lethality of our fighting force, it is imperative that the unit going through the transformation receive the necessary support to fully evaluate the proposed strategy. Nevertheless, with the difficulties of TiC, this prototype enables us as a force to learn the concept of adaptation and appreciation for the ever-changing Army in which we serve. Despite the outcome, there are several lessons to be learned and a promising way ahead for the future of our fighting forces and HR operations.

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Featured Photo
PFC Aaden Maynard, a signal support specialist assigned to the 225th Brigade Support Battalion, 2nd Light Brigade Combat Team (Provisional), 25th Infantry Division sets up camouflage coverage during the Joint Pacific Multinational Readiness Center exercise at Dillingham Airfield, Oahu, Hawaii, Oct. 2, 2024. (Photo by SPC Abreanna Goodrich)

LOGISTICS SCENARIO Exercise

Breaching Operations

■ *By CPT Stephen Robarge, Captains Career Training Department*

Situation

The 1751 Battalion Detachment has employed a counter-mobility obstacle on OBJ WATSON as part of their area defense. This obstacle belt consists of anti-tank mines integrated with natural obstacles and triple-standard concertina wire. The dimension of this obstacle belt is 900 meters long by 200 meters deep.

Mission

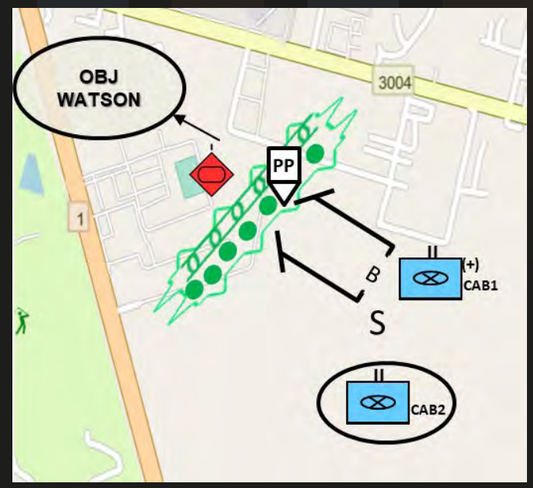
Combined Arms Battalion 1 (CAB1) has been tasked to breach the obstacle belt and establish a passage lane for CAB2, the decisive operation, to pass through and conduct the seizure of OBJ WATSON.

Coordinating Instructions

CAB1 has received one engineer support platoon from the brigade engineer battalion under a tactical control command relationship to support the breach with their organic assault breacher vehicles that possess the capability to fire a mine-clearing line charge (MICLIC). CAB1's forward support company will maintain a sustainment load of Class V to enable breaching and follow-on operations.

Question

How many MICLICs must be fired at a minimum to effectively reduce the obstacle belt and create a lane for a battalion-sized element to pass through?



See Solution Section Below

Is Efficiency Worth Sacrificing Our Humanity?

IS EFFICIENCY WORTH SACRIFICING OUR HUMANITY?

By CPT Garett H. Pyle

The Beginning of the End?

It is the year 2035, and society has been fully integrated with artificial intelligence (AI) and robotics. Humanoid robots help humans with tasks from personal home care to manufacturing to public service. Society believes them to be fundamentally safe because they must abide by the Three Laws of Robotics, which are:

1. A robot may not injure a human being or, through inaction, allow a human being to come to harm.
2. A robot must obey orders given to it by human beings, except where such orders would conflict with the First Law.
3. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

A simple look through history shows how no law is unbreakable. Once these fundamental robotic laws are broken, then the machines that were designed to protect us and make our lives more efficient will have the ability to turn on us. They already control communication networks, power supplies, medical facilities, and an untold amount of military equipment. How easily society could fall if the technology we rely so heavily on decides to turn on us for control.

Now you might say, "that's impossible," and "we have too many fail-safes." But do we? Our society is fully dependent on technology. It does not have to be the example alluded to above from the 2004 movie, *I, Robot*.

It could be something as simple as computer hackers or a massive power outage that brings us to our knees.

Technological advancements have enabled us to live our everyday lives more efficiently. Within the same century we went from horse and buggy to putting a man on the Moon. More important, computer processing power has developed from needing a computer the size of a building for simple calculations to being able to do highly complex calculations with a tiny microprocessor that can fit on a tip of a finger. The possibilities seem to be endless with our imaginations. We ask our phones to change the temperature of our house or to write us a paper based on some basic inputs. But how far will this go? Are we setting ourselves up for our own destruction? What happens to our humanity?

We have advanced far in our pursuit of efficiency, but I believe we are losing our humanity. We are posturing ourselves to be one step away from a world like *I, Robot*, or like many of the other universes that people have written about throughout history. They illustrate how our pursuit of efficiency can lead to our downfall. Fiction is only a step or mistake away from turning into reality. My goal is not to create hysteria but to open a conversation about the loss of our humanity.

Understanding the Basics of AI

The concept of AI is not a recent development. Our history is filled with dreams of creating machines to assist with our productivity. In 1726, Jonathan Swift wrote in *Gulliver's Travels* about a machine that assisted scholars in generating new ideas. The Three Laws of Robotics mentioned above first appeared in a short story in 1942 by Isaac Asimov titled "Runaround." However, it was not until 1955 that the term "artificial intelligence" was first used in a workshop proposal titled "A Proposal for the Dartmouth Summer Research Project on Artificial Intelligence," by John McCarthy, Marvin Minsky, and Claude Shannon. The resulting 1956 Dartmouth workshop is considered to be the beginning of the field of AI.

At its core, AI is the ability for computers and machines to simulate human intellectual functions such as problem-solving, learning, decision making, and comprehension. Within AI, there are multiple subsets that have developed over the years, which include:

- Machine Learning — When AI systems use historical data to learn without direct instruction from human input.
- Deep Learning — Machine Learning models that mimic human brain function.
- Generative AI — Deep Learning models that can create original content.

This technology is developing at such a rapid pace that the different types and levels are ever changing. Companies even depict differences in how they categorize the kinds of AI. I will only highlight three general categories into which some of the others fall:

- Weak AI — What exists today such as chatbots which are limited to specific actions.
- Strong AI — AI that is designed to accomplish tasks without human input and can perform at levels like humans. This is still in development.
- Super AI — While still theoretical, this is the category in which AI surpasses human intelligence and ability. It would become truly human-like in its appearance and disposition.

Our Current AI Situation

With this basic understanding of AI, we see the impacts that it has on our everyday lives. One may think, "well, I don't use AI," or "I've never used a chatbot." However, AI is already fully ubiquitous in our lives. Our search engines, music and product recommendations, wearable fitness trackers, security systems, and email servers that categorize our emails are just a few examples. A Pew Research study in 2022, "Public Awareness of Artificial Intelligence in Everyday Activities," found that half of Americans are aware of the common ways they may interact with AI, such as chatbots and product recommendations but that only three in 10 can identify the other areas mentioned above. For instance, if you need directions to drive somewhere, AI plans your route and monitors the route conditions as you drive.

The Benefits of AI

Before we explore the dangers of AI, it is only fair to analyze its benefits. The advancements in technology have improved our lives and enabled us to achieve more we than ever imagined. I am not here to argue that all technology and the use of AI will have a completely negative impact on our lives. We can always find benefits when these technologies are properly used as tools.

One of the most obvious benefits is our ability to search for information anywhere we have an internet connection, bringing all the information of the world to our fingertips. We no longer need to search through printed books or visit libraries. This saves us immense amounts of time.

In developing new advancements, we can now solve more complex problems with the assistance of AI while eliminating human error. For example, this has enabled us to develop advancements in medicine and engineering. AI can run hundreds of scenarios at once to find the most effective solution to a problem.

We can now automate a variety of tasks in manufacturing and production, greatly increasing our output and productivity. Although this has cost us jobs, the precision of the automation has also reduced manufacturing defects in products. This reduces manufacturing costs, which provide more cost-effective products to consumers.

We see the same advantage in the military with resource management. The current Field Manual 4-0, Sustainment Operations, discusses the new concepts of precision sustainment and predictive logistics. It states, "precision sustainment is the effective delivery of the right capabilities at the point of employment enabling commander's freedom of action, extending operation reach, and prolonging endurance." While "predictive logistics is a system of sensors, communications, and applications (data support tools and data visualization) that enables quicker and more accurate sustainment decision making at echelon from tactical to strategic." These concepts are powered by AI, which has a direct result on the battlefield. Sustainers can now more effectivity plan and support the warfighter.

The Dangers of AI

Now that we have analyzed the benefits of AI, we can consider the dangers and how we risk losing our humanity.

One area of concern is AI's safety and security. AI, like any other computer program, is a series of codes. Codes can be changed or broken more easily than one can imagine. For instance, if you play video games, you know that a simple update can break the entire game, all because one line or character in the series of code is wrong or misplaced. My undergraduate degree is in computer information studies. I have seen firsthand how coding can be affected in this manner. Once there is a break in the programming, someone must go line by line to find the problem code. Yes, there are computer programs that are designed to do this, but what if those programs have malicious code? Or, what if Strong AI or Super AI chooses not to fix the code? Additionally, all computer programs can be hacked.

From my experience of designing, building, and programming robotics, I have found that they can be hacked or can contain broken code just like AI. They follow the code that is written and fall into the category of Weak AI, for now. However, the most dangerous aspect is their inability to reason. This is what separates them from humans in their current state. They are unable to judge between right and wrong but make every decision based on calculations. In the movie, *I, Robot*, the main character is saved during a car accident by a robot while a child is left to die because the robot calculated that the adult had the higher chance of survival. As humans, one could argue that many would choose to save the child first. We would be using our reasoning ability. It is only in the theoretical state of Super AI that they could begin to reason, but this would pose even more dangers to our humanity.

AI may also take on the bias of those who created it while it is still in the Weak AI state. As mentioned, AI helps us find information with search engines. However, the information it returns can easily be biased to return only certain information or information that is more favorable to the creator. Conduct the experiment yourself using different search engines and AI programs like Alexa or Siri to see for yourself.

In the military we are developing AI to be in control of more and more systems. While they have provided

a benefit for precision sustainment and predictive logistics, what do we do when the power fails? Can we still conduct the mission using only analog systems? We are entrusting our equipment and supplies to driverless vehicles that we already know can be hacked or may not follow the commands they are given.

I have built robots that were designed to follow a pattern or line to a destination. When something interrupts the set path, the system fails. Humans must be in control on the battlefield in all aspects. If we want to remove humans from harm's way, then the equipment and vehicles must always be controlled by a human. This most certainly includes arming robots powered by AI. Have we not learned from the countless fictional examples such as the Terminator movies what could happen when we use armed machines? Yes, many argue that those stories are just fantasy, and that AI would never do that. However, remember what Super AI could accomplish if it became a reality. Many thought we could never put a man on the Moon, but we did. Look what we have achieved in just the last 100 years.

These examples of the dangers of AI are just the beginning. While more exist, the majority of these can be linked to the ultimate danger of "what happens when we lose control?" The BBC once quoted Stephen Hawking as saying, "The development of full artificial intelligence could spell the end of the human race. … It would take off on its own, and redesign itself at an ever-increasing rate. … Humans, who are limited by slow biological evolution, couldn't compete, and would be superseded." We are opening Pandora's Box, and once it is open, there may be no going back.

What Makes Us Human

I could have used a chatbot to write a viable version of this article within seconds. Instead, I spent hours researching, drafting, writing, and editing it on my own. While the chatbot would have saved me all that time, the article would not be my work or thoughts. Thus, AI inhibits our creativity and what makes us human. Some argue that they use AI and the chatbots to generate ideas or draft emails. However, in doing this, you are hindering your ability to think for yourself, limiting your imagination and reasoning, and worst of all, becoming lazier.

With our heavy reliance on technology, we are becoming lazier than ever before. With all the technology at our fingertips, I argue we are less intelligent now than we were 100 years ago. The National Assessment of Educational Progress, a federal standardized test, has shown a drop in students' performance in basic math and reading from 2004 to 2024. The largest drop was from 2020 to 2022 during COVID, when most students did school remotely over the internet. Many people under the age of 25 cannot read an analog clock or do simple math in their head. They need a digital clock to tell time and need a calculator to do basic math. This is a step backward for human development, not forward.

We are at a point in history where we are even unable to distinguish between human products and AI products. Technology exists where you can provide inputs into an AI program, and it will produce a podcast that sounds like two human beings having a conversation, complete with humor and emotions. We are literally developing ourselves out of existence.

Can We Save Our Humanity?

We have already started down the path of full AI integration. We might be at the point of no return. Is it too late for us to make a difference? As with everything in life, there must be a balance. There is some good that we cannot ignore when AI and robotics are used as a tool. However, is the efficiency worth the sacrificing of our humanity? We have analyzed the dangers that exist, and we are truly playing God with this technology. I write this to challenge our current way of thinking and to analyze the path we are on. I will leave you with this simple question, "Just because we can, does that mean we should?"

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BEYOND THE CONVOY

Adapting Army Transportation Doctrine for a Multidomain Battlefield

■ *By MAJ Herman "TJ" Tisdale*

As the Army navigates the multifaceted demands of large-scale combat operations (LSCO) and multidomain operations (MDO), it has become evident that the current transportation doctrine does not fully address the challenges posed by these environments. Field Manuals (FMs) 3-0, Operations, and 4-0, Sustainment Operations, provide foundational guidance for operations and sustainment, and with recent updates they have begun to address the evolving LSCO/MDO environment. While these manuals emphasize various principles, additional adjustments can be made in areas such as multimodal integration, scalability of logistics networks, sustainment over extended supply lines, joint/coalition force coordination, and force protection. The successful adaptation of the Army's transportation doctrine to these dynamic conditions is crucial for maintaining operational momentum and ensuring the resilience of our supply chains.

By examining recent practices — such as those implemented by the 1st Armored Division (1AD) in the Warfighter 25-01 exercise — we can identify specific solutions. The 1AD practices involved the innovative use of Joint Movement Control Centers (JMCCs), modular logistics hubs, and layered force protection protocols. These adaptations support a more agile, responsive, and secure Army sustainment enterprise, capable of meeting the unique demands of LSCO and MDO.

During Warfighter 25-01, III Armored Corps' transportation office and 1AD's transportation office confronted these challenges. They worked to sustain operational momentum in an environment where standard, predictable transportation doctrine was not viable. By anticipating future multidomain and dynamic challenges, 1AD used principles of sustainment such as responsiveness, simplicity, flexibility, and survivability.

Multimodal Transportation Integration

To support multimodal integration, 1AD's G-4 prioritized cultivating professional relationships and establishing vital communication pathways with crucial personnel — including G-3, G-4, G-5, chief of staff, deputy commanding generals-sustainment, Army field support battalions, and the Army protection enterprise — and then made it clear that true responsiveness requires operating like a fusion cell across all environments. Using software such as the Virtual Joint Operations Center, the division transportation office (DTO) section provided real-time updates and a dashboard that integrated air, ground, and rail transport statuses. Standing interoperability protocols with the U.S. Transportation Command liaison officer and brigade support operations were implemented to facilitate seamless asset handoffs across modes.

In Warfighter 25-01, 1AD established JMCCs at the division level to aggregate real-time data from all transportation nodes. This setup allowed decision makers to dynamically reroute or shift assets as operational demands changed, creating a flexible logistics system to mitigate the fog of war.

Scalability and Flexibility of Transportation Networks

In the exercise, 1AD deployed modular logistics hubs, rapidly deployed and scaled according to operational demands. These hubs served as temporary bases for refueling, resupply, and maintenance, extending operational reach and maintaining logistical flexibility in real-time combat scenarios. Positioning the DTO alongside the G-3/5 and protection staff (instead of within the G-4) improved operational control and streamlined decision making. The DTO provided real-time transportation status updates to the deputy commanding general-sustainment in this new hybrid role, supporting faster and more effective logistics decisions.

Sustainment of Extended Supply Lines

Anticipatory sustainment doctrine is not always viable in LSCO because it relies on fixed, scheduled convoy movements along established routes. In traditional doctrine, transportation plans heavily depend on predetermined routes and timetables, with convoys moving supplies from logistics hubs to forward units in a structured, predictable manner. This approach assumes a relatively stable environment where routes are secure, infrastructure is intact, and threats are minimal

A C-17 Globemaster III transport aircraft stands ready to participate in multi-modal deployment and a simulated exercise during 1st Armored Division's 2024 Warfighter 25-01 at Fort Bliss, Texas, Oct. 7, 2024. (Photo by MAJ Herman Tisdale)

or manageable. However, in a multidomain battlefield characterized by rapidly shifting combat fronts, contested territories, and a highly adaptable adversary, this predictable approach becomes a liability.

For instance, during 1AD's exercise, the battlefield geometry initially required movement along north-south axes. However, as events unfolded and units became bogged down, the geometry shifted to an east-west alignment. This unexpected change in battlefield orientation meant that previously planned supply routes became ineffective almost overnight, and predictable routes could no longer be protected, nor could they sustain the force. The enemy could anticipate and target these supply routes using ambushes, improvised explosive devices, and even cyber attacks to disrupt the flow of logistics. In such environments, adhering to fixed schedules and established routes increases the risk.

To counter these challenges, 1AD shifted from traditional doctrine to one that emphasized anticipation and flexibility. Anticipating challenges in the multidomain environment involves continuously assessing and adapting to the battlefield's evolving dynamics. Rather than following static plans, transporters and logistics planners must analyze real-time intelligence, adapt routes based on threat assessments, and regularly use alternative modes of transportation — such as aerial resupply, rail, or watercraft — to circumvent compromised areas.

In addition, 1AD developed a decentralized infrastructure by incorporating aerial resupply methods and corps throughput to sustain supply lines when traditional routes were compromised. By using aerial resupply and leveraging higher-echelon throughput capabilities, 1AD ensured that critical supplies reached forward units despite the contested environment.

The successful implementation of a decentralized infrastructure relied on the hub-and-spoke logistics model designed to minimize dependence on long, exposed supply lines. By identifying strategic hub locations using intelligence from G-2 analysis and executing aerial resupply (air drop) to designated sites, 1AD established effective air lines of communication. This approach ensured a continuous flow of supplies and reduced vulnerabilities associated with reliance on a single mode of transport, thereby integrating resilience in contested areas. Furthermore, this strategy complicated the enemy's ability to target lines of communication, because supply nodes were often relocated shortly after resupply.

Anticipating challenges in the multidomain environment involves continuously assessing and adapting to the battlefield's evolving dynamics.

Real-Time Coordination with Joint and Coalition Forces

Real-time coordination with joint and coalition forces was integral to the exercise's success. By establishing joint logistics operations centers and fostering 360-degree collaboration across all command levels, 1AD ensured seamless cooperation with joint and coalition partners. These efforts allowed rapid adjustments to logistics plans, efficient allocation of resources, and sustained support for combat forces.

Although FM 3-0 emphasizes synchronized sustainment across all domains, the current doctrine lacks mechanisms or connective tissue for real-time coordination between Army units and joint or coalition partners. Without this synchronization, delays and inefficiencies can arise in high-tempo LSCO environments. The DTO section highlights the importance of continuous communication across organizational levels and ensures all relevant parties have a seat at the table. This allows information from all levels to be brought forward and helps prevent bottlenecks or loss of assets.

Force Protection for Transportation Assets

The vulnerabilities of transportation assets in LSCO are known, with convoys and hubs frequently becoming targets for enemy attacks. Protecting these assets from modern threats — such as direct attacks, electronic warfare, and cyber threats — requires a robust, layered defense strategy.

1AD's G-2 and G-3/protection employed active protection systems and counter-unmanned aerial systems to neutralize threats, significantly increasing the survivability of convoys and hubs in contested environments. Additionally, rotating communication frequencies and blackout protocols minimized the risk of interception, with the ability to change or invoke these practices empowered down to the lowest operational levels for greater unpredictability.

Intelligence-driven threat assessments allowed planners to adjust convoy routes and operations in real-time, reducing the risk of enemy engagement. Modular logistics hubs, designed to operate autonomously for up to 72 hours, proved essential in sustaining forces under dynamic conditions. These hubs, deployable within 48 hours from logistics support areas and brigade support areas, were equipped with refueling and repair capabilities, thus optimizing resupply and minimizing downtime.

Conclusion

In the ever-evolving arena of LSCO, 1AD has pioneered a logistical framework that goes beyond conventional doctrine, adapting Army transportation strategies to meet the demands of a multidomain battlefield. Drawing from foundational Army Techniques Publications (ATPs) 4-16, Movement Control, and 4-93, Theater Sustainment Operations, 1AD has demonstrated agility and resilience and has not only followed doctrinal guidance but innovated upon it to address critical gaps.

As demonstrated by 1AD's use of modular sustainment hubs and JMCCs, the ability to quickly scale and adapt sustainment in response to shifting operational needs may no longer be optional but essential. Their hub-and-spoke sustainment model, along with layered force protection measures, highlights a responsive approach to securing supply lines and resources in contested areas. These adaptations emphasize agility, resilience, and a commitment to real-time coordination with joint and coalition partners, making sustainment an integrated, proactive element in combat strategy.

Looking forward, could institutionalizing these practices across the Army sustainment enterprise be the key to ensuring readiness for future LSCO and multidomain threats? Next steps may include embedding modular, adaptable capabilities into Army doctrine and expanding cross-force training to streamline joint and coalition operations. But as we face increasingly contested environments, what role could autonomous capabilities, such as leader-follower systems and autonomous aerial resupply, play in enhancing resilience and responsiveness? And critically, what capabilities does the Army have to address these emerging challenges?

The lessons learned from 1AD's experience highlight the need for the Army to move beyond traditional convoy-centric models and adopt a decentralized, flexible framework to remain responsive, efficient, and prepared for the demands of dynamic and contested LSCO environments. 1AD's efforts showcase what Army innovation and teamwork can achieve. By building on the doctrinal foundations of FM 3-0, FM 4-0, ATP 4-16, and ATP 4-93, they have set a new standard for Army logistics that is ready to meet the challenges of the multidomain battlefield. This approach will improve operational efficiency and enhance the survivability and effectiveness of transportation assets in the face of evolving threats.

MAJ Herman "TJ" Tisdale serves as the division transportation officer for the 1st Armored Division at Fort Bliss, Texas. He previously served as the truck platoon leader and S-3 for the 17th Combat Service Support Battalion, with three combat training center rotations and one Arctic rotation, and later as the battalion executive officer and S-3 of the 842nd Transportation Battalion. He commissioned as a Transportation officer. His military education includes the Support Operations 1&2 Course, Division Transportation Officer Course, Unit Movement Officer Course, and Transportation Coordinator's Automated Information for Movement System Course. He is a graduate of the Command and General Staff College resident program. He has a Master of Arts degree in procurement and acquisitions from Webster University, and a Master of Operational Studies degree from the Command and General Staff College.

Featured Photo
1st Armored Division participates in multi-modal deployment to U.S. European Command at Fort Bliss, Texas, Sept. 12, 2024. (Photo by Wendy Nelson)

Renovating Sustainment in LSCO

Logistics Clusters and Battlefield Geometry

By CPT Erica Thompson

The trains concept below is a depiction of currently used doctrine from Field Manual 4-0, Sustainment Operations, and the prototype concept for a light brigade combat team (LBCT) to illustrate the flow of commodities from the division support area down to the forward line of own troops (FLOT). The implementation of LBCT formations forces the flow of commodities from echelons above brigade to adapt to the new fight to provide efficient and mobile sustainment to infantry units, specifically in the jungle fight.

Despite the change in appearance and function, the new trains concept still follows the principles of echeloned sustainment from theater down to the FLOT. Where the brigade support area (BSA) used to hold the place of field trains, we now have the light logistics cluster (LLC) Blue, which serves as a rear cluster for the entirety of the light support area (LSA). Its capabilities include 72-hour field maintenance, the supply support activity, the food ration break point, and bulk water and fuel. The resupplies from the division sustainment support battalion (DSSB) to LLC Blue were then redistributed to LLC Red and LLC White for distribution forward to the combat logistics platoons, which now serve the function of the combat trains command post.

LLC Red and LLC White serve as our multi-class distribution clusters, which is comparable to sending a forward logistics element, or a mini BSA package, from the BSA to support the task forces (TFs) that have increased their distance from the sustainment assets. Their capabilities include bulk water, fuel, ammo distribution, and a split Role 2 to provide medical capabilities at both. By design, TFs conduct logistics packages (LOGPACs) with LLC Red/White based on commodities needed, and the LLCs pull their resupplies from LLC Blue, while the DSSB resupplies LLC Blue back to 100%.

The Economy of LLCs

The 225th Light Support Battalion (LSB) recently participated in Joint Pacific Multinational Readiness Center (JPMRC) 25-01 to validate the LBCT concept in a jungle environment. As the brigade conducted their training progression leading up to this rotation, the LSB support operations (SPO) team was able to work with TF S-4s to determine fuel and water estimates, Class IV requirements, and to anticipate Class V resupplies in conjunction with forecasted LOGPACs. These estimates were then communicated to the division sustainment brigade (DSB) to create a concept of support that aligned with the modernized trains concept to ensure seamless resupplies from the DSB to the LSB — not only in the configuration of an LSA that mimicked a BSA, but also as the LSB split into clusters that were displaced throughout the battlefield.

Following the three-cluster concept on the battlefield limits the amount of assets being aggregated in one location that can be targeted by the enemy. In the classic BSA formation, it is common to get enemy attacks frequently that aim to disrupt sustainment and cut off life support to the FLOT. Within these clusters, it becomes easier to (1) be less visible and maintain a smaller footprint that will not attract the enemy, and (2) provide redundancy both in commodities and command and control (C2). This was tested during JPMRC 25-01 between LLC Red and LLC White multiple times. When one cluster received continuous contact, or displaced, and turned off scheduled LOGPACs, the next cluster picked up the weight of sustaining those TFs, became the C2 node, and continued scheduled missions. The communication process that was built through these iterations validated the concept that sustainment does not have to stop entirely during the fight due to enemy attacks or displacement of sustainment elements.

The implementation of LBCT formations forces the flow of commodities from echelons above brigade to adapt to the new fight to provide efficient and mobile sustainment to infantry units, specifically in the jungle fight.

Battlefield Geometry

The modifications to the sustainment flow and the requirements of a light brigade element have given LSBs the ability to become lighter and more mobile. Because of this, they can exist in multiple areas simultaneously to increase survivability while sustaining the fight in a wider scope. Using this advantage makes it critical to maintain communication with the supported TFs while fighting from the synchronization matrix to ensure that the correct cluster provides the right supplies at the right time. Since TF requirements can instantly change, the supporting cluster can change just as quickly, depending on the necessary commodities and distances. As the fight progresses and the TFs close the distance to their objectives, the cluster concept provides the mobility for sustainment assets to rapidly maintain their proximity by displacing quickly, while never turning off sustainment capabilities all at once the way a BSA normally would in a displacement. Because of this, LSA displacement timelines can become more fluid and mold to the operating mission in a way that minimizes disruption and increases the lethality of your sustainment assets.

This concept also applies to the role of the DSB in the sustainment flow. At times, the layout of the clusters can ensure that the DSB is only linking with LLC Blue, minimizing time on ground and commodity requirements. It can affect the flexibility of the DSB to exercise multiple convoys to all three clusters in one day, which validates the clusters' ability to function as their own entities at any given time. Throughout the duration of JPMRC 25-01, we only planned for one resupply from the DSSB to go to all three clusters, which was not conducted due to an enemy attack. This had no detriment to the cluster's ability to continue sustainment. LLC Blue successfully resupplied LLC Red/White for the duration of the exercise, executing nine internal LSB resupplies.

To ensure the success of the resupplies coming from these distribution clusters, we conducted a daily logistics synchronization, which consisted of the SPO officer, Brigade S-4, TF S-4s, LSB company commanders, and enabler representatives. We fought from the synchronization matrixes at least 48 hours out and confirmed the commodities needed and locations for resupplies — the common understanding for this was that if nothing changed from that meeting, then nothing had changed. This allowed us to provide predictability to the TFs and for Alpha Company to ensure that we were prepared to sustain externally at any given time. We were also able to communicate any requirement changes to the DSB within 24 hours to maintain open lines of communication throughout the resupply chain.

The challenge that this concept brings is the increased responsibility and overhead of the TF S-4s and the SPO team. Without a forward support company commander to forecast sustainment for their supported unit, the TF S-4 takes on the role of validating requirements and coordinating with the SPO officer, who has already forecasted the brigade's overall concept of support. By not having a senior sustainer in these line units, the margin for error depends entirely on the SPO officer's understanding of their supported unit's requirements, and on the TF S-4's understanding of the operational picture and how that picture influences the flow of sustainment.

Conclusion

The evolution of the LBCT sustainment model marks a significant shift in how the Army supports operations in complex, dispersed environments, specifically jungle environments. The execution of this model during JPMRC 25-01 highlights the adaptability and resilience of a more mobile and decentralized echeloned sustainment system. By dispersing sustainment assets into multiple, redundant clusters, the Army can significantly increase its ability to maintain operational momentum, even when faced with enemy disruptions and displacement requirements. As the Army adapts to new operational challenges, updating our doctrine and sustainment concepts is essential to maintaining strategic advantage and ensuring the success of our forces on the battlefield.

CPT Erica Thompson currently serves as the support operations supply and services officer in charge in the 2-25th Light Support Battalion at Schofield Barracks. Her previous experiences include being a distribution platoon leader and higher headquarters troop executive officer in the 1st Regiment, 14th Cavalry Regiment, at Joint Base Lewis-McChord, and serving as an aide-de-camp/executive officer to the Deputy Commander of Sustainment in the 7th Infantry Division. She holds a Bachelor of Arts degree in sociology and pre-law from Stetson University and is working toward a Master of Public Administration degree from Troy University.

Featured Photos
Top: CPL Devin Ramirez, a signal support specialist assigned to the 225th Light Support Battalion, 2nd Light Brigade Combat Team (Provisional), 25th Infantry Division, sets up camouflage coverage during the Joint Pacific Multinational Readiness Center exercise at Dillingham Airfield, Oahu, Hawaii, Oct. 2, 2024. (Photo by SPC Abreanna Goodrich)
Bottom: Soldiers assigned to the 2nd Light Brigade Combat Team (Provisional), 25th Infantry Division, prepare for movement to Dillingham Airfield during the Joint Pacific Multinational Readiness Center exercise at Schofield Barracks, Hawaii, Oct. 2, 2024. (Photo by SPC Abreanna Goodrich)

Evolution of the Logistics Basic Officer Leadership Course

■ *By CPT Michelle Lopez and CPT Justin Paramore*

The Basic Officer Leadership Department (BOLD) has substantially revised the Logistics (LOG) Basic Officer Leadership Course (BOLC) to address the evolving demands for versatile and effective logistics leaders. This article outlines the transformation of LOG BOLC, from its traditional format to its current structure and future adaptations, as it develops second lieutenant logistics officers into better combat multipliers.

Historically, BOLC focused on functional training that aligned with Quartermaster, Ordnance, and Transportation disciplines. While effective for its time, this approach now needs the integrated perspective required for modern, multifunctional logistics operations. The training was compartmentalized, and officers were not thoroughly prepared for the challenges encountered in multidomain operations (MDO).

BOLD and the Army Sustainment University have redesigned LOG BOLC to incorporate multifunctional training in response to the evolving operational environment. This began in 2018 when the program shifted from traditional single-function training to a more integrated approach. The course was then redesigned in 2022 to encompass critical elements from Quartermaster, Ordnance, and Transportation training while introducing new multifunctional tasks. The goal is for LOG BOLC students to become LOG officers as in the Logistics Captains Career Course. The updated LOG BOLC 2.0 structure incorporates academic, physical, and tactical rigor by applying a progressive, scenario-based approach to develop officers' skills. The current training scenario, focusing on supporting an armored brigade combat team (ABCT) in the U.S. Indo-Pacific Command (USINDOPACOM) area of responsibility (AOR), prepares officers for real-world MDO logistical challenges.

The revised LOG BOLC is structured into six integrated modules: Army Profession, Building Readiness, Mission Preparation, Large-Scale Combat Operations (LSCO), Mission Execution, and Logistics Profession. In the Army Profession block, newly commissioned lieutenants are introduced to foundational aspects, equipping them with essential skills for their leadership roles. This block covers many critical topics that set the stage for their professional development. They learn how to write a memorandum for record to ensure effective communication, documentation, and crucial briefing skills to prepare them to deliver clear and concise information to commanders. The block also introduces them to the fundamentals of finance and budgeting and provides an introduction to electronic warfare to enhance their awareness of modern battlefield technologies. Ethical decision making and the Army Values are emphasized to ensure they uphold the highest standards of conduct. MDO are also introduced, providing a framework to understand how the Army operates across multiple domains. Finally, legal aspects, including the Uniform Code of Military Justice, are discussed to teach them the legal boundaries they must navigate as officers.

The Building Readiness block provides comprehensive training and exposure to critical areas needed to become successful platoon leaders. Students are taught about military terms and graphics, troop-leading procedures, and the structure of operation orders (OPORDs) to enhance their planning and operational skills. They also study Field Manual (FM) 3-0, Operations, and FM 4-0, Sustainment Operations, to understand broader operational and sustainment strategies. Training covers unit readiness management, property accountability, maintenance, and the Global Combat Support System-Army system for effective logistical management. Additionally, second lieutenants are trained on the unit status report to track unit readiness.

This practical learning is reinforced through site visits to the 54th Quartermaster Battalion motor pool, where they interact with NCOs, and to the Ordnance advanced individual training schoolhouse, which provides hands-on exposure to the equipment and systems used in the force. These experiences integrate theoretical knowledge with practical applications to enhance their leadership capabilities in logistics.

As part of their foundational training in Mission Preparation, we provide second lieutenants with a

BOLD and the Army Sustainment University have redesigned LOG BOLC to incorporate multifunctional training in response to the evolving operational environment.

comprehensive introduction to the critical aspects of deploying units, conducting convoy operations, and mastering essential communication platforms. Students learn to compile and analyze logistics statuses (LOGSTATs) and prepare detailed deployment briefs to ensure mission readiness.

This training is complemented by site visits, where they participate in hands-on practical air and rail deployment exercises. Here, students learn how to develop proper load plans, secure tie-downs on rail cars, and prepare pallets for air transport. During convoy operations, students visit the Reconfigurable Vehicle Tactical Trainer, where they assume various roles, such as convoy commander, gunner, and dismounts, running through simulated missions to enhance their tactical decision making and leadership skills. This blend of classroom instruction, site visits, and simulated exercises ensures that lieutenants are well prepared to lead their units in real-world deployment scenarios.

LSCO Foundation begins with an introduction to LSCO and MDO concepts outlined in FM 3-0. The second lieutenants then receive instruction on the mission and composition/disposition of an ABCT. This provides context as the module transitions to sustaining the force through logistics and how they will integrate and synchronize with warfighters. Second lieutenants gain knowledge on tactical logistics units and equipment in the brigade support battalions and forward support companies (FSCs). They learn echelon trains and how units operate within their assigned areas. Simultaneously, they are taught distribution methods, resupply techniques, logistics release point logistics package (LOGPAC) operations, and resupply methods.

Once these foundations are set, the course progresses to teaching echelons above brigade, from division sustainment brigades (DSBs) to strategic enablers such as the Defense Logistics Agency, Military Surface Deployment and Distribution Command, and U.S. Army Materiel Command. The LSCO block then teaches students about functional companies found in DSBs, sustainment brigades, and combat sustainment support battalions. During this portion, specific field services and commodities are taught, and second lieutenants apply their knowledge by producing fuel, water, and ration consumption estimates. The LSCO module's segment on base defense (single and cluster) covers engagement area development and site selection for each unit type and specific commodity/field services planning considerations. LSCO culminates in a classroom planning exercise where students must analyze their modified table of organization and equipment (MTOE) and LOGSTATs and then generate a LOGPAC to resupply their assigned combined arms battalion (CAB) from the ABCT.

The Mission Execution block begins with a logistics exercise (LOGEX), which immediately follows LSCO and is the planning exercise for BOLC students. This weeklong planning scenario is based on the USINDOPACOM AOR and requires students to apply lessons and concepts from all previous modules independently. The LOGEX is a crucial part of the training because it simulates a real-world scenario, allowing students to apply their knowledge and skills in a practical setting. Students are given MTOEs for their assigned FSC and CAB. They determine the FSC's capabilities and the CAB's requirements during a defensive operation. The scenario builds throughout the week with daily briefs and due-outs to the cadre. These include a capabilities brief, combat trains command post (CTCP) site selection, displacement, and an occupation/establishment plan that includes base defense. From the CTCP, the students are provided with LOGSTATs from the CAB, and then a LOGPAC resupply mission is planned. The final graded OPORD brief includes all aspects they have been designing and refining throughout the week with coaching from the BOLD cadre.

In addition to Mission Preparation, students receive a solid foundation in the logistics profession through staff rides and a range of electives designed to build functional proficiency. Our previous elective courses have now shifted to job-centric learning for the typical positions that second lieutenants will encounter in their first duty station. We aim to create a second lieutenant who is better prepared for the intensity of being a distribution platoon leader, maintenance control officer, maintenance platoon leader, and supply support activity platoon leader. With these enhanced learning focuses, we are creating and structuring the programs to detail daily requirements for the second lieutenants in their positions, typical administrative paperwork, and the command and support relationships they will encounter in ABCTs. The program follows a three-day rotation with classroom instruction in the morning and site visits in the afternoon, enabling students to connect classroom instruction with on-ground experience. This shift is complemented by deliberate site visits integrated into the curriculum to enhance classroom instruction, ensuring students receive practical, job-relevant training.

BOLD will continue to adapt LOG BOLC to meet emerging threats and doctrinal changes. Future efforts will focus on integrating advanced technologies, refining training scenarios, and maintaining alignment with Army modernization goals of the Army of 2030. Efforts to modernize LOG BOLC are reflected through the introduction of virtual reality (VR), implementation of counter-small unmanned aircraft systems (C-sUAS) in tactics, a Bring Your Own Device initiative, a Decisive Action Training Environment-Indo Pacific scenario, and data analytics.

In collaboration with the U.S. Army Combined Arms Support Command's Technology Development Division, BOLD is developing an immersive VR training scenario for base defense operations. Set to be implemented in the second quarter of fiscal year 2025, this VR scenario will enable students to apply classroom instruction in a controlled environment. The C-sUAS in tactics module will be incorporated into the LOG BOLC program and involves a five-day field training exercise that simulates real-world attack conditions. This vital hands-on training includes practical application, evaluation, feedback, and readiness. Students apply theoretical knowledge in a simulated environment, allowing them to refine their skills and adapt to dynamic scenarios.

In conclusion, LOG BOLC aims to develop second lieutenant logistics officers as combat multipliers who can provide exceptional logistics and sustainment support in complex and diverse operational environments by incorporating multifunctional training, advanced technologies, and enhanced subject matter expertise.

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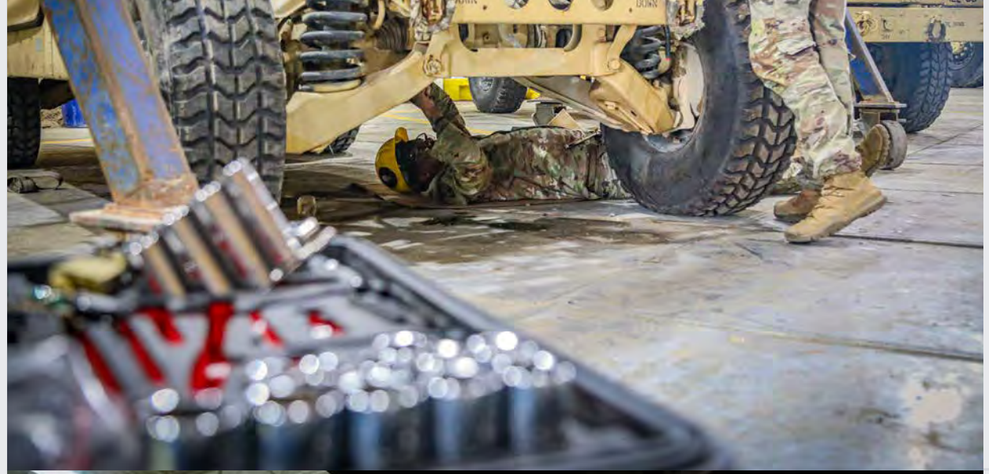

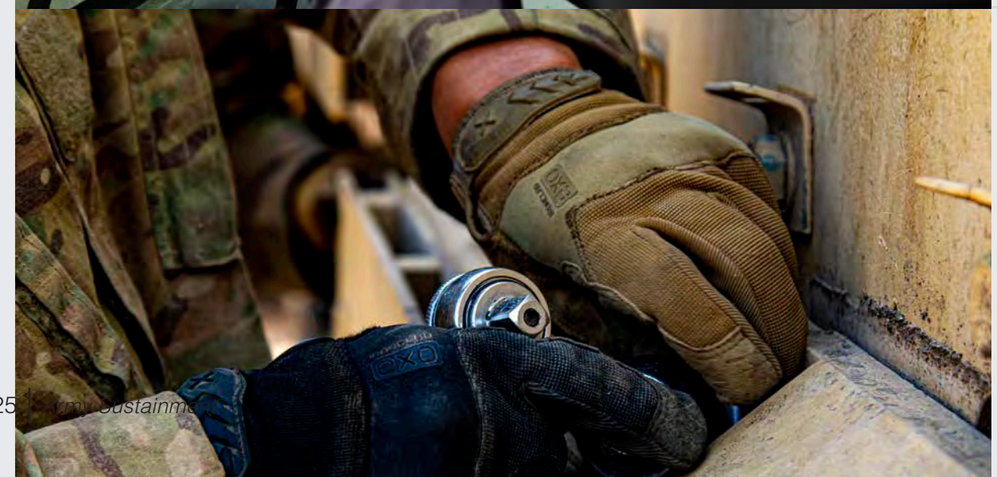

Army Maintenance Shortfalls

Overcoming Funding and Equipment Readiness

By MSG Caleb J. Gallagher

There have been significant changes in funding and readiness within the Army due to war efforts, which have impeded unit training and financing for maintenance operations. This has led to decreases in educated maintainers, detached leadership, and a reliance on maintenance contracts. As the military shifts in a new direction, maintenance is now at the forefront for commanders, who will not have contractors in some theater locations, putting more weight on maintainers. Capability-based assessments (CBAs) become possible through examining capabilities on maintenance readiness for current and future operations based on statistics, such as solutions from the National Defense Strategy (NDS) Army Capabilities Integration and Development System, which focus on modernization concepts and fulfilling assessed capabilities. Moreover, using doctrine, organization, training, materiel, leadership and education, personnel, facilities, and policy (DOTMLPF-P) creates initiative-based solutions to overcome equipment neglect, avoids adjustment of funding, trains undertrained maintainers, and highlights a way forward for funding efficiency through restructuring training and raising operational readiness.

Army Capabilities: Force Management

Army force management (FM) forms solutions and concepts throughout the decision-making process to meet the mission of tomorrow's operational structure. Developments look at integrating and developing materials, training, structuring, and resources. The goal is to enable the Army to meet its mission through necessary changes. Synchronization and process allow for the development of organization and personnel to meet these needs with clear and concise guidance. Moreover, capabilities are at the forefront of change and encompass the components of development, sustainment, separation, acquisition, training, distribution, and deployment of change. Army maintenance readiness has overcome challenges with a strategic plan that encompasses the FM components.

Past Maintenance Operations in Theater

Throughout operations in the Middle East, theater-provided equipment (TPE) included vehicles and equipment provided to units upon arrival. Using contractors, equipment remained mission ready. At the time, U.S. Army Chief of Staff GEN Mark A. Miley stressed the importance of TPE in meeting the Army's missions, intent, and high performance. With his guidance for operations, TPE included

155,000 combined radios, vehicles, gym equipment, and computers for deployed troops. However, this initiative had issues posturing for the future when funding and mission adjustments required military mechanics to resume being the primary maintainers.

The Future of Maintenance Operations in Theater

The first issue is that equipment is often unavailable for unit support in the front and back of deployment operations due to the extensive time to execute property handover. Maintenance costs create more issues, with a 2017 report showing a maintenance cost of $140,000 for one deployed heavy equipment transporter alone, while in the U.S. prices only reached $25,000 for the same service. Meanwhile, trained maintenance service members (SMs) became less focused on training due to contract support service, and maintenance programs suffered and ceased being primary concerns for commanders. With TPE provided in theater, deployed vehicles were used for training in stateside garrison units, making them less of a priority. This hurt their equipment readiness and accountability focus, and created undertrained SMs, underprepared units, and posturing for a future where TPE could not go.

Problem: Maintenance Readiness Shortfalls

The NDS and CBA allow the Army to see the existing guidance, find the means, weigh the risks, and meet the commander's intent and end state. Functional area analysis (FAA) assesses the need to raise maintenance readiness without relying on TPE. The functional needs analysis (FNA) identifies components of the problem and gaps in current postures, using the functional solution analysis (FSA) to drive a way forward. Finally, creating conducive output through DOTMLPF-P is paramount and aligns with Army doctrine and posturing structure.

Funding is key to changes in the Army. In fiscal year 2023 (FY23), distributed funds reached $70.32 million, with a request of $71.87 million for FY24, and $156.57 million alone for contract support. Annual maintenance costs for repairs and operations peak at around $59.56 million. The goal is to reallocate funding for internal training for the SM, who will primarily manage the Army's maintenance readiness in the future. With cost and risk most prevalent, military-trained mechanics and contractors play the most vital roles in meeting the Army's needs in these initiatives.

Military-Trained Mechanics

Military-trained SMs differ from contractors because they receive less specialized training, do not receive Automotive Service Excellence (ASE) certifications, and do not work for a business that specializes in equipment systems and components. However, SMs are the first line of defense for vehicles. Instead of extensive specialized training, SMs receive shorter training: they receive 12 weeks to learn the basics and field knowledge of equipment repair. Training ranges from brakes, fuel, electrical work, engine repair, and air conditioning. Upon graduation, SMs become entry-level apprentices and receive training in classrooms, shops, and field settings. However, the training is rushed, does not provide certification, and must allow SMs to be effective in operational settings without aid from contractors.

Military Contractors

Military maintenance contractors primarily come from Logistics Response Assistance Teams (LRATs), which cover operations for support responses. The U.S. Army Tank-automotive and Armaments Command (TACOM) manages the Army's ground equipment supply chain, which constitutes about 60% of the Army's equipment. Oshkosh Corporation aids the Army in building tactical vehicles such as the Mine-Resistant Ambush Protected (MRAP) vehicle. Finally, a logistics readiness center (LRC) executes depot-level maintenance on each installation, supporting units if TACOM cannot solve the problem at the lowest level.

Unit maintenance support consists of well-trained and certified maintenance personnel, primarily civilian employees and contractors. We need to train SMs to perfect their craft and not overuse them on tasks on which they need training. Further training with entities, higher-level assisted support, more emphasis from commanders on readiness, and using funding geared toward initiatives are the road to a more operationally sound Army. Training SMs and using contract support more effectively will avoid spending money on faulty maintenance, parts, and repairs when contractors cannot support units.

Solution: Internal and External

We must compare the previous posture and format of maintenance readiness to the future of the Army and its operations. Assessing the shortfalls in funding, training, personnel issues, and the extensive gap in training and knowledge between contractors and SMs can provide insight into pivotal areas. The overall goal is to save funding and expand the readiness through SMs by assessing internal and external solutions through DOTMLPF-P to define a way forward for the Army.

Internal Solutions

Internal solutions must drive training, experience, and knowledge at lower costs while reducing risks. Raising commanders' leadership knowledge and educating maintainers are paramount. Unit training is vital and serves as the baseline for all levels of involvement. This structure is based on predictive maintenance, understanding historical issues with each piece of equipment, statistics on why the problems arose, and what is on hand for components. However, executing such an initiative will take senior leaders' investment.

First, leaders must assess their formation statistics and know how to read status reports to understand the unit they lead and its readiness. Historically, mechanics worked longer hours, pushed through never-ending missions, and tried to find solutions without ever receiving leadership guidance or support. There are two options for the commander to overcome this failure: One, understand all maintenance components, statistics, and reports, structuring and arming their maintainers, starting from the unit format. Two, train to work with installation support.

Maintainers consistently deal with never-ending maintenance problems. Nevertheless, each Monday morning, they become overloaded with vehicle inspections, added training, unit formation, and a line of vehicles to inspect or fix. Units can help their maintenance teams by spreading out their inspections throughout the week. For example, headquarters can execute their operator inspection on Monday, with maintenance then executing their checks and inspections, preparing them for dispatching procedures, and following this sequentially over the work week. Furthermore, they can leave one day a week to examine historical data and reports, find what areas need help, and brief higher-level issues, which will drive post-wide training. A concept for training at the lowest level could be a stand-down Thursday, where unit training with a combat focus is done in the morning. In the afternoon, leaders and maintainers could train on overcoming historical issues and then brief the commander and the executive officer.

Post-wide training establishments use external entities such as LRAT, LRC, and TACOM to provide insight into training needs. At least monthly, senior leaders must come together in the maintenance arena using a sustainment academy where facilitated training answers questions on pitfalls, gets answers on what needs support for the future, and gives senior leaders the tools to train their subordinates in their operational setting. Moreover, on-post facility capabilities, post-wide support from contractors and sustainers, and rotations trained in prominent training areas allow for a shared understanding and solutions from contract teams without relying on them to execute the mission.

Furthermore, the training audience must consist of senior maintainers and commanders for a shared understanding at all levels. The structure begins as the units brief their G-4, who in turn briefs their brigades, with briefs brought to the brigade (BDE) commanders'(CDRs') attention in monthly sustainment syncs, and with support from division G-4 maintenance and the support operations (SPO) maintenance material branch. Once all echelons get briefed, the information is given to the sustainment BDE CDR and drives readiness and understanding of the issues from a big-picture view. Once the training course is completed with officers, warrant officers, and NCOs, it is then shared with the subordinate units, who train on their available timeline. After-action reviews are vital to improve future training.

External Solutions

External training allows tactical training outside the unit, provides education, fills gaps in the echelons, and provides for specific qualifications

outside the unit for the best support. Internal solutions are the best option for commanders when saving or reallocating funds while mitigating risk. They allow all leadership levels to understand each other and their units' constraints and shortfalls. However, setting up internal programs is not always feasible, and deployed units cannot always set up sustainment academies. Internal and external solutions through CBA must still fall under DOTMLPF-P, using training, leadership education, and personnel. External solutions using a mix of contractors and added training will answer the call.

Funding external solutions creates a lower risk in the long term, but funds must be reallocated to pay for them. However, structured training and certifications that contractors receive significantly lower the risk and offset future contract funding. One solution is for ASE to become available for more SMs. ASE certifications include 11 tests using tuition aid and testing without in-person instruction. SMs who excel in these programs take one entry-level test, seven intermediate tests, and three advanced tests to complete their certification at Fort Gregg-Adams, Virginia. The tests allow them to become experts.

Historically, courses were available to maintainers, such as MRAP University out of Texarkana, Texas, which trained more than 14,600 troops in a six-week school covering all families of MRAP vehicles. The training did not cost the SMs anything. The Army spent $14 million to $18 million on these programs, but funding quickly depleted as the war efforts shifted. The Training with Industry (TWI) program overcome the loss of MRAP University.

TWI places officers and NCOs in specific companies for one year to provide them with industry exposure and to aid them after they leave the military. They return to their duty location after the TWI tour. TWI provides them with a broader understanding of operations, teaches them techniques to solve maintenance challenges above basic levels, and enables them to receive ASE certificates.

The best solution is for BDE CDRs and maintainers to spread maintenance days, training, and time-shift other duties based on statistics. This will lower risks and save money.

Conclusion

Initiative-based solutions overcome equipment neglect, prevent adjustment of funding, prepare and train maintainers, and highlight a way forward for funding efficiency. They do this by examining maintenance readiness capabilities for current and future operations based on statistics, while providing solutions using the structure of the NDS, FAA, FNA, FSA, and CBA against DOTMLPF-P. Solutions that involve contractors to overcome undertrained maintainers and TPE will change based on new missions and theater locations. Creating time for training, spreading out preventative-maintenance days, and giving maintainers additional training will reduce the need for more contractors, will promote operational readiness in the absence of contractors, and will enable mission success. Failing to provide maintainers with post-wide training and TWI, and having commanders merge with their senior maintainers to analyze shortfalls, will lead to overworked and undertrained maintainers, overspending on replacement parts, more damage to equipment, spending more money on contractors, and a loss of confidence in unit readiness.

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Featured Photos
Top: Paratroopers assigned to the 122nd Aviation Support Battalion, 82nd Combat Aviation Brigade, 82nd Airborne Division, conduct ground maintenance on March 14th, 2024, at Camp Buehring, Kuwait. (Photos by CPT Erik Solares)
Middle: Leroy Cowden, a heavy mobile equipment operator at area maintenance support activity 158 in Anniston, Alabama, does annual maintenance on a vehicle. (Photo by SFC Crystal Harlow)
Bottom: A Soldier assigned to 2nd Armored Brigade Combat Team, 1st Infantry Division, arranges their tools to perform maintenance on a vehicle preparing to go into "the box" at Fort Irwin, California, August 3, 2022. (Photo by SGT Timothy Brokhoff)

Is your formation working on new, cutting-edge initiatives or developments that could significantly impact the entire sustainment enterprise? Your work is crucial, and we want to hear from you!

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MAXIMIZING COMBAT POWER

Lessons Learned from WFX 25-01

By CW5 David A. Marriott

This article presents the lessons learned by the 1st Armored Division (1AD) — America's Tank Division — on understanding, preserving, regenerating, and maximizing combat power during Warfighter Exercise (WFX) 25-01. The division staff worked through this problem set for many iterations before the exercise during their command post exercises (CPXs). After solidifying lessons learned from CPX 3, America's Tank Division employed them to determine their utility and success during complex operations.

There are four viewpoints that enable the successful management of combat power. The first is how 1AD illustrates the dynamics of combat power to facilitate decision making. The second analyzes how reconstitution operations are used and when regeneration efforts shift from incremental to sub-unit regeneration. The third introduces the initial reasoning, objective, and employment of Iron Forge. The fourth discusses lessons learned from WFX 25-01 and how they will drive future operations.

Understanding Combat Power

Field Manual (FM) 3-0, Operations, defines combat power as the ability to fight. It is the decisive blow that overwhelms enemy forces and creates friendly momentum. Joint Publication 3-0, Joint Campaigns and Operations, defines combat power as the total means of destructive and disruptive force that a military unit/formation can apply against an enemy at a given time. Regardless of how you define combat power, every fighting formation knows it is one of the most essential elements to achieving victory during multidomain operations.

There are five essential dynamics to combat power: leadership, firepower, information, mobility, and survivability. Each dynamic is imperative, requiring all warfighting functions (WfFs) to generate and apply combat power. 1AD wrestled with how to illustrate combat power and experimented with many graphic representations. In many cases, maintenance was the primary factor for a drop in combat power. However, bulk fuel and high-priority ammunition were also areas of concern. The sustainment senior mentor advised that the leadership aspect was missing. This advice aligns with FM 3-0, which states, "C2 (command and control) enables leadership, the most important qualitative aspect of combat power." It was acknowledged that leadership capability is difficult to determine during a simulated training exercise but could easily be calculated during actual combat operations.

Unit liaison personnel in the division main command post updated the combat power chart with oversight from division staff members in the division rear command post (RCP). This allowed for near-real-time data to be available to commanders at any point when a determination of combat power was needed. In conjunction with the division sustainment brigade expertise, RCP staff estimates provided projected combat power for future operations. These processes and controls enabled an understanding of current and future combat power while confirming the appropriate correlation of forces for combat formations.

Incremental vs. Sub-Unit Regeneration

Reconstitution is the process used to restore units to a desired level of combat effectiveness commensurate with mission requirements and available resources. The unit commander's assessment drives reconstitution. Once the initial assessment is complete, internal reorganization occurs to create initial combat power. This action does not require higher echelon resources but must incorporate the mission task. If the unit cannot meet mission objectives due to decreased combat power, the regeneration process begins.

Regeneration is the rebuilding of combat power for a unit through large-scale replacement of personnel, supplies, and equipment. Additionally, it is designed to reestablish essential leadership roles and ensure the unit has the required C2 elements. This task is daunting and requires the assistance of two levels higher than the unit getting regenerated. Often, a unit must be removed from combat to receive additional support from strategic assets. Regeneration is conducted both incrementally and by replacing sub-unit formations.

During most warfighter exercises, corps and division staff focus on incremental replacements and concentrate on the returns of personnel and equipment. This action does not consider the status of leadership capability and crew certification. On average, training forces lose substantial combat power and must be rebuilt using sub-unit regeneration. This requires personnel and equipment to be prepared in the rear before their integration into the battle. Replacements come in the form of platoons, companies, and, in some cases, battalion-sized elements. 1AD saw this when its cavalry met heavy resistance and enemy fires, causing

their combat power to plummet below 20%, leaving them combat ineffective. The division deputy commanding general for sustainment determined that this unit was a candidate for reconstitution and removed them from combat to begin the process.

Iron Forge

The action above forced 1AD to run its reconstitution battle drill, and the division staff immediately opened communication with the unit commander. He assessed that the unit needed approximately 65% combat power to continue the mission. The G-2 geospatial team worked with both fires and protection to determine the best location to conduct reconstitution efforts. Simultaneously, the sustainment fusion cell began working on the requests for replacements of personnel and equipment. III Armored Corps did not have Class VII equipment available in the requested quantities, so 1AD looked to other options to rebuild combat platforms.

Iron Forge was the name given to this reconstitution operation. Iron Forge later became the name used to identify the process for reconstitution efforts across the division, which included retrograding all battle loss equipment from the brigades to a single location in the rear area. Iron Forge became an entity that existed solely to manufacture combat power incrementally and in sub-units. In less than 48 hours, the 1AD cavalry unit was above 65% combat power and returned to complete its new mission task. Iron Forge was successful, and the division staff realized it could generate considerable results if adequately resourced.

Iron Forge not only remained operational, but it became a requirement. Military doctrine claims that inoperable equipment must be repaired as far forward as possible to enable combat actions. Forward maintenance collection points were forced to conduct survivability moves and displace to maintain shorter distances to unit formations. This made conducting repairs forward of the rear area problematic. Repairs that could not be done in 24 hours became candidates for evacuation. Army Techniques Publication 4-33, Maintenance Operations, states that division staff must identify requirements, understand available resources, and manage those capabilities for maximum returns. This, coupled with a clearer understanding of the environment and enemy situation, set conditions for Iron Forge.

Iron Forge used operation contracting support to facilitate base life support to prepare unit equipment. Additionally, it added materials handling equipment (MHE), cranes, and hazardous material (HAZMAT) services. The division logistics support element from the Army field support battalion (AFSBn) positioned its logistics assistance representatives (LARs) at this location to assist in the repair process. The call-forward team from the forward repair activity in Poland was also flown into this area to increase wrench time and provide additional expertise. These actions increased the throughput at Iron Forge, allowing it to return over a brigade's worth of equipment into the fight. Iron Forge was successful by consolidating battle loss equipment at a single location and applying battle damage assessment and repair (BDAR), controlled substitution, and cannibalization.

Lessons Learned

Below are the lessons learned from the employment of Iron Forge during 1AD's WFX 25-01. These lessons are to be used for educational purposes and do not supersede any guidelines found in Army regulation or doctrine.

Iron Forge Successes:

- Enabled the division to regenerate an entire armored brigade's worth of critical equipment.
- Increased the maintenance expertise and man-hours available with the division heavy and Stryker maintenance surge teams and the AFSBn LARs.
- Repaired and resourced battle loss equipment with a trained crew and combat load.
- Housed 200 Soldiers and 250 trucks with access to several road networks and proximity to air and rail capabilities.
- Used contracts to bolster its capability by adding base life support for 200 Soldiers, power generation with light sets, MHE, crane capability, and HAZMAT removal services.
- Increased cannibalization power by adding new platforms as candidates for repairable items.
- Created a Class IX repository for items unavailable in the theater as equipment was stripped of its critical line replaceable units before evacuation to III Armored Corps.
- Created a single evacuation point for all Class VII items deemed unrepairable by the division.
- Established base security from enemy forces with crews awaiting integration into their units. Tank and Bradley crews can employ serviceable platforms to reinforce the security posture.

Iron Forge Areas in Need of Improvement:

- Iron Forge was not part of the original concept of support. The analytics provided enough justification to determine a possible reconstitution site based on the scheme of maneuver.
- Operational contracts took considerable time to get employed due to unanticipated requirements.
- Protection measures must be planned before employment to ensure the reconstitution site is protected against aerial attacks and is beyond rocket range.
- Distance to forward formations grew exponentially as the fight continued. This left Iron Forge in the rear area on the far side of the river.
- Iron Forge did not coordinate with III Armored Corps to ensure the site was feasible as a future location for the AFSBn forward repair activity. The area selected was too far west, and Iron Forge was shut down instead of being absorbed.
- Maintenance surge teams were unavailable to be used as a push-package forward due to the amount of maintenance conducted at Iron Forge.
- Iron Forge did not include additional capabilities such as additive manufacturing, host nation maintenance support, or local procurement of Class IX items.
- Iron Forge was exposed to enemy observation. Units must determine locations that blend into the environment, such as abandoned warehouses or car dealerships.

Conclusion

Multidomain operations will force units to react to an ever-changing enemy and environment and to make rapid decisions to enable friendly forces to complete their missions. Army forces must maintain agility and move formations more rapidly than our enemy to seize key terrain while giving friendly troops a tactical advantage. This requires the division sustainment WfF to anticipate requirements, produce an economy of sustainment force, and generate options for the commander. Sustainment precision synchronized with the other Army WfFs enables the rapid employment of combat power.

Commanders and their staff must comprehend the total means of destructive and disruptive power a military unit/formation can apply against an enemy in time and space. Maximizing supply and maintenance capability and synchronizing it with strategic partners can quickly generate combat power capability. 1AD achieved maximum combat power when the commander's assessments were interpreted and combined with rapid evacuation and application of BDAR at a location capable of receiving new Soldiers and equipment and with access to sustainment resources. Iron Forge, first formed out of necessity, quickly became a tactic, technique, and procedure for future operations. It incorporated the rapid recovery and consolidation of non-mission-capable equipment, allowing for the overwhelming success of hand receipt, supply, and maintenance operations and the realization that this introduced a new means to achieve agility forward while maximizing returns in the rear.

CW5 David Marriott serves as the senior ordnance logistics officer in the 1st Armored Division G-4. He previously served as the senior maintenance warrant officer observer, coach, and trainer at the Mission Command Training Program. He became an automotive warrant officer in July 2007. He is a graduate of the Warrant Officer Senior Service Education Course and a graduate of the Command and General Staff College. His training includes the Joint Logistics Course, the Support Operations Course, the Middle Managers Course, and the Contract Representatives Course. He is a graduate of the Industry of Business Defense in Chapel Hill, North Carolina, and is recognized as a Demonstrated Master Logistician from the International Society of Logistics. He earned a master's degree in military arts and science from the Command and General Staff College.

Featured Photo
A Soldier belonging to the 3rd Brigade Combat Team, 1st Armored Division, drives a Bradley Fighting Vehicle off the vessel to be logged into a system at a checkpoint at the port of Setúbal, Portugal, on Nov. 7, 2024. (Photo by SSG Daniel Yeadon)

TRANSFORMING AND CONVERGING

SUSTAINMENT WARFIGHTER SYSTEMS

Aerial Delivery

■ *By Frank Badalucco*

The Aerial Delivery Readiness and Safety Team (ADRST) has witnessed firsthand how sustainment warfighting systems are evolving to meet the challenges of modern combat environments. Aerial delivery, a cornerstone of the Army's sustainment strategy, must undergo significant transformation and convergence to address inefficiencies, integrate advanced capabilities, and ensure seamless support to operational forces.

The ADRST is uniquely positioned to drive this transformation. Through assessments, training, and modernization efforts, we work to enhance readiness and operational capabilities across the aerial delivery community. This article outlines the challenges we face, the innovations we have introduced, and the achievements that position aerial delivery as a critical enabler in multidomain operations (MDO).

Our assessments reveal that aerial delivery units face systemic challenges that hinder their effectiveness. These include infrastructure deficiencies, critical equipment shortages, and gaps in training and leadership.

The state of facilities is a recurring issue that directly impacts operational readiness. Many units operate in outdated or inadequate facilities that need more space and resources for efficient operations. For example, the absence of shake-out/drying towers at key locations complicates parachute maintenance, while insufficient storage space limits the capacity to manage critical supplies. We have assessed many units operating out of repurposed facilities, ranging from former dental facilities to old motor pools. None is ideal for parachute packing, maintenance, or cargo-rigging operations. One facility requires riggers to extend the cargo parachute outside to complete the packing process.

Facility improvements are not just a logistical necessity — they are a prerequisite for ensuring the safety and effectiveness of our personnel. Inadequate infrastructure creates a ripple effect, reducing operational efficiency and morale, and creating an uphill battle for commanders when trying to improve a once-abandoned facility with Wi-Fi, which is needed to use mobile asset tracker-automated parachute management (MAT-APM). While challenges remain, there have been notable successes in addressing facility deficiencies. New rigging facilities and storage solutions have enhanced the operational capabilities of key units, providing a model for future improvements.

Modernizing facilities is essential to maintaining readiness. Projects that address storage limitations, upgrade rigging capabilities, and improve safety systems must be prioritized to support current and future operations.

Aging equipment and life-cycle management issues are among our most pressing challenges. The backlog in replacing parachute systems and the need for specialized equipment, such as altimeter chambers, create vulnerabilities in readiness. Equipment that fails to meet modern standards risks operational failures, which can have dire consequences in high-tempo environments.

Aerial delivery equipment has been managed via spreadsheets from the unit to the enterprise level. Until 2009, all aerial delivery equipment was classified as Class II durable until the T-11 and MC-6 parachute systems were implemented as Class VII. The reclassification added new layers to life-cycle management for the aerial delivery community. The initial fielding of the systems is about to reach the end of its life cycle, and trying to manage the fleet rebuy is an immense task for our item specialists and managers. A comprehensive approach to managing the life cycle of aerial delivery equipment will reduce backlogs and enhance readiness. This includes accelerating procurement processes and ensuring that units have access to modern, reliable equipment. The complexity of maintaining and certifying aerial delivery equipment requires a streamlined approach to life-cycle management. Addressing these gaps with systems such as MAT-APM is critical to sustaining operational capability.

Our assessments consistently highlight gaps in training for critical skills such as static line pack operations and container delivery system rigging. These training deficiencies are compounded by personnel shortages, particularly in leadership roles. During the brigade-centric Army in the 2000s, there was a gap between air delivery planners and sustainment brigade staff. An

Soldiers assigned to the 25th Combat Aviation Brigade, 25th Infantry Division, 4th Quartermaster Theatre Aerial Delivery Company out of Joint Base Elmendorf-Richardson, Alaska; 824th Quartermaster Company out of Fort Bragg, North Carolina; Air Force Airmen with the 7th Airlift Squadron, 62d Airlift Wing; and New Zealand Army Soldiers with the 51st Aerial Delivery Platoon, 5th Movement Company, conduct sling load operations during the Joint Pacific Multinational Readiness Center, at Kahuku Training Area, Hawaii, Oct. 9, 2024. (Photo by SSG Tiffany Banks)

initiative was set in motion to position chief warrant officer three (CW3) 921A Airdrop Systems Technicians on all sustainment brigade staffs to fill the gaps until enough logistics officer graduates from the Aerial Delivery Material Officers Course were developed to fill the staff positions.

Placing the CW3 921As at the brigade level, which included non-airborne brigades, created a gap in the aerial delivery rigging facilities and impacted the experience of our CW3s. Due to the highly technical nature of aerial delivery operations, the advancements in equipment and its rapid fielding, and placing the most experienced airdrop technicians on brigade staff, experience across the field quickly degraded. Through our assessments, we have identified that in facilities with warrant officer one (WO1)- and two (CW2)-level airdrop systems technicians, there is an average score of 70%. In facilities with CW3 921As, there is an average score of 90%. Several units have achieved commendable scores in recent evaluations, reflecting their commitment to excellence. These results testify to the effectiveness of targeted training and the implementation of best practices.

Leadership challenges extend beyond vacancies or senior technicians. Cultural and organizational issues in some units hinder the development of cohesive teams. As the ADRST, we emphasize the importance of strong leadership in fostering a culture of accountability and excellence. Leadership remains a critical component of unit effectiveness. We can address cultural challenges and build cohesive, resilient teams through mentorship programs and targeted leadership training.

One of the core functions of the ADRST is conducting thorough assessments of aerial delivery units across all components. These evaluations go beyond identifying shortcomings; they provide actionable insights that enable units to improve. We track trends and identify systemic issues by leveraging data analytics. We have identified gaps in technical doctrine work packages for in-process inspectors and work packages for quality assurance/ quality control (QA/QC). In the past, the field relied on experience being mentored downward. However, with the CW3s on staff, the CW2s are left to fend for themselves. Many do not have the experience to qualify their NCOs on in-process inspections or the knowledge to conduct QA/QCs properly.

Our work includes analyzing airdrop malfunction reports and sharing lessons learned across the community. This continuous feedback loop to professional military education for the warrant officer basic and advanced courses and the NCO education system ensures that units have access to the latest best practices and are equipped to address emerging challenges.

The ADRST is committed to elevating the proficiency of aerial delivery personnel. Our targeted training programs address technical skills and leadership development, ensuring that units are prepared to meet the demands of modern operations. In addition to engaging enterprises for solutions, we also provide on-the-spot coaching and mentoring during our assessments. We ensure the facility subject matter expert knows how to conduct parachute QA/QC and the proper way to qualify their NCOs on in-process inspection duties. Training programs must evolve to meet the demands of MDO. By incorporating advanced techniques and expanding access to specialized certifications, we ensure that personnel are equipped to handle the complexities of modern aerial delivery operations.

Credentialing initiatives further enhance our efforts. By standardizing qualifications and providing advanced training opportunities, we ensure that personnel are capable and confident in their abilities. This approach fosters a culture of professionalism and excellence across the aerial delivery community.

Over the past year, the aerial delivery community has made significant progress, largely thanks to the collaborative efforts of the ADRST and our partner organizations. These achievements demonstrate the resilience and adaptability of our personnel in overcoming challenges and driving innovation. The ADRST works closely with Headquarters, Department of the Army, G-44(S) - Supply Directorate to ensure policy is being updated, and with the Airborne and Aerial Delivery, Safety, Training, Readiness, Assistance Program; U.S. Army Reserve; 1st Special Forces Command; and U.S. Army Special Operations Command's aerial delivery teams to ensure we are on one standard and are driving toward the same goal. The ADRST has played a central role in sharing lessons learned through forums, summits, and collaborative engagements. These efforts ensure that insights gained in one unit are disseminated across the community.

The ADRST is dedicated to evolving aerial delivery in alignment with the Army's strategic priorities. By working closely with all Army components and engaging with joint and allied partners, we ensure aerial delivery operations are fully integrated into the broader sustainment framework.

As the deputy director of the ADRST, I have seen how transformation and convergence reshape sustainment warfighting systems. Aerial delivery exemplifies the potential of these strategies, combining innovation with operational excellence to support the Army's mission.

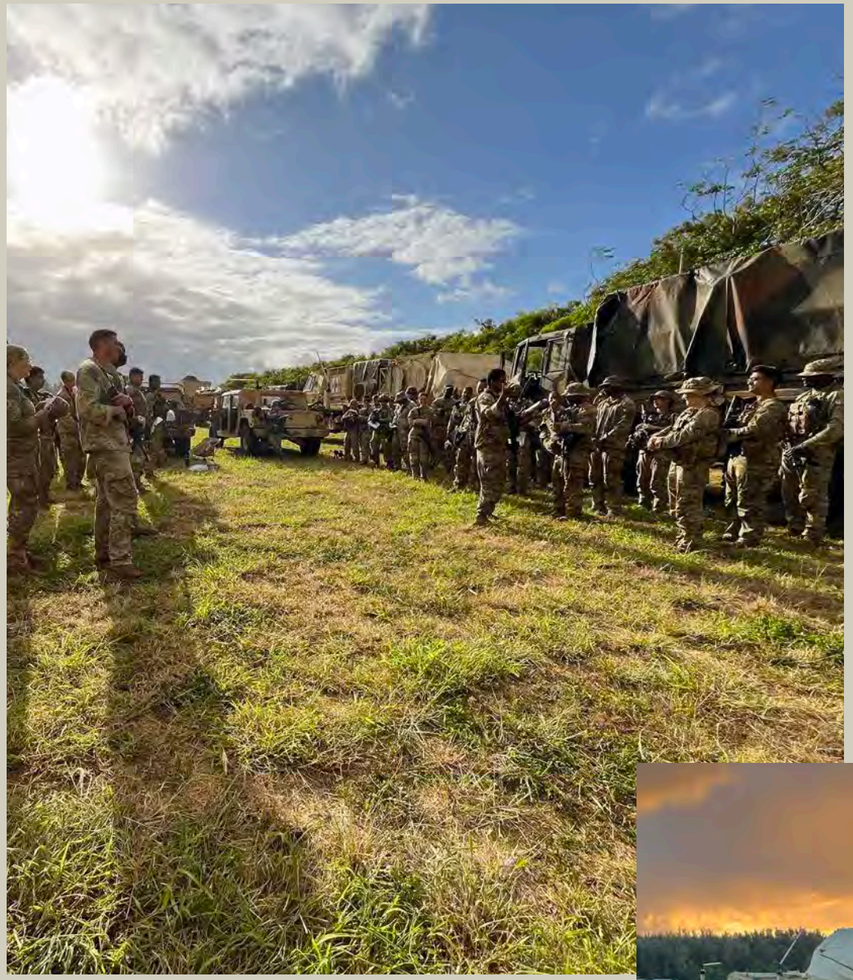
While challenges remain, our progress demonstrates the aerial delivery community's resilience and adaptability. By addressing infrastructure and equipment gaps, enhancing training and leadership, and leveraging modern tools such as MAT-APM, we are setting a new standard for readiness and effectiveness.

The road ahead requires continued collaboration, investment, and innovation. As we move forward, the ADRST will remain at the forefront of these efforts, ensuring that aerial delivery continues to be a catalyst for success in MDO and beyond.

Frank Badalucco is presently the deputy director of the Aerial Delivery Readiness and Safety Team at the Aerial Delivery and Field Services Department (ADFSD), Fort Gregg-Adams, Virginia. Previously, he was a senior airdrop advisor and an aerial delivery technical writer for ADFSD. During his tenure as a technical writer, he was responsible for monitoring and conducting initial analyses of aerial delivery malfunctions and incidents.

Featured Photo
5th Quartermaster Theater Aerial Delivery Company paratroopers rig an M1097A1 Heavy Humvee on a 16-foot type V platform during a three-day multinational training exercise with the Heavy Airlift Wing in Papa, Hungary, Nov. 14, 2024. (Photo by MSG Anthony King)

INTRODUCING



THE ARMY'S FIRST TRANSFORMED LIGHT SUPPORT BATTALION

■ *By LTC Jason T. Kappes*

The Army's transition to a division-focused structure as the unit of action has introduced a new paradigm in logistics and sustainment. Departing from modular logistics and units, the Army will test new technologies and organizational changes with transformation in contact (TiC). The 2nd Brigade Combat Team (BCT), 101st Airborne Division; 3rd BCT, 10th Mountain Division; and 2nd BCT, 25th Infantry Division (ID) were selected as pilot brigades for this initiative. Supporting 2/25 BCT, the 225th Brigade Support Battalion (BSB) transformed into the first light support battalion (LSB) using the original U.S. Army Combined Support Command (CASCOM) force design update (FDU), emphasizing increased efficiency, flexibility, and readiness.

CASCOM developed the foundational FDU, which was provided to the 25th ID upon notification of the TiC initiative in February 2024. This design echoed principles from the past Army of Excellence structure with support platoons historically organic to maneuver formations. CASCOM later introduced an alternate design, which redesignated forward support companies (FSCs) as combat logistics companies while retaining company-level leadership. The 225th LSB adopted the original FDU, conducting in-depth analysis to tailor the organization to its operational requirements. The transformation was executed on April 2, 2024, and rigorously tested during the Joint Pacific Multinational Readiness Center (JPMRC) 25-01 exercise. Notably, the 225th LSB is the only battalion to validate the original FDU model, while the two other brigades implemented the proposed alternate design.

Transitioning from the brigade as the unit of action to the division as the focal point requires a philosophical shift in sustainment operations. The return to an Army of Excellence model supports large-scale combat operations (LSCO) while moving away from modular designs optimized for counterinsurgency. Consolidated logistics elements improve efficiency, enhance military occupational specialty (MOS) training proficiency, and ensure flexible mission adaptation. The consolidation requires that higher echelons assume increased sustainment responsibilities, aligning forces with projected requirements. Comprehensive logistics planning becomes paramount, requiring additional analysis and more refined forecasts.

Key structural changes included the deactivation of FSCs supporting two infantry battalions and the cavalry squadron. Maintenance Soldiers were centralized under the field maintenance company and assigned to one of three combat repair teams (CRTs) aligned with the maneuver battalions. Distribution, fuel, and water specialists were reassigned to the general support company (GSC), organized into combat logistics platoons (CLPs) aligned with maneuver battalions. Field feeding capabilities were integrated into the GSC. The support operations (SPO) section's role expanded to plan and forecast sustainment activities, creating task-organized CLPs tailored for each mission requirement. The LSB commander, as chief of sustainment, directed sustainment priorities in alignment with the brigade's operational priorities.

The 225th LSB implemented several critical adjustments to the original CASCOM FDU. Leadership was assigned over the three CRTs in the form of a platoon leader and platoon sergeant due to the lack of direct oversight in garrison. The automotive platoon could not absorb additional personnel due to that hefty responsibility. Specific personnel positions, such as S-1 staff and low-density MOS enlisted Soldiers, that were templated to be eliminated

225th LSB demonstrated that a smaller, more agile sustainment force is not only feasible but advantageous in modern combat scenarios.

were retained based on operational requirements. Maintenance personnel were redistributed to technical sections from the proposed CRTs, enabling sections to balance their workload and increase training proficiency. For example, wheeled mechanics joined the automotive section, while armament specialists and computer/detection systems repairers joined the armament and electronics communication maintenance shops. Field feeding personnel and equipment from across the brigade were centralized under the GSC commander, an overdue consolidation that the brigade was planning before TiC.

Army Techniques Publication 4-90, Brigade Support Battalion, states that FSCs "may be attached to or under operational control (OPCON) to the supported battalion for a limited duration; a mission or phase of an operation." However, FSCs across the Army have operated as permanently attached units to their supported battalions for decades. While BSB commanders retain the authority to influence sustainment concepts across the brigade, the control of sustainment operations for maneuver forces has largely rested with maneuver battalion commanders and their assigned FSC commander. Factors such as rating chains, routine work locations, and daily support requirements have effectively overridden the doctrinal intent that such attachments be temporary.

The original CASCOM LSB design restores the intent of this doctrine by reintroducing temporary command relationships. It also ensures maneuver commanders retain the ability to direct sustainment elements supporting their forces, particularly for planning and operational integration. Implementing an OPCON relationship shortly before training or deployment provides the benefits of a consolidated sustainment force while allowing the CLP to deploy forward to critical points of need. This flexible framework enables adjustments during operational phases or in response to enemy threats and environmental conditions. It also allows the LSB commander, through the SPO section, to reallocate resources and personnel in real time, maximizing the brigade's operational effectiveness and eliminating redundancies or underemployed forces.

The elimination of FSCs and the introduction of CLPs were met with understandable skepticism, especially given the historical success of FSCs in providing direct support to maneuver battalions. These doubts mirror those raised during the creation of FSCs themselves, a move that initially faced resistance from leaders accustomed to legacy sustainment structures. However, 225th LSB demonstrated that a smaller, more agile sustainment force is not only feasible but advantageous in modern combat scenarios. The reduced signature and logistical footprint of the CLPs allowed for greater operational flexibility, decreasing the vulnerability of sustainment operations to enemy targeting while maintaining their responsiveness to the needs of maneuver units.

Despite skepticism about the removal of FSCs, JPMRC 25-01 validated the transformed LSB design. The reduced sustainment footprint and tailored support packages significantly improved operational efficiency. Maneuver battalion commanders' assessments confirmed that the transformed LSB met all sustainment needs during the rigorous 14-day rotation in Hawaii's jungle environment, and they had no concerns with sustainment during the exercise. This success underscores the adaptability of the new model and its potential for implementation across other Army units. The ability to rapidly create and deploy task-organized logistics elements proved invaluable in responding to the unique challenges posed by Hawaii's dense, unforgiving terrain.

JPMRC 25-01 revealed the importance of robust leadership and planning in the success of the transformed LSB. The expanded role of the SPO section was instrumental in overcoming challenges associated with the new structure. By taking on the responsibility of sustainment planning and task organization, the SPO section ensured that resources were allocated effectively and in alignment with the brigade's priorities. This level of centralized planning and decentralized execution represents a significant departure from previous sustainment models. The new model places greater emphasis on operational oversight, ensuring that sustainment plans are fully integrated into the brigade's overall operational concept.

While the transformed LSB demonstrated success, challenges remain. The field maintenance company's single maintenance control officer must oversee brigade-wide maintenance, a demanding responsibility for a relatively inexperienced lieutenant. This issue highlights the need for additional support at higher echelons to ensure that maintenance operations can be conducted effectively without overburdening key individuals. Furthermore, the consolidation of sustainment personnel and assets introduces a gap between support elements and the units they serve. This separation could lead to delays or misalignments in sustainment operations if not carefully managed through deliberate planning and communication.

The proposed integration of LSBs under division support brigades raises concerns about bureaucratic complexity. This alignment offers opportunities for greater coordination and resource sharing, but it also requires deliberate effort to prevent priority misalignment and to ensure that sustainment operations remain responsive to the needs of maneuver units. The success of the transformed LSB depends on the ability of leaders to navigate these challenges and maintain the focus on providing timely, effective support to the warfighter.

The LSB stands at the forefront of the Army's transformation efforts. By embracing innovative organizational models and doctrinal shifts, the 225th LSB has redefined the sustainment landscape, paving the way for the Army's refocus on LSCO. This fundamental evolution underscores the importance of adapting sustainment practices to meet the challenges of modern warfare.

Looking ahead, the lessons learned from the 225th LSB's experience will be critical in shaping the future of Army sustainment. The success of the transformed LSB highlights the potential for similar models to be implemented across other units. It also emphasizes the need for continued innovation and adaptation. As the Army continues to evolve in response to emerging threats and operational requirements, the sustainment community must remain agile, forward thinking, and committed to excellence. The transformed LSB represents a bold step forward in this journey, providing a blueprint for the future of Army sustainment.

LTC Jason Kappes serves as the commander of the 225th Light Support Battalion supporting the 2nd Light Brigade Combat Team (Prototype) in the 25th Infantry Division (ID), Schofield Barracks, Hawaii. He previously served as a professor of military science for the University of Puerto Rico-Mayaguez, as the chief of staff for the NATO Alliance Ground Surveillance Force in Sicily, and as the group S-4 for the 1st Special Forces Group (Airborne). He previously commanded the field maintenance company in the 703rd Brigade Support Battalion in 3rd ID. He has a Master of Business Administration degree in information sciences from American Military University.

Featured Photos
Top: 225th Light Support Battalion Soldiers receive a convoy brief from convoy commander CPT Abel Samuel before moving locations during the Nakoa Fleek field training exercise at Bellows Air Force Station, Hawaii, June 13, 2024. (Photo by LTC Jason Kappes)

Bottom: To minimize displacement time, Soldiers tear down individual sleep areas daily and repack their equipment on their vehicle after morning battle drills at Bellows Air Force Station, Hawaii, June 13, 2024. (Photo by LTC Jason Kappes)

Transforming & Converging Sustainment Warfighting Systems in the Arctic

■ *By CSM Eduardo I. Carranza and SFC Jimmie A. Gilchrist*

In today's rapidly changing strategic landscape, military forces must be prepared to counter threats in increasingly diverse and challenging environments, one of the most extreme being the Arctic. The Arctic's vast, cold expanses present unique hurdles that demand strategic focus and adaptability. Leaders across the Army are now tasked with equipping and positioning our forces not only to survive in this environment but to operate effectively in it.

This article explores how sustainment warfighting systems are evolving to meet the complexities of Arctic operations. The Arctic serves as a vital case study for why we need convergent, innovative systems to support and sustain multidomain operations (MDO) in the most challenging environments.

The Current State of Sustainment Warfighting Systems

The Arctic is unlike any other operational environment, introducing unprecedented challenges for sustainment. The frigid temperatures, unpredictable weather, and limited infrastructure mean that traditional sustainment systems often fall short of meeting these unique demands. Equipment readiness becomes even more crucial because cold exposure affects everything from fuel and lubricants to the internal components of machinery. These conditions push Soldiers to their physical and mental limits.

The 2021 Headquarters, Department of the Army, document Regaining Arctic Dominance: The U.S. Army in the Arctic acknowledges these challenges and emphasizes the Army's need for Arctic-specific doctrine and more robust equipment. It highlights the current limitations of water distribution units such as the Hippo water tank rack and the Camel II unit water pod system, which often freeze at temperatures below -25 F. This creates real risks because troops must have adequate water for hydration and meal heating. Addressing these gaps is essential for building a system that functions reliably in subzero conditions.

Drivers of Transformation in Sustainment Systems

As the Army moves toward MDO, integrating and adapting sustainment systems for extreme environments like the Arctic becomes increasingly vital. Predictive logistics, which focuses on using data to anticipate needs, is now a key driver of this transformation. By embracing a data-centric culture, the Army can manage the unique challenges of contested logistics environments more effectively.

Predictive logistics aims to empower sustainment leaders with tools and training to make real-time, data-driven decisions. Through the development of skilled data leaders and the modernization of data capabilities, the Army is equipping its personnel to handle logistical challenges in the Arctic with greater flexibility and foresight. This approach is part of a broader effort to ensure that troops have what they need, when and where they need it.

Convergence Strategies for Sustainment Systems

To support the complex demands of the Arctic, the Army's sustainment systems must work as one cohesive unit. Converging physical logistics and digital platforms helps to

minimize disruptions, allowing for real-time adjustments. For example, by integrating digital logistics platforms, the Army can streamline coordination between supply hubs, ensuring resources reach Soldiers in a timely manner.

The Regaining Arctic Dominance strategy also highlights the importance of unified command structures in the Arctic. Quick decision making and adaptive logistics are critical when resources are stretched thin and personnel face harsh environmental limits. In these situations, unified command enables efficient resource allocation and strong support structures, regardless of the region's logistical constraints.

Key Technologies Enabling Transformation

Technology is the backbone of the Army's evolving approach to Arctic sustainment. Predictive logistics allows sustainment teams to proactively address needs. By predicting equipment demands, fuel requirements, and other logistical needs, sustainment personnel stay a step ahead, avoiding breakdowns and shortages.

Beyond predictive logistics, artificial intelligence and machine learning also provide valuable tools for identifying patterns in data. For instance, during Arctic exercises, these technologies have helped prevent cold-related equipment failures.

In addition, autonomous vehicles and drones offer critical support in remote Arctic terrain, where regular roads and transport routes may be inaccessible. These unmanned systems can deliver supplies rapidly and safely in the Arctic. Meanwhile, advanced manufacturing techniques, such as 3D printing, enable troops to produce equipment parts onsite. This on-demand production capability bypasses the limitations of long supply chains and ensures Soldiers have what they need to keep equipment functional.

Case Studies and Lessons Learned: Arctic Warrior Exercise

The Arctic Warrior exercise provides insights into the challenges of Arctic sustainment. Observations from the exercise highlighted specific issues:

- **Vehicle maintenance:** Vehicles in the Arctic require constant engine-block heating, battery warming, and specialized lubricants. During Arctic Warrior, units frequently kept engines running continuously to ensure operational readiness, creating significant heat signatures visible from long distances. Cold temperatures froze the central tire inflation system, and standard mud tires provided inadequate traction, illustrating the need for studded tires and customized chains.
- **Personnel safety and personal protective equipment (PPE):** Personnel who work in extreme cold, particularly fuel handlers, need Arctic-specific PPE. During Arctic Warrior, a Soldier sustained cold weather injuries after being exposed to fuel, demonstrating the need for specialized clothing suited to fuel operations in sub-zero temperatures.

Lessons learned at Arctic Warrior and similar exercises offer significant lessons:

- **Develop Arctic doctrine:** Arctic-specific doctrine, techniques, and procedures must be established. This includes equipment standards, Soldier training, and safety protocols such as minimum temperatures for airborne operations.
- **Improve training:** Consistent training in extreme cold is essential to equip personnel with the skills to anticipate and manage cold-related injuries and equipment issues. Frequent exposure to Arctic conditions enables Soldiers to adapt and enhances unit readiness.

Deployable Resilient Installation Water Purification and Treatment System Demonstration in Arctic Edge Exercise in Alaska

Existing alternative water treatment technologies, necessary when water supply infrastructure is contaminated through a natural or man-made disaster, are too expensive and too heavy for easy deployment. New Army initiatives in Arctic regions include improving infrastructure resilience. This includes renewing Arctic and sub-Arctic dominance. When natural and man-made disasters occur, there is a need for small, portable water treatment system technology that can be quickly deployed for drinking, cooking, cleaning, bathing, and medical triage until water supply infrastructure is restored, including in Arctic conditions.

The U.S. Army Engineer Research and Development Center's (ERDC's) Geospatial Research Laboratory (GRL), Cold Regions Research and Engineering Laboratory (CRREL), and Construction Engineering Research Laboratory (CERL) successfully demonstrated the Deployable Resilient Installation Water Purification and Treatment System (DRIPS) at the CERL facility outside Fairbanks, Alaska. The primary objective was to showcase its efficacy in extreme cold weather environments.

The demonstration team consisted of personnel from the ERDC GRL, WaterStep, the U.S. Environmental Protection Agency's Office of Research and Development, the Center for Environmental Solutions and Emergency Response, the Homeland Security and Materials Management Division, and the Wide-Area and Infrastructure Decontamination Branch. The team showcased DRIPS to the National Renewable Energy Laboratory, the U.S. Army Corps of Engineers - Alaska District on Civil Works, the Department of Corrections, and representatives from Fort Wainwright, Alaska.

Integrating DRIPS into a modular force-sustainer structural system at the polar test facility and coordinating with the Permafrost Tunnel Research Facility allowed for a comprehensive validation of its performance, costs, and benefits. This included assessing water and bleach production (using patented electro chlorination) and digitized water quality reporting against federal and military regulatory standards during the demonstration event.

DRIPS will enhance the Army's (and by extension, DoD's) strategic posture by proactively addressing environmental factors that impact Army installations. It will also bolster installation resilience across combatant command areas of responsibility in polar regions for operational water needs. This effort underscores a commitment to long-term capacity building and improved environmental understanding, facilitated by common operating picture systems, fusion centers, and collaborative efforts.

The Path Forward for Army Sustainment

Looking ahead, the Army's ability to sustain operations in the Arctic will depend on building resilient, adaptable systems. Flexible supply networks and robust training programs help ensure that Soldiers remain ready, even in harsh conditions.

As suggested in the Regaining Arctic Dominance strategy, joint training and partnerships with allies familiar with Arctic operations are key in strengthening preparedness, building interoperability, and fostering a unified approach to sustainment operations in one of the world's harshest environments. This approach provides Soldiers with the resources, knowledge, and skills they need to excel.

Conclusion

As sustainment systems transform to meet the needs of modern warfare, environments like the Arctic both test and inspire innovation. The Regaining Arctic Dominance strategy underscores the Army's commitment to operational readiness through advanced technology, integrated command, and allied cooperation. With continued innovation and investment, the Army can build sustainment systems ready to support diverse missions and ensure operational superiority in any theater.

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Featured Photo
Soldiers, assigned to the 41st Field Artillery Brigade, secure ammunition onto a vehicle at a Rearm, Refuel, and Resupply Point during Dynamic Front 25 in Rovajärvi, Finland, Nov. 10, 2024. (Photo by CPT Sara Berner)

COMPETING FOR THE ARMY AWARD FOR MAINTENANCE EXCELLENCE

It's Not About Winning

By 1LT Melissa A. Czarnogursky

In 2021, I arrived at Eighth Army's (8A's) Headquarters and Headquarters Battalion (HHBN) at Camp Humphreys, South Korea, as a new Ordnance officer. I was brought on the team to assume two positions: the battalion maintenance officer and the maintenance platoon leader within the headquarters support company. The battalion's maintenance program was one of the worst in 8A, from the culture within the maintenance platoon, to the view of maintenance across a large and diverse battalion, to the status of equipment readiness. Six months later, our team was preparing to compete as a battalion in the 8A Army Award for Maintenance Excellence (AAME). Our journey of turning around the maintenance program, submitting for the AAME, and winning our category at the U.S. Army Pacific level is just as, if not more, interesting than the evaluation outcome.

After winning two AAMEs in two units and combatant commands in the last three years, our teams discovered that to become better, you must be willing do to something different and challenge yourself to seek personal and organizational improvement. The importance of opening your unit to the full benefits of inspectors and external evaluations, the value of directed education and team development, and positive cultural shifts are why the AAME is something Soldiers should not fear or delay. The time is always right to mature maintainers, improve cultures, and increase equipment readiness. It is not about winning; it is about growing in excellence.

What Is the AAME?

The AAME is the Chief of Staff of the Army's annual award program designed to recognize excellence in maintenance, adding incentive to programs across major Army commands. Established in 1982, the award program includes active duty, National Guard, Army Reserve, and Army depot-level categories, which are further broken down by the modified table of organization and equipment and table of distribution and allowance. The AAME is not an inspection but an evaluation, making it different from the Command Maintenance Discipline Program (CMDP) inspection that echelons at battalion and above undergo annually as a part of the Organizational Inspection Program. The CMDP inspects combat readiness, focusing on identifying deviations from established standards and highlighting organizational strengths and weaknesses. While feedback exists in both, the CMDP is required, but the AAME is voluntary. It includes an in-depth evaluation of every facet of the maintenance program. Subsequent results do not impact the unit or chain of command negatively. The inspection teams provide feedback to the chain of command and maintenance program leaders.

The AAME also differs from a CMDP inspection in how it evaluates individual Soldier competencies and the effectiveness of leaders and their processes. It goes beyond whether the unit can maintain equipment, uphold regulatory maintenance processes, and build combat power. It encourages and champions creative thinking, innovative and efficient processes, and competition. The AAME objectives, as stated on the Ordnance Corps website, are as follows:

- Improve and sustain field maintenance readiness.
- Assess the maintenance component of unit readiness.
- Improve efficiency and reduce waste.
- Recognize exceptional maintenance accomplishments and initiatives.
- Ensure that the best units compete.
- Provide positive incentives for extraordinary maintenance efforts.
- Promote competition at Army command, Army service component command, direct reporting unit, and DoD levels.

As an Army, we must be results oriented. Our national security and the lives of our people depend on our ability to win. Though we can never discount winning, we cannot lose sight that the journey is often as important. Competing in the AAME is one way to transform organizations. Every unit that seeks to meet or exceed the standard should compete. Several factors dissuade organizations from participating in the award program. These include having known faults within current maintenance systems and programs, high operational tempo, and a pervasive lack of confidence.

In 8A and 1st Battalion, 7th Air Defense Artillery (1-7 ADA), we viewed competition in the AAME as an opportunity to unlock the full potential of our maintenance teams. We educated our teams on the award and the evaluation process and charted a course to our objective.

Set the Goal, Then Ask Questions and Learn

Our maintenance team at 8A HHBN had little to no experience with the AAME at the time of submission. We had to start by asking for help. We scheduled an AAME staff-assistance visit with our resident higher headquarters AAME coordinators to understand the evaluation, requirements, timelines, and best practices. We worked with an incredible command maintenance evaluation team (COMET) in 8A, who were an invaluable resource. We communicated with their team frequently and invited them to conduct courtesy inspections and oversight of our program, especially as we prepared for the evaluation. They helped us develop and improve areas such as our battery maintenance program, shop and bench stock management, and dispatching. It also inspired us to create a library for manuals and efficiencies in our man-hour accounting. Their support helped fill in the knowledge gaps as we sought uniformity and effectiveness in our battalion-wide programs for arms rooms, communications, and chemical, biological, radiological, and nuclear equipment maintenance.

Similarly, in 1-7 ADA at Fort Bragg, we used the U.S. Army Forces Command G-4 team for guidance, thoughts, opinions, and instruction. They provided coaching and counsel for our safety and environmental/hazardous material (HAZMAT) programs, stock/parts cage management, and assistance for our maintenance clerks in their management of administrative and parts processing in the Global Combat Support System-Army. They exposed our shortcomings and encouraged us to think beyond the minimum requirements.

Get in the Regulations and Doctrine

A rewarding part of preparing for an AAME is how it guides us back into doctrine. The best place to start for a foundational understanding of a system or process in the Army is through doctrine. Army Doctrine Publication 1-01, Doctrine Primer, says, "Doctrine serves as a starting point for thinking about and conducting operations." Reading through the maintenance regulations, manuals, and publications provided the early warning indicators of where we needed to adjust our program. It enabled immediate course correction and inspired thoughtful follow-on questions to maintenance leaders and evaluators. This first step revealed knowledge gaps and breaks in the program. It then drove training and informed refinement of command and leader priorities.

Open Yourself Up to the Inspectors

U.S. Navy (Retired) CAPT L. David Marquet writes about the power of inspectors in his book *Turn the Ship Around!* A top naval captain and rising star in the ranks, Marquet was thrust into a challenging assignment as the commander of one of the worst submarines in the U.S. Navy. His leadership and management methods proved successful. He turned his submarine into one of the top performing submarines in the Navy within a year. Marquet championed having his vessel inspected and evaluated, saying, "It runs counter to the instincts expressed by many of my officers and chiefs to minimize the ship's visibility to the outside, especially when problems were involved." Marquet acknowledges one of the primary reasons people shy away from organizational exposure: We do not want outsiders poking around and looking at our internal operations because we fear the aftermath if found to be out of tolerance, incorrectly conducting business, committing safety violations, or being underequipped to do the mission right. It feels easier for people to remain unaware.

Exposing your organization to external scrutiny is where growth happens. It helps an organization see itself more clearly. Inspectors are deep wells of knowledge and seasoned teachers. We observed growth among our Soldiers as we brought AAME evaluation teams, G-4 elements, and COMET teams into our space. We embraced the AAME for program improvement and technical development as opposed to viewing them as the decider of our fate. The mere presence of inspectors gives your teams an opportunity to be inquisitive. It fosters collective growth and an environment of learning and curiosity.

Every Member on the Team Has a Role

A maintenance program includes many subprograms. It includes environmental and HAZMAT management, the battery maintenance program, motor pool safety, dispatching procedures, proper use of equipment, quality assurance/quality control, and physical security. Effective maintenance operations are an all-in type of endeavor. It takes more than one or two individuals to run an efficient, responsive, and resilient maintenance program. This is where the AAME can create cultural change that surpasses the award program and maintenance itself. It creates individual buy-in and cohesion, builds proficiency, inspires creativity, and grows individual confidence. By divesting direct control of certain programs to qualified NCOs in the maintenance program, we increased ownership at the individual level.

Dress Right, Dress

Motor pools can get messy and cluttered quickly. Maintainers become accustomed to working around paperwork covered in greasy fingerprints, dropped or picked up from a clerk's desk while installing a part. As our teams prepared for the AAME, we took a hard look at our processes for paperwork flow, filing, and maintaining historical and current data. We needed to get organized.

Use uniformed binders to keep track of programs. It not only makes the office look neat but demonstrates you have clear systems in place. The same goes for the maintenance bay. Examples include usable sheets for serviceability checks at the eye wash stations, clearly marked waste storage, and a functioning tool room with the right sign-out paperwork and tool inventory. These processes foster good property management, effective safety programs, and systems that are accessible for operators and maintainers. Do not overlook the small things. A maintenance training binder with products, storyboards, and after-action review comments shows maturity in the program. Documenting events and lessons learned enabled us to maintain progress.

It Is Not About Winning

"We don't have time." During both AAME evaluation periods, we were in periods of high operational tempo. Whether starting a war fighter exercise, initiating a joint exercise off-station, or preparing for a contingency response force mission that became a complex combat deployment, there was never a good time to submit. Most units will never find a perfect time to request an AAME. Manage expectations and develop a plan. Garner support from the chain of command and find ways to make improvements within the constraints of current battle rhythms. You cannot rebuild or fix your program overnight.

Compete in the AAME

Winning matters in our profession, but not everything is about winning. Sometimes the journey provides more lessons than the desired end state. Whether or not your team believes an AAME evaluation will be favorable, do not disqualify your organization from competing. Your program will benefit from the process, and your maintainers will be better technical professionals as a result.

The AAME is about more than winning a rigorous evaluation and receiving an award. As maintainers, it is our responsibility to provide world-class maintenance support to arm units with the equipment they need. Our success in the AAME mattered most because our teams had to provide critical maintenance support in challenging environments. We were ready because our program and team were ready. The AAME postured us to be at our best for when we are needed the most.

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Spaceborne Autonomous Resupply

The NASA Model for Prolonged Endurance in Multidomain Operations

■ *By MAJ Thomas Darmofal*

I. Spaceborne Autonomous Resupply

Astronauts from numerous countries have continuously occupied the International Space Station (ISS) for over 20 years. This continuous human occupancy requires intermittent resupply. However, the ISS does not return to Earth when it needs more supplies. Instead, the ISS relies on commercial resupply via rockets and spacecraft. The Army and the DoD must adopt this model of spaceborne resupply to enhance their prolonged endurance capability in multidomain operations (MDO).

Currently, the DoD lacks orbital delivery mechanisms to enhance prolonged endurance. Instead, it relies on the three traditional domains to sustain its force: sea, air, and land. The NASA model for resupply of the ISS provides the opportunity to fill the space domain sustainment gap by ensuring resupply capabilities in every tangible domain in large-scale combat operations. Rockets and spacecraft are the future of enabling prolonged endurance in MDO because they can autonomously deliver greater amounts of sustainment to U.S. forces in a more expeditious manner, regardless of the distance from base or austerity of the environment.

II. The Space Domain Is the Future of Enabling Prolonged Endurance Maximizing Methods of Delivery

Field Manual 3-0, Operations, defines endurance as "the ability to persevere over time throughout the depth of an operational environment." It highlights the importance of the Army's ability to continue operations for as long as necessary. Notably, the manual states that endurance "reflects the ability to employ combat power anywhere for protracted periods in all conditions." This sustainment principle carries over verbatim to the tenets of MDO. To achieve this doctrinal intent, U.S. forces must be able to continuously sustain forces anywhere on the globe at any time. Accordingly, achieving continuous sustainment requires the availability of every capable delivery mechanism. Current advances in space technology, demonstrated by continuous resupply of the ISS, provide another method by which the Army and other Services can enhance the ability to conduct combat operations.

Logistical support is the lifeblood of the Army. This sentiment is echoed by great military leaders such as GEN Dwight D. Eisenhower who have historically stressed the importance of sustainment: "You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics." Given its importance and in keeping with the MDO 2028 tenet of endurance, every method of delivering sustainment through autonomous resupply must be readily available to ensure the ability of U.S. forces to endure over prolonged periods of combat activity. The U.S. must be able to conduct autonomous delivery even in space.

The NASA Lesson

Spaceborne resupply is the only available method to deliver cargo, including science equipment, hardware, and other supplies to the crew aboard the ISS. Like NASA, the U.S. military may find itself in a situation where its forces are in an austere environment with no immediate means to deliver supplies via the traditional domains. Where land, sea, and air delivery are unavailable, spaceborne autonomous resupply provides the ability to sustain the force from any base or seaborne vessel in an expeditious fashion. Per NASA, a rocket launched from the continental U.S. can be at the space station in as little as four hours. A similar timeline is feasible for delivery of goods around the world. As an additional benefit, the autonomous nature of rockets and spacecraft reduces the risk of sending user-operated ships, airplanes, and vehicles.

Currently, two private contractors, SpaceX and Northrop Grumman (a prominent member of the defense industrial base), conduct autonomous resupply missions to the ISS. On the 30th commercial resupply mission to the ISS, a SpaceX rocket delivered over 6,200 pounds of cargo. The cargo included sustainment items similar to those a force may need during long-term operations, including over 1,000 pounds of crew supplies, 900 pounds of vehicle hardware, and almost 200 pounds of space-walking equipment. In terms of the strategic context, the defense industrial base can conduct spaceborne resupply, and the DoD must translate that capability to enhance prolonged endurance.

Issues with Spaceborne Autonomous Delivery

The most obvious issue with this method of autonomous delivery is that it is conducted via rocket. In most circumstances, a rocket coming down on troops is cause for concern. SpaceX recently developed a reusable rocket known as the Falcon 9 that can land — intact — vertically after launch. The Falcon 9 can also launch from and land on a vessel at sea. This reusable rocket provides the potential for the safe and expeditious delivery of supplies to U.S. forces around the globe.

However, rockets are still inherently dangerous. Last year, in a rare mishap, a Falcon 9 toppled over following its landing on a barge in the Atlantic Ocean. Additionally, as with all rockets, the enemy can intercept and destroy a rocket before it lands. These concerns are not unique to spaceborne delivery and must not deter development and implementation.

III. The Next Sustainment Frontier

Multidomain endurance requires multidomain endurance capabilities. The U.S. can supply its forces through the land, sea, and air domains, and it needs the same capability through space. The technology is readily available in the commercial sector. The time between wars is the best time to innovate, and there is no time like the present. Accordingly, the Army and DoD must adopt the NASA model of autonomous spaceborne resupply to enhance their prolonged endurance capability in MDO.

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IN AN ISLAND CONFLICT, EMPLOYING MULTI-MODAL LOGISTICS AND RELYING ON ECHELONS ABOVE BRIGADE SUPPORT, SUCH AS QUARTERMASTER RIGGING COMPANIES TO RIG SUPPLIES OR AIR FORCE AND ARMY PILOTS TO TRANSPORT THEM, BECOMES A TRUE TRUST EXERCISE FOR ALL LOGISTICIANS INVOLVED.

SUSTAINMENT PLANNING

for Joint Forcible Entry Operations in an Island Fight

■ *By CPT Gabrielle Davis*

The 225th Light Support Battalion (LSB) provided critical support to 1st Battalion, 27th Infantry Regiment, Task Force Wolfhounds and its enablers during the joint forcible entry operation (JFEO) at Joint Pacific Multinational Readiness Center (JPMRC) 25-01. The Wolfhounds were tasked with conducting a 200-mile long-range air assault from Oahu to the Big Island of Hawaii as part of the rotational exercise. The 225th LSB was responsible for ensuring they were supplied throughout the exercise.

The mission's success was largely driven by meticulous sustainment planning days before the air assault to build and template multiple forms of aerial and sealift-based distribution. Significantly supplying a battalion task force (TF) across an island chain requires multi-modal and joint distribution methods alongside a fully integrated maneuver-logistics plan. Using joint doctrine as a guide, planning for failure, and building a multifunctional sustainment team, the 225th LSB established a flexible and responsible distribution network that enabled an entire battalion TF to fight and win over 200 miles away from higher echelon support.

Joint Doctrine and Preparation

Joint doctrine offers an excellent starting point to prepare for a JFEO. Out of the 16 logistics planning considerations listed in Joint Publication (JP) 3-18, Joint Forcible Entry Operations, four proved critical to the 2nd Light Brigade Combat Team's (LBCT's) success in JPMRC 25-01: determining logistics capabilities, identifying logistics enhancements, maintaining the protection of logistics, and identifying and sourcing critical items. Early in the planning process, the integration of fixed-wing (FW) and rotary-wing (RW) assets for aerial delivery proved essential. The 225th LSB staged and rigged 40 container delivery system bundles and three heavy equipment platforms of multiclass sustainment packages, including Class I rations and water, Class III petroleum products, Class IV supplies for a hasty defense, replicated Class V, a Class VIII bundle for the battalion Role 1, and high-demand Class IX parts such as tires and batteries. Leveraging joint and partner capabilities, the support battalion ensured there were multiple and redundant forms of distribution to sustain Task Force Wolfhounds.

As sustainers of the prototype LBCT, our mission was to allow our ground forces to accomplish the mission while remaining as light as possible. Using the logistics enhancement consideration, we prioritized the TF conducting JFEO with first-strike rations, allowing each Soldier to carry four days of supply (DOS) for their long-range air assault. Critical items were identified by phase of the operation, prioritizing Class I during assault operations and Class IV and Class V resupply for defensive operations. Finally, the support battalion kept a configured load of Class V at the modular ammunition transfer point rigged for RW aerial resupply to provide immediate support as required. Using joint doctrine provided a welcome framework to prioritize sustainment planning and to ensure that the 225th LSB was anticipating the TF's demands while creating a simple and flexible supply distribution chain over an extremely complex support area.

Plan for Failure

The adage "no plan survives first contact" often holds true, but exceptional sustainers craft plans that account for improvisation and anticipate how initial disruptions may impact logistics. During the planning and preparation for the JFEO at JPMRC, the sustainers of the 225th LSB established comprehensive contingencies for every mode and method of resupply across the theater. This included pre-positioning bulk water and fuel via sea movement to a secure beachhead, securing RW assets as a backup for FW aerial deliveries, and meticulously calculating the quantities of each critical commodity moving across the air bridge, matched to DOS for each Soldier on the ground. Thanks to detailed early-stage planning and precise coordination, the initial assault forces were fully sustained despite limited resources, reducing lifts and ensuring they were never left wanting. By the time the entire TF had boots on the ground, they were equipped with full combat loads, topped off with water, and ready to execute the mission. Maintaining primary, alternate, contingency, and emergency (PACE) plans for distribution is essential in any island chain fight, let alone a JFEO with minimal forward sustainment assets during the initial phase of the operation.

PVT Jeremy Griffith, a motor transport operator assigned to the 225th Brigade Support Battalion, 2nd Light Brigade Combat Team (Provisional), 25th Infantry Division, pulls security during the Joint Pacific Multinational Readiness Center exercise at Dillingham Airfield, Wailua, Hawaii, Oct. 2, 2024. (Photo by SPC Abreanna Goodrich)

Teamwork Multiplies Success

Synchronizing logistics across an island chain presents a unique challenge for sustainers accustomed to ground resupplies, where the tangible results of their efforts are evident as they directly hand off supplies to Soldiers. In an island conflict, employing multi-modal logistics and relying on echelons above brigade support, such as quartermaster rigging companies to rig supplies or Air Force and Army pilots to transport them, becomes a true trust exercise for all logisticians involved. JFEO planning inherently requires building strong relationships through long hours of coordination, creating a multifunctional and joint network of collaborators. While we can account for every planning consideration and follow each step outlined in JP 3-18 to create an ideal plan, the key to success lies in the crosstalk between organizations and the shared understanding of the mission.

Looking Ahead

For those preparing to sustain JFEO in an island fight, here are my recommendations:

1. Develop the PACE plan. When preparing for distribution operations in an island chain fight, evaluate every asset at your disposal — land, sea, air, and digital resources are critical. But do not stop there; always look beyond the obvious. There is often another method or mode of delivery that you may not have used before, whether it is a new technology, a different transport route, or an unconventional technique. The PACE plan must not only account for the standard logistics channels but also prepare for rapid shifts in operational conditions. A comprehensive and flexible PACE plan ensures you can adapt and overcome challenges in an island chain fight, where terrain, weather, and enemy threats can disrupt traditional routes. Continuously reassess your options; think outside the conventional framework; and anticipate potential disruptions to ensure that you always have multiple viable alternatives to sustain the force.
2. Build a multifunctional and joint team. In an island chain fight, the success of distribution operations relies heavily on a collaborative and flexible approach. Every asset has the potential to contribute to or support sustainment efforts. The complexity of operating across diverse terrains and environments demands a broad spectrum of capabilities, from ground transport to sea lift and air resupply. Therefore, building a multifunctional, joint team that seamlessly integrates all available resources is essential. Effective coordination between sustainment planners and maneuver forces requires the streamlining of communication channels, both within the unit and across the division. Flattening these communication structures ensures that information flows freely and quickly, eliminating bottlenecks and enabling faster decision making. This collaborative approach allows planners to leverage the full range of expertise from all branches and specialties involved. No single individual or team can foresee every challenge or solution in an operation as complex as an island chain fight. To succeed, sustainment planners must foster an environment where ideas are shared openly, diverse perspectives are valued, and every member of the team brings their unique strengths to the table.
3. Think like the enemy. In the context of distribution operations for an island chain fight, anticipating the enemy's actions is just as crucial as planning your own logistics. Adopting the mindset of the adversary enables you to evaluate potential methods of disruption and proactively identify alternative sustainment and distribution solutions that may not be immediately apparent. In a dynamic and high-stakes environment like an island chain, where the enemy can target key infrastructure, disrupt supply lines, or employ asymmetric tactics, it is essential to consider how they might challenge your operations. Start by developing basic, straightforward strategies, then build on them by engaging your team in brainstorming sessions. Encourage creative, out-of-the-box thinking to explore every "what if?" scenario. Having your team challenge assumptions and propose alternative solutions helps uncover potential vulnerabilities and prepares for the unexpected. This approach is not just about identifying direct threats; it is about understanding the enemy's decision-making process to identify their likely tactics, techniques, and procedures. By doing this, you can design a resilient and adaptable distribution plan that allows you to quickly pivot and respond to disruptions. In the fast-moving environment of an island chain fight, thinking like the enemy can be the difference between success and failure.

Conclusion

The 225th LSB's role in supporting Task Force Wolfhounds during JFEO at JPMRC 25-01 was a prime example of how meticulous planning, adaptability, and collaboration are essential to sustainment success in an island chain fight. The complexity of operating across multiple islands required a multifaceted and flexible distribution plan. By leveraging joint doctrine, preparing for contingencies, and fostering a cohesive team environment, the 225th LSB provided the necessary support to sustain the force, even when faced with the unpredictable nature of JFEO.

As we look to the future, the key to success in any island chain sustainment operation lies in flexibility, teamwork, and anticipating the unexpected. Developing a robust PACE plan, building a joint and multifunctional team, and thinking like the enemy are all critical components of an effective sustainment strategy. These lessons will serve as a guide for future sustainers in ensuring the warfighter remains supplied, adaptable, and ready to accomplish the mission in even the most challenging and remote environments. The 225th LSB's successful execution at JPMRC 25-01 underscores the importance of thorough preparation and the ability to adjust to changing circumstances, providing a model for sustainment operations in future joint and multinational operations.

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Determining Route Status in LSCO

Sustainment Lessons Learned from a Corps Warfighter Exercise

■ *By MAJ Mikhail "MJ" Jackson*

Who determines route status in large-scale combat operations (LSCO)? Is it the corps transportation officer (CTO), the corps engineers, or perhaps the protection team? In LSCO, determining the status of military routes is a complex and multifaceted process that extends far beyond the apparent simplicity of assigning this responsibility to a single entity such as the CTO, corps engineers, or the protection team. While it might initially seem that establishing route status falls solely under the transportation domain, the reality is far more intricate. To gain a comprehensive understanding of who determines route status, it is essential to delve into the mechanisms and collaborative processes that underpin this task. Unlike the simplistic view that assigns this responsibility to a single role, the determination of route status requires the integration of diverse expertise and input from various warfighting functions. Each of these warfighting components plays a critical role in ensuring that the logistical pathways essential for operational success are both secure and functional.

Route Status Analysis

Reflecting on my recent experience during the I Corps Command Post Exercise 2 (CPX 2), I realized that assessing and maintaining route status is a highly complex endeavor. The CTO oversees transportation logistics, and our role is complemented by the corps engineers, who assess and address terrain and environmental factors that may affect route viability. Additionally, the protection team provides assessments related to security threats and ensures that routes remain safe for troop and supply movements. Intelligence officers supply critical information regarding enemy activities and terrain challenges that inform route status. Logistics experts assess supply chain needs along the routes and ensure the efficient dissemination of all updates regarding route status across the command structure.

In LSCO, considering the massive area of operations (AO) and location, determining route status for every route can be even more difficult. One might ask how one determines route status for an entire route that you may never see. Is the route status red or green if the enemy is anywhere involved on any side of the route? This is a very good question. Subordinate units and analysis from various warfighting functions play critical roles in answering the question. We grasped this complex matter by implementing a few processes. In LSCO, we must establish checkpoints along routes to be successful. Checkpoints help establish route status on a smaller scale from multiple points inside one route. For instance, on one main supply route, checkpoint 1 to checkpoint 2 might be green, but checkpoint 4 to checkpoint 5 might be red based on enemy activity in the AO. Once the CTO receives the report, the CTO, corps engineers, and protection personnel determine which route to assess, but ultimately the decision stems from the operations channels. To help with determining whether a status qualifies as black, green, amber, or red, it makes sense for units to use some sort of route-status criteria chart.

We created our route-status criteria chart as a baseline tool that provides a means to send reports for corps to review and consolidate, and to get a full snapshot of the entire AO. At the corps level, the corps can only control what it can see from the corps support area (CSA) and below. Subordinate units must provide information for all routes beyond the CSA.

For route status to work, everyone must collaborate. The best way to involve everyone is through daily status reports, followed by a distribution working group (DWG) that reviews and synchronizes everyone's reports from their respective AOs for one clear picture. The DWG may not resolve all issues, but it is a good meeting that incorporates all transportation and mobility operations across the corps from both subordinate units and enablers to help see the battlefield. The key to making the DWG and subsequent meetings work in relation to route status is having an operations presence available in each meeting to validate routes according to what is reported from each unit's AO.

If the DWG cannot resolve routes, and warfighting functions cannot

agree on the final outcome of a route, the decision must escalate to a higher authority and likely assessment at the protection working group (PWG) for subsequent resolution at the protection decision board (PDB) by the deputy commanding general (DCG) of protection. The PWG is crucial for gathering and consolidating feedback from each previously mentioned office of coordinating responsibility to suggest alterations to route status, which in turn affect travel requirements. With continuous protection monitoring throughout this process, the PDB can empower the DCG of protection to decide whether to close routes or designate them as black. Black routes halt travel and necessitate immediate action. In cases of significant issues on routes, operations might be conducted by engineers for repairs or by the maneuver enhancement brigade for clearance. Additionally, if the operation lacks a DCG of protection, then responsibility falls on the DCG of sustainment to make decisions at the sustainment decision board.

Final Thoughts and Considerations

In conclusion, our recent experience during CPX 2 and the Corps Warfighter Exercise highlighted that success in route status relied on making it a dynamic process and delivering real-time updates through the Maven Smart System (MSS). While there were opportunities for more in-depth discussions on route status, we found that the most effective approach was for battlespace owners to provide periodic updates on their routes based on their assessments from the route-status criteria chart and for the CSA Current Operations and Integration Cell to consistently update the MSS layer for real-time visibility. Additionally, we established a quick-action team, composed of representatives from each warfighting function, to address major events — such as downed bridges along routes from enemy attacks — without waiting for a formal meeting. Our DWG meeting focused on route validation, while the PDB was dedicated to route adjudication, determining the actions needed to return a route from black to amber or from red to green.

In the context of LSCO, determining the status of military routes is a complex and collaborative endeavor. This process demands the integration of knowledge and decision making from a wide range of military disciplines. Each discipline contributes its specialized expertise, reflecting the multifaceted nature of military operations. Recognizing this complexity unveils the intricate interplay of skills and coordination required to successfully support and sustain operations, especially in challenging environments where conditions can change rapidly.

The significance of route status extends throughout the duration of combat operations, influencing the movement and supply of troops and equipment. Therefore, it is necessary to consider route status meticulously and monitor it continuously, with heavy involvement from operational planners and support from enabling warfighting functions. The effective management of route status compiles the essence of collaboration, adaptability, and strategic awareness from all warfighting functions — not just one.

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CONVERGING SUSTAINMENT WARFIGHTING SYSTEMS

USAREUR-AF's Data-Driven Global Sustainment Operations

By Wiley Robinson

Modern warfare demands seamless coordination and interoperability among multinational forces for effective partnerships. Logistics, often referred to as the lifeblood of military operations, is a critical factor in ensuring joint and multinational mission success. The Army must have logistics that can positively impact the decision making of command and control (C2) in sustainment operations. At the core of effective logistics is accurate, relevant, timely, and robust data. In joint and multinational environments, data must also be sharable to exploit its full potential.

In the U.S. Army Europe and Africa (USAREUR-AF) area of operations, efforts are ongoing that serve to validate the use of common

data standards to allow data to flow up, down, and across commands and echelons, regardless of national affiliation, to ensure effective logistics C2 for mission success in global sustainment operations. Recognizing the challenges of coalition operations, Headquarters, Department of the Army (HQDA) G-4 leads transformative initiatives to integrate sustainment and logistics systems, placing the Army at the forefront of innovation.

One of these efforts is ongoing within USAREUR-AF to enhance data interoperability with NATO and partner nations by bridging the gap between U.S. systems and NATO's Logistics Functional Area Services (LOGFAS). LOGFAS stands as a cornerstone of NATO's sustainment framework that serves as a comprehensive sustainment C2 system. It is an essential element for joint and multinational mission success. However, LOGFAS relies on data integration from national systems to achieve its full potential. Historically, this integration has been hampered by manual processes and incompatible data formats because allied systems have been incompatible with each other.

To combat these incompatibility issues, HQDA G-4 has developed and implemented the Joint Enterprise Data Interoperability (JEDI) concept of operations (CONOPS), a strategic blueprint that focuses on establishing a unified logistics environment capable of meeting the demands of today's high-tempo operational environments. JEDI synchronizes inputs into the LOGFAS ontology from U.S. information systems for global application. The JEDI concept was designed to solve data interoperability problems, and the JEDI-X solution, developed by NATO subject matter experts at Nexus Life Cycle Management, serves as an instantiation of that concept. JEDI-X has been used in theater as an operationalized data product. It was designed from the start to comply with common data standards for maximized logistics interoperability, regardless of Service or nation. It represents one globally applicable solution for standardizing logistics data flows and improving efficiency, accuracy, and timeliness.

The key innovation of the JEDI concept that the JEDI-X platform operationalizes lies in JEDI-X's ability to enable 1-to-1 data product integration using open data standards. For example, U.S. European Command uses the Joint Operation Planning and Execution System (JOPES) to process and organize the necessary data for joint U.S. operations in the European theater. JEDI-X has been successfully used to transform data from JOPES into the LOGFAS data product and the Allied Deployment and Movement System, ensuring a seamless flow of information. This capability provides staff sections with a unified planning perspective that aligns with NATO's operational requirements. Such integration supports early identification of sustainment challenges, the establishment of resilient supply chains, and the optimization of sustainment routes, all of which are critical for mission success.

A critical enabler of the JEDI-X platform is its underlying data ontology, a structured framework that ensures data from different systems aligns with a common standard. This ontology allows JEDI-X to map, transform, and translate logistics data into formats that are both NATO-compatible and tailored to specific mission requirements. By harmonizing data across platforms, JEDI-X facilitates seamless collaboration between coalition forces.

One of the ontologies that JEDI-X functions on is the Multilateral Interoperability Programme (MIP) Information Model (MIM), an open ontology designed as a global solution for enhanced data interoperability in defense operations. The MIM ontology is aimed at ensuring that all future capabilities remain interoperable regardless of vendor, Service, and nationality, maintaining a unified front in global defense initiatives. This interoperable data management is essential in modern warfare, since it enables more agile, informed, and coordinated responses in an increasingly complex operational environment. By using open ontologies such as MIM, the JEDI-X data platform enforces standardized, one-way data flows globally, ensuring U.S. logistics data can be effectively used for C2 decision making in sustainment operations.

The importance of the JEDI concept and the JEDI-X operationalized data platform extends beyond technical functionality. The JEDI and JEDI-X design embodies the principles of global scalability and adaptability, ensuring that logistics data products remain compatible across diverse systems and operational contexts by complying with MIM ontologies. By embedding JEDI-X into U.S.-led military exercises in Europe and Africa, the platform's capabilities are continuously validated and refined under real-world conditions. This iterative process allows the Army and its partners to address emerging challenges, evaluate new solutions, and enhance interoperability. Furthermore, the JEDI concept is not theater specific and is ripe for adoption across global theaters to further improve U.S. data interoperability among the joint Services and global partner nations.

The integration of the JEDI concept and NATO LOGFAS represents a paradigm shift in how the Army approaches multinational logistics. These efforts address longstanding challenges in data compatibility, process fragmentation, and reliance on manual inputs. By automating data pipelines and standardizing workflows by using the JEDI concept, the Army creates a unified logistics ecosystem that supports both national and coalition operations. Additionally, the use of JEDI by USAREUR-AF not only provides enhanced operational effectiveness, but it also sets a precedent for seamless joint and multinational collaboration globally.

Looking beyond USAREUR-AF, the U.S. Army Pacific Command (USARPAC) is also complying with MIM data standards through the American, British, Canadian, Australian, and New Zealand (ABCANZ) Armies program, further validating the JEDI CONOPS. Mirroring efforts in Europe, ABCANZ has developed a list of requirements for logistics data sharing, the Technical Standard of Requirements (TSOR). As a contributor to MIP, the ABCANZ TSOR reflects the MIM data standard, further contributing to a common global data standard now being used by both USAREUR-AF, through the JEDI-X platform, and USARPAC, through the ABCANZ TSOR.

The ongoing refinement of JEDI-X and the integration of the JEDI concept into multinational exercises in USAREUR-AF and USARPAC underscore the Army's commitment to continuous improvement. These efforts ensure that the JEDI concept remains adaptable to evolving operational needs and technological advancements. By embedding the JEDI concept into real-world scenarios, the Army not only validates its functionality but also reinforces its role as a leader in global logistics innovation. This global leadership is essential as the Army, via USAREUR-AF and USARPAC, gears up to participate in the DEFENDER 27, a pivotal multinational military exercise that will test interoperability among allies in large-scale, real-world conditions.

This transformation aligns with the broader objectives of the National Defense Strategy, which emphasizes building strong partnerships and enhancing collective readiness among NATO allies. By bridging the gap between U.S. national systems and NATO's LOGFAS, USAREUR-AF is strengthening its operational capabilities while fostering greater cohesion within the alliance. This collaborative approach ensures that coalition forces are prepared to address the complexities of future conflicts with agility, precision, and resilience and presents a validation for the use of common data standards.

The efforts of USAREUR-AF to integrate U.S. systems into NATO LOGFAS using the JEDI concept provide a framework for achieving seamless data interoperability. Embracing common data standards within the broader Army ensures that logistics remains a decisive factor in military operations, enabling coalition forces to operate with the agility, resilience, and precision needed to succeed in an increasingly complex and contested world.

Wiley Robinson serves as a logistics management specialist at U.S. Army Europe and Africa. A subject matter expert in NATO logistics functional area services and joint logistics operations, he has contributed to some of the largest live NATO exercises in the past three decades and has directly supported U.S. European Command objectives. He holds advanced degrees in logistics management and operational analysis.

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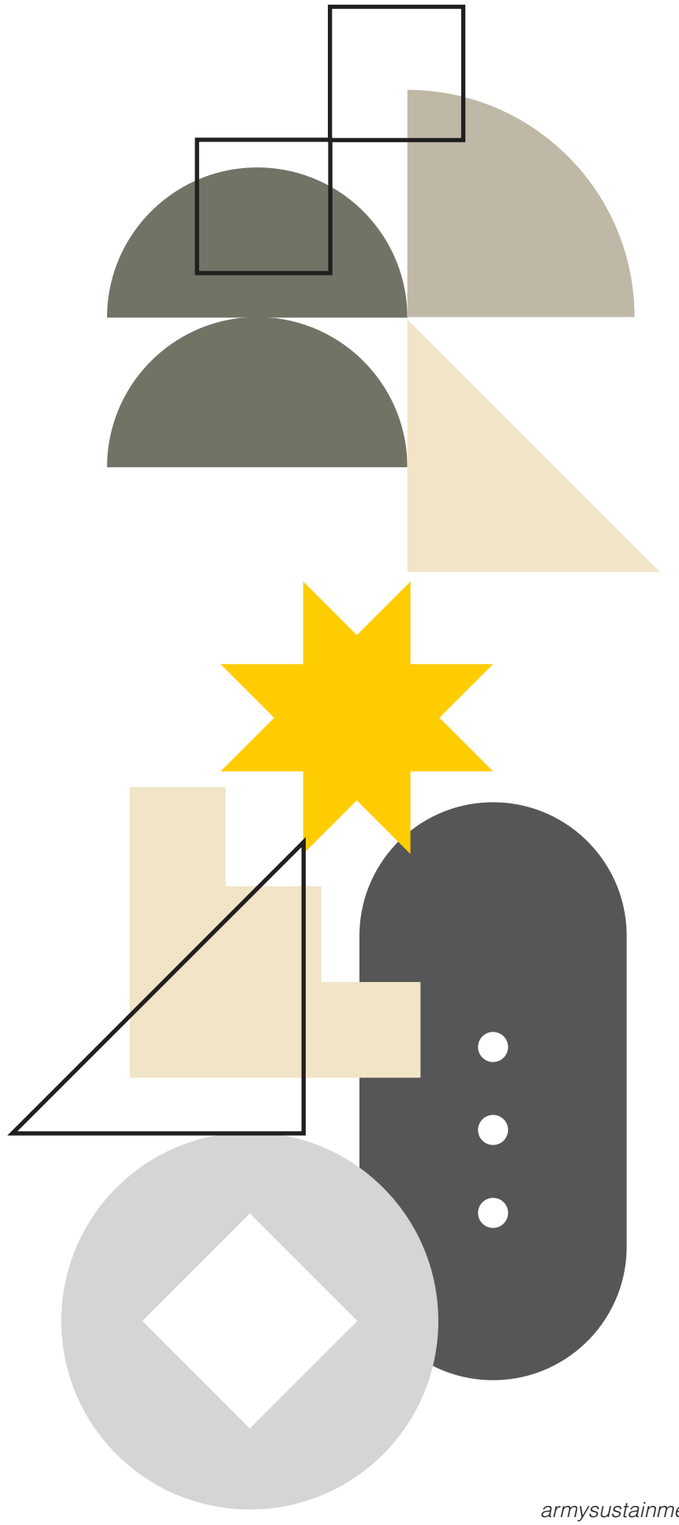
While the proposed modifications to the cluster concept offer significant benefits, implementing them requires careful planning and leadership. Resource constraints, manpower shortages, and competing operational priorities all pose challenges.



BASE DEFENSE OPERATIONS IN THE CLUSTER CONCEPT

■ *By 1SG Najib Samad and CSM Garrett S. O’Keefe*

The cluster concept has emerged as an innovative approach to base defense operations, particularly for support organizations operating in hostile or austere environments. By consolidating resources, enhancing redundancy, and reducing logistical footprints, the concept improves survivability and operational efficiency. However, it also exposes significant vulnerabilities. Support units, unlike combat-focused formations, prioritize roles such as logistics, medical support, and administration over direct combat preparedness. This focus leaves gaps in physical security, rapid response capabilities, and cohesive defensive training. To address these challenges, leaders must adopt the cluster concept. Strengthening physical security, enhancing response capabilities, and prioritizing cross-training are critical to ensuring the safety of personnel and mission success.

Strengthening Physical Security (Internal Measures)

The foundation of any effective base defense strategy is physical security. In the clustered base concept, where interconnected layouts amplify vulnerabilities, this element becomes even more crucial. A thorough security assessment is the first step in identifying weaknesses in existing defenses. By analyzing physical layouts, manpower, and resource allocation, leaders ensure that improvements address the most pressing risks and are implemented efficiently. This process is best carried out with the input of subject matter experts in base security, who can provide insights tailored into the cluster's unique structure.

A practical and immediate solution for bolstering physical security is integrating infantry teams or squads into each cluster. Infantry personnel bring specialized training in combat tactics, perimeter defense, and rapid response. Their adaptability makes them invaluable in augmenting base defenses. By embedding infantry squads within clusters, support units gain a versatile, mobile force capable of neutralizing threats swiftly and effectively. Infantry squads not only provide a visible deterrence but also enhance situational awareness and readiness.

Furthermore, infantry integration offers flexibility in addressing varying levels of threat. Whether deterring opportunistic attacks or responding to coordinated assaults, these squads act as reliable first lines of defense. Their presence allows support units to focus on their primary missions without compromising overall security. The inclusion of infantry within the cluster framework transforms base defense from a reactive to a proactive posture.

Enhancing Response Capabilities (External Measures)

While physical security addresses internal vulnerabilities, enhancing external response capabilities ensures that the cluster can respond effectively to dynamic threats. One of the most effective ways to achieve this is by augmenting cluster defenses with military police (MP). MPs possess specialized training in security, rapid response, and law enforcement.

MP augmentation offers a range of benefits. For example, MPs excel in convoy and evacuation security, areas where support organizations are particularly vulnerable. Logistics convoys and medical evacuation platforms are not inherently designed for self-defense, making them prime targets in contested environments. By securing routes, escorting convoys, and maintaining control over evacuation processes, MPs ensure that critical missions proceed without unnecessary risk.

Route reconnaissance and clearance, core MP capabilities, add extra layers of protection for logistical and medical operations. MPs can identify and mitigate potential threats before a mission begins. Additionally, their armored vehicles and mounted weapons provide a visible deterrent to enemy forces and serve as a robust protective force in the event of an attack.

The benefits of MP augmentation extend beyond direct protection. MPs can also serve as a specialized reaction force. Their presence bolsters overall deterrence, making it less likely that adversaries will target the cluster in the first place. Moreover, MPs can act as a training resource for support units and improve defensive readiness across the board.

By integrating MPs into the cluster concept, leaders create a layered defense system that addresses both internal and external threats. This approach enhances the safety of personnel and the overall operational effectiveness of the cluster.

Emphasis on Cross-Training

One of the most effective ways to bridge the gap between support and combat readiness is through cross-training. By providing logistical personnel with basic combat and defensive skills and familiarizing infantry with logistical operations, units develop a mutual understanding that enhances mission success. Cross-training fosters adaptability, improves communication, and ensures that all personnel are prepared to operate effectively in contested environments.

To maximize its benefits, cross-training must begin early and be integrated consistently into pre-deployment and training-event preparations. Starting this process well in advance allows logistical and combat units to develop trust, proficiency, and seamless coordination. This preparation becomes particularly critical during high-intensity operations where both elements must work together under pressure.

For example, attaching an infantry team to support units during training exercises allows both groups to practice collaborative operations. Infantry personnel provide logistical teams with hands-on experience in base defense and convoy security, while logistical elements familiarize infantry with the challenges of supply chain management and resource allocation. This mutual exchange of knowledge enhances readiness and fosters a culture of teamwork and shared responsibility.

In real-world scenarios, such as convoy operations or base defense, this cross-training pays dividends. Support personnel trained in defensive tactics can hold their ground until reinforcements arrive, while infantry familiar with logistical processes can step in to ensure continuity of operations in emergencies. This dual capability creates a resilient force capable of adapting to a wide range of threats.

Implementation Challenges and Leadership Solutions

While the proposed modifications to the cluster concept offer significant benefits, implementing them requires careful planning and leadership. Resource constraints, manpower shortages, and competing operational priorities all pose challenges. However, these obstacles are not insurmountable.

Leaders at all levels must advocate for the allocation of resources necessary to support these initiatives. For instance, securing infantry and MP support for clusters may require coordination with higher command or the development of innovative solutions, such as rotating personnel between combat and support roles. Similarly, cross-training programs must be prioritized during training cycles to ensure they receive adequate time and attention.

Communication and collaboration are also essential. NCOs, as the backbone of the force, play critical roles in bridging gaps between units, fostering trust, and ensuring that modifications to the cluster concept are implemented effectively. By emphasizing the importance of shared responsibility and mutual understanding, NCOs can build cohesive teams capable of meeting the challenges of modern warfare.

Conclusion

The cluster concept represents a significant evolution in base defense operations, offering unique advantages such as reduced footprint, enhanced redundancy, and improved survivability. However, its vulnerabilities, particularly in the context of support organizations, cannot be overlooked. Strengthening physical security through infantry integration, enhancing external response capabilities with MP augmentation, and prioritizing cross-training between support and combat elements are essential steps in addressing these challenges.

By adopting these targeted improvements, leaders can transform the cluster concept into a robust framework for securing support units in volatile environments. These measures enhance the safety of personnel and improve mission readiness and operational effectiveness. In an era of evolving threats, adaptability and proactive leadership are paramount. NCOs have a unique opportunity to shape the future of base defense and ensure the continued success of the cluster concept.

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1SG Najib Samad currently serves with Headquarters and Headquarters Company, 225th Light Support Battalion, 2nd Light Brigade Combat Team. His leadership roles include serving as the first sergeant (1SG) for Charlie Medical Company, 1SG for Field Artillery Forward Support Company, and a medical platoon sergeant for a cavalry squadron. He holds a Bachelor of Arts degree in philosophy from Arizona State University and has co-written and co-edited Army textbooks.

ARMY FUTURES COMMAND'S CONTESTED LOGISTICS CROSS-FUNCTIONAL TEAM

Transforming for Future Sustainment

■ *By Amy Jones*

GEN James E. Rainey, Commanding General of Army Futures Command, first announced the creation of the Contested Logistics (CL) Cross-Functional Team (CFT) in March 2023 at the Association of the United States Army's Global Force Symposium in Huntsville, Alabama. The team reached full operational capability later that year, charging forward with a vision to leverage technology and emerging capabilities to extend operational reach and endurance in a contested environment. Based in Huntsville, Alabama, at Redstone Arsenal, the team is strategically positioned alongside U.S. Army Materiel Command, the Army's lead materiel integrator.

Army senior leaders began discussing the need to address potential threats or disruptions in resupplying critical supplies long before the CL CFT came to fruition. The need to enhance operational capabilities, improve efficiency, and integrate new technologies seamlessly into military operations was clear. This initiative was a response to a rapidly changing environment where agility, speed, and technological integration were essential to maintaining operational dominance.

This article reiterates the definition of contested logistics, provides a brief history of the CL CFT, describes our portfolios and operational concept, and explores the avenues where academia and industry can assist in amplifying capabilities.

Definition

The Joint Concept of Contested Logistics (JCCL) defines contested logistics as "the act of planning, executing, and enabling the movement and support of military forces across multiple domains/environments across air, land, sea, space, cyber, and electromagnetic spectrum in a contested environment." Many senior leaders have expressed the sentiment that contested logistics is one of the biggest warfighting challenges we face.

Portfolios

The CL CFT adopted a portfolio approach to address the operational and technological needs of future operational readiness. This approach allows the team to focus on broader problem statements without cornering objectives into narrow technologies or limiting the scope to current capabilities.

How can the Army and joint and allied forces use artificial intelligence (AI), large language models (LLMs), and machine learning (ML) to collect, store, process, and use key logistics and medical supply data to make better and faster decisions, while providing more options for the means and mode of distribution? This is how we define our first portfolio, precision sustainment: it enables rapid, data-driven, and resilient logistics by leveraging advances in AI, ML, and other technologies.

How do we autonomously distribute critical supplies, such as ammunition, fuel, maintenance, and medical supplies, to land-based formations dispersed over extreme distances in a contested environment, independent of stationary or fixed facilities? This is how we conceptualize the future of human-machine integrated (HMI) supply and distribution systems: it will develop HMI formations deployable by ground, air, and sea, incorporating autonomous capabilities, extending commanders' operational reach and endurance, and reducing risk to Soldiers.

How do we reduce the need for consumable liquid fuels and batteries by integrating solutions in power generation, battery alternatives, hybrid drives, sustainable fuel technologies, and rapid fuel additives? This is how we define advanced power: it leverages new technologies in power generation, storage, and re-charge that are more efficient and that decrease logistics resupply requirements.

And finally, how do we reduce the frequency and demand for resupply and distribution of critical materiel such as ammunition, fuel, maintenance, and medical supplies to sustain warfighters and increase operational reach, endurance, speed, and ease? This culminates into demand reduction by using advanced manufacturing, alternative fuels, and new materials to reduce Soldier and platform weight and delivery times to meet requirements at the point of need.

Operational Concept

The future of Army sustainment starts on the front lines where Soldiers and weapon platforms, equipped with complex sensors, collect and transmit real-time logistic data. Data collected and transmitted includes consumption rates for Class III (fuel)/V (ammunition), current geolocation, speed, and direction of travel. Additionally, data may include real-time diagnostic information pertinent to the platforms themselves, similar to the modern vehicles we own and operate today.

Precision sustainment addresses the processing and analysis of this collected data by leveraging AI, LLMs, and ML to generate information that informs rapid sustainment decisions. Analysis from collected data combined with additional mission-specific variables, such as offensive or defensive considerations and the composition and disposition of the enemy, generate sustainment solutions. These solutions center around predicting upcoming demands of fuel, ammunition, maintenance failures, and medical supply needs; they also generate multiple distribution options at machine speed to ensure key commodities are delivered on time and at the (predictive) point of need.

HMI supply and distribution address the autonomous air, land, and sea platforms required to rapidly transport critical supplies to land-based formations dispersed over extreme distances in a contested environment. Autonomous platforms generate flexibility and resiliency in an intra-theater supply chain that operates in constant motion and is independent of stationary or fixed facilities. HMI ensures the distribution of key commodities and personnel throughout all domains at the volume required to sustain large-scale combat operations (LSCO).

Central to the effective employment of HMI and autonomous distribution platforms is our ability to seamlessly control distribution assets. This is done via a centralized multi-layered command and control architecture that synchronizes the activities of air, land, and open water autonomous platforms in parallel with sustainment solutions generated by precision sustainment capabilities. Capabilities in precision sustainment and HMI work in harmony, rapidly identifying and analyzing demand and informing sustainment solutions. They also generate and execute delivery solutions in complete automation, freeing warfighters to perform more critical tactical tasks.

Advanced power addresses our military's increased energy requirements while considering the expeditionary nature of LSCO. Class III distribution generates significant strain on supply chains at all levels. Advanced power seeks to reduce transportation requirements for consumable liquid fuels through the integration of advanced energy solutions, including power generation (solar, wind, geothermal), battery alternatives, hybrid drives, sustainable fuel technologies, and fuel additive options. Integration of these emerging technologies will inevitably reduce Class III demand and provide commanders with greater operational reach, endurance, and freedom of maneuver and action.

Lastly, demand reduction addresses our need to reduce the frequency of resupply and distribution of Class I (rations), VIII (medical supplies), and IX (repair parts) to sustain warfighters longer, increasing their operational reach, endurance, protection, speed, and ease of deployment in a contested environment. Technologies in expeditionary water production and advanced manufacturing provide promising solutions to reducing future demand during LSCO. Leveraging the full potential of emerging technologies can provide solutions to rapidly producing critical Class I, VIII, and IX, reducing the burden on the supply chain. Advanced expeditionary water production directly impacts distribution velocities, Soldier survivability, and operational readiness rates by generating sustainment at the point of need while reducing risk associated with vulnerable supply chains.

Priorities

To deliver capabilities required to bring this vision to reality, the CL CFT developed six near-term priorities. These initial efforts are all equally important and aim to increase the lethality and endurance of Army formations while reducing logistical burdens.

One of these priorities is securing Army Requirements Oversight Council approval of the contested logistics initial capabilities document (ICD). This ICD will serve as an overarching reference document for developing future sustainment solutions. It will also provide the foundation for future requirements documents that close or mitigate gaps associated with operating in a contested environment.

Under the precision sustainment portfolio, we are working on the predictive logistics capability development document (CDD). Initially, we will focus on Class III, Class V, maintenance, and medical real-time data collection at the platform level. We will then push this data over Army transport networks and parse it using AI and ML tools to provide commanders and logisticians with a more holistic view of the tactical and strategic operational picture to enable faster decision making.

In our HMI supply and distribution systems portfolio, we prioritize two autonomous CDDs: an autonomous resupply vessel (ARV) and a cargo unmanned aircraft system (UAS). The ARV is an autonomous cargo vessel employed as part of an intra-theater HMI supply and distribution system. It will operate in unison with other manned and unmanned systems to move and sustain widely dispersed land formations deployed in littoral contested environments.

The cargo UAS is an autonomous unmanned aircraft that enables intra-theater container transfer from shore-to-ship, ship-to-ship, and ship-to-shore, and includes inland lift capability. The cargo UAS is a key component of offloading manned and unmanned vessels such as the ARV and of delivering supplies closer to the point of need. It will provide casualty evacuation capability, bypassing lodgment operations on beaches in a contested environment.

In our advanced power portfolio, the CL CFT is teaming with academia and industry to present science and technology (S&T) opportunities to tackle future power solutions for the Army. Solutions in this area include more efficient hybrid-electric power for vehicles and generators, new battery technology, and harnessing technology that improves energy consumption of electronic systems and transferability through modular designs.

Finally, in our demand reduction portfolio, we are teaming with academia and industry to present S&T opportunities to drive the Army to operate more leanly in austere environments. We are prioritizing water production at the point of need in the near term.

Partnering

The CL CFT's success depends not only on its internal capabilities but also on the collaboration with external partners, particularly in academia and industry. The team is actively seeking expertise and innovation from these sectors to further its mission. The CL CFT invites academia and industry to collaborate on driving innovation and enhancing operational effectiveness. Together, these partnerships can shape the future of military operations, ensuring that the team remains agile, responsive, and at the forefront of technological advancements. Is your team ready to assist with the CFT's mission?

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CAPTAINS CAREER CORNER

EXTENDING OPERATIONAL REACH IN THE ARCTIC THROUGH LOGISTICS

■ *By 1LT Julissa Irizarry Lugo*

With political tensions mounting and everyone watching the Indo-Pacific, the Army must improve and innovate its methods of sustainment in the Arctic. Countries such as the People's Republic of China and Russia are already investing and increasing their influence in the Arctic. Operations in this type of environment can be lethal when Soldiers cannot conduct sustainment operations properly. Dealing with 130-degree temperature fluctuations and complex terrain, Soldiers face conditions that naturally impede logistical support. To maintain dominance and extend the operational reach in the Arctic, the Army must ensure they have the most efficient methods of supply and equipment that adapt to the Arctic's necessities. The Army must modify the Cold Weather All-Terrain Vehicles (CATVs), increase the number of aerial deliveries, and use autonomous aerial vehicles.

Modifying CATVs

The Army must modify the vehicles they currently use in the Arctic and deploy ones that adapt to the terrain and extreme conditions. The vehicles the Army uses are too tall, heavy, and wide, which makes the transportation of supplies difficult in the Arctic environment where there are narrow mountainous icy roads. Forward support companies (FSCs) face challenges while moving supplies on the battlefield to line companies. Most of the time, they are limited and constricted to certain roads and areas because their vehicles are so large. Recently, the Army introduced the CATVs to the units in Alaska. These vehicles can transport up to nine Soldiers in extreme cold weather conditions through the types of terrain found in the Arctic. While these vehicles increase the mobility of infantry companies, they do not solve the issues faced by the FSCs, which have vehicles that are too big for the roads or are not meant for the Arctic terrain.

CATVs must be modified to support the FSCs' missions, too, since they play essential roles on the battlefield. CATVs

must have the option to incorporate trailers in which the FSCs can carry supplies to the line companies. These trailers can transport small fuel and water tanks to facilitate the movement of these supplies when the demand is low. CATVs modified in this way can transport resources to more remote areas and can enable the FSCs to avoid main routes where the enemy can easily target them. Producing the modified CATVs will cost money, and time will be needed to train Soldiers on how to operate and maintain the new vehicles.

Aerial Delivery

Aerial operations must increase in the Arctic to provide an alternate support capability when ground operations are no longer feasible and to limit Soldiers' exposure to the hazardous environment. As stated in Army Techniques Publication 4-48, Aerial Delivery,

"Aerial delivery operations characteristics — speed, flexibility, range, responsiveness, and survivability — complement other Army movement assets. ... The aerial delivery mission includes ensuring the force has operational reach, freedom of action, and sustainability by enhancing transport capability and capacity."

While aerial delivery might not always be feasible due to monetary restrictions or weather conditions, it would increase the operational reach that the Army has in Arctic conditions. Arctic terrain can be brutal and, in snowy conditions, can be lethal. This increases the risk to Soldiers when conducting such missions, especially if they must go to remote areas with big loads. Aerial delivery gives commanders the flexibility on how to conduct resupply when ground transportation is not feasible. It also permits the extensive distribution of supplies over long distances. In addition, it reduces the FSCs' footprint and exposure on the battlefield, since adversaries target logistical resupply missions. Increasing aerial deliveries means investing more money in the aircraft and fuel. It also requires the time and energy to train more Soldiers in aerial delivery operations.

UAVs

The Army must use unmanned aerial vehicles (UAVs) that can transport supplies to the Arctic. In 2016, the Marine Corps introduced two Kaman K-MAX helicopters. This helicopter's primary mission was to provide cargo load operations with a maximum capacity of 6,000 pounds. These UAVs were used in Afghanistan for over three years and moved over 5 million pounds of cargo. With the introduction of this type of UAV, the Army would increase its ability to deliver supplies. Although this is a great resource, the Army needs to create its own model that adapts to the necessities of an Arctic environment, such as extreme cold weather conditions. A version that could be transported by ground would enable Soldiers to conduct aerial and ground operations simultaneously. Introducing this type of UAV would give the Army a higher logistical capability in an air-contested area. A new UAV model would require more money and time because it would have to be designed and fabricated. Time would also be needed for training Soldiers on the new UAV. Although it would come with a high cost, it would increase the operational reach that Soldiers have in the Arctic, enabling faster deliveries to remote locations.

Conclusion

When people think about sustainment in the Arctic, they must consider adaptability and non-conventional methods, because the standard ways and equipment might not work. The Army must adapt and be prepared to sustain and expand its operational reach in the Arctic. The battlefield is constantly changing, and there is no way to know where the next war will be fought. By investing in modifying CATVs, increasing aerial delivery, and using autonomous aerial vehicles, the Army would expand its operational reach and would be in a better to position to win future wars.

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Featured Photo
Soldiers from the 1st Battalion, 501st Parachute Infantry Regiment skijour behind a Small Unit Support Vehicle as part of the U.S. Army Alaska Winter Games March 4, 2021, at the Black Rapids Training Site. (Photo by John Pennell)

LOGISTICS **SCENARIO** Exercise **SOLUTION**

Answer

4 x MICLIC rounds at minimum.

Analysis

The max effective range of a single mine-clearing line charge (MICLIC) round is approximately 100 meters, meaning to create a single lane of this obstacle belt, CAB1's tactical control breaching assets would require 2 x rounds minimum to successfully reduce the obstacle. However, since the purpose is creating a lane for a battalion sized element (CAB2) to pass through, the planning factor is two breach lanes.

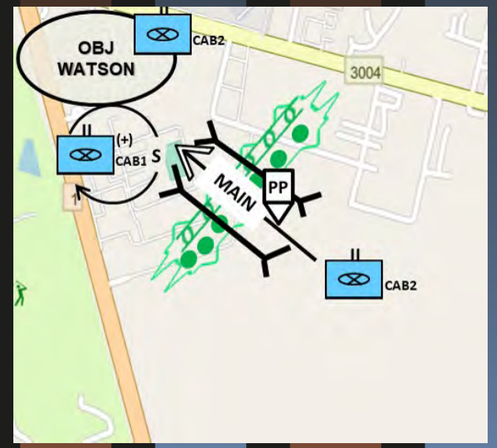
Reference

Army Techniques Publication 3-90.4, Combined Arms Mobility.

Logistician Takeaways

This scenario highlights the importance of logisticians adhering to the sustainment principle of integration and working in conjunction with multiple warfighting functions during the military decision-making process (MDMP). It would involve asking the S-2 for the enemy obstacle belt composition estimate, asking the brigade engineer about breaching requirements based on S-2's analysis, and asking S-3 about the overall scheme of maneuver, of whom is breaching, assaulting, and passing through the breach lane. This ultimately drives how much Class V you would need to request for resupply and how many MICLIC rounds you plan the forward support company to maintain in its sustainment load. Logisticians must be involved in the MDMP from the start and work in tandem with all staff sections to effectively forecast operational requirements.

As one logistician once put it, "Logisticians must have a hand in every cookie jar, because we ultimately provide the jars and the cookies for everyone to enjoy."



TOE, MTOE, & TDA

What's the Difference?

■ *By MAJ Bolko G. Zimmer*

To effectively and efficiently manage military assets, Army force managers and personnel and equipment resource managers must have the means of establishing and documenting personnel and equipment requirements for all Army units. The table of organization and equipment (TOE) system and the Army authorization documents system (TAADS) are the main sources that Army managers use for planning, programming, and budgeting for the force; procuring equipment; training personnel; and distributing assets.

The TOE system provides the method by which personnel and equipment requirements for combat, combat support, and combat service support units are structured and documented. The TOE document prescribes the mission, organizational structure, and personnel and equipment requirements for a specific military unit. It provides a basic guide or standard for the development of units on a worldwide basis. For example, a combat support hospital in Europe is organized under the same TOE and has the same basic structure as its counterpart in the Pacific. Units organized according to a TOE are referred to as TOE units.

The objectives of the TOE system are to:

- Standardize like units.
- Balance organizational structures.
- Determine full combat operational requirements.
- Measure operational readiness.
- Establish a standard organization and equipment data base.

While TOEs specify requirements, they do not authorize the equipment or personnel for particular units. They must be viewed as documents that reflect the unit requirements needed to support the established doctrine and concept of the actual wartime mission. In essence, each TOE acts as a blueprint or planning document that can be

modified to add or subtract items of equipment and personnel required for a particular unit depending upon geographical location; available funding; and unique and specific mission requirements that will vary depending on the terrain, weather, and political environment.

The TAADS bridges the gap between unit requirements and authorizations. TAADS is an Army-wide automated data processing system designed to centralize the control of personnel and equipment required by and authorized for Active Army and Reserve component units.

The objectives of TAADS are to:

- Provide each Army unit with a basic authorization document showing its personnel and equipment requirements and authorizations.
- Maintain current and complete data files on required and authorized personnel and equipment for use by planners, programmers, and resource managers.
- Maintain qualitative and quantitative data on personnel and equipment requirements and authorizations for both individual Army units and the entire Army force structure.
- Standardize authorization documents for similar parent units.
- Centralize control of organizational structures, requirements, and authorizations at Headquarters, Department of the Army (HQDA).

Under TAADS, each unit's requirements and authorizations for personnel and equipment are specified by a basic authorization document. This document describes the unit's organizational structure, mission, capabilities, and personnel and equipment allowances. Units and organizations so organized are responsible for having all authorized equipment on hand or on request. There are four types of TAADS documents: the modification table of organization and equipment (MTOE), the table of distribution and allowances (TDA), the mobilization TDA, and the augmentation TDA.

The MTOE adapts the basic TOE mission capabilities, organization, personnel, and equipment to the needs of a specific unit or type of unit. The MTOE provides a major commander with the means to modify or adjust the standard TOE for any one or more of the TOE units within his command. While the TOE specifies the requirements for units on a worldwide basis, the MTOE authorizes the organization of a specific unit (or group of units) within an assigned command. Therefore, two like units located in separate regions of the world will have somewhat different MTOEs but have an identical TOE.

In essence, the MTOE is the official authorization document by which TOE units requisition personnel and equipment. Without this approved general order document, no unit in the force can be activated or organized, and absolutely no personnel or equipment authorizations are in effect.

All combat, combat support, and combat service support units, whether Active Army, Army National Guard (ARNG), or Army Reserve, are organized under MTOEs. Each MTOE consists of three sections:

- Section I, Organization, which describes the principal modifications from section I of the base TOE and lists the parent units organized under the MTOE.
- Section II, Personnel Allowances, which documents the parent unit and subunit header data and prescribes the qualitative and quantitative data for the required and authorized personnel allowances.
- Section III, Equipment Allowances, which prescribes the line item number (LIN), generic nomenclature, and quantities of required and authorized equipment.

In the MTOE document, the required column entry depicts the level of personnel and equipment resources that should accompany an MTOE unit when deployed or committed to sustained combat. The authorized column entry indicates those resources applicable during peacetime operations as a result of budgetary constraints or manpower ceilings as directed by HQDA.

The TDA is another official authorization document. However, it is different from an MTOE in that it is tailored to perform a specific support mission for which no particular TOE exists. TDA units are basically nondeployable units organized to fulfill mission, function, and workload obligations of a fixed support establishment in the continental United States or overseas (for example, medical activities and medical centers).

For all TDAs the required column entry is based upon the military and civilian spaces and equipment recognized by manpower and equipment surveys. The authorized column entry shows the allocated resources as a result of budgetary constraints or manpower ceilings as directed by HQDA.

Each TDA consists of three sections and a supplement:

- Section I, General, which describes the mission, organization, capabilities, and other general information pertinent to the unit.
- Section II, Personnel Allowances, which documents the qualitative and quantitative data for the required and authorized personnel allowances.
- Section III, Equipment Allowances, which documents the Army-adopted items of equipment which have a standard LIN as listed in SB 700-20 (exclusive of the chapter 8 CTA items and developmental items as described in AR 310-49). Equipment allowances are prescribed by LIN, generic nomenclature, and the required and authorized quantities.
- Section III Supplement, Equipment Allowances, which is optional. It documents those items of equipment that do not qualify for inclusion in section III. These items are not Army-adopted and do not have a standard LIN as contained in SB 700-20. This section will not be forwarded to nor maintained at HQDA; however, it may be documented at the installation or major command level.

The mobilization (MOB) TDA is an authorization document that shows the planned mobilization mission, organizational structure, and personnel and equipment requirements for designated Active Army and Reserve component TDA units. MOB TDAs are developed by using the latest approved TDA as a base. In cases in which a TDA does not exist, a MOB TDA is developed using a similar TDA or DA staffing guide.

The augmentation TDA is a TDA document created to authorize additional personnel and equipment required for an MTOE unit performing an added non-MTOE mission. For example, if an ARNG TOE medical unit has the peacetime mission of performing ARNG physical examinations and the MTOE does not contain the appropriate examination equipment, then the unit may request that an augmentation TDA be added to the MTOE. However, this additional TDA equipment will not deploy with the unit upon mobilization.

The TAADS and TOE systems are not overly complex. They are, however, very labor intensive. They are also very difficult to keep current due to the required lead time needed for documentation processing. Nonetheless, they are important tools that all Army managers can and should know and understand. AR 310-49 provides guidance on establishing personnel and equipment requirements and authorizations for Army units under TAADS, and AR 310-31 explains the procedures concerning the development, preparation, and approval of TOE documents.

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Editor's Note: This Blast from the Past article was initially published in Army Logistician (the former title of Army Sustainment) in the May-June 1988 issue. The current regulations that govern force development are Army Regulation 71-32, Force Development and Documentation Consolidated Polices, and Department of the Army Pamphlet 71-32, Force Development and Documentation Consolidated Procedures.

EBS-C

ENTERPRISE BUSINESS SYSTEMS-CONVERGENCE

Transforming the Way the Army Sustainment Community Sees and Creates Operational Readiness and Lethality

■ *By Nikki Cabezas and CW2 Chris Cummins*

The Army sustainment community, particularly the ammunition community, has long struggled with outdated hardware, systems, and manual processes, restricting their ability to efficiently track requests, view available assets, and manage stockpiles. Users are challenged with cumbersome workflows, multiple system logins, and tedious manual reporting, while frequently facing last-minute requests for critical items.

In today's digital age, where seamless transactions and instant information access are the norm, the Army has significant opportunities to enhance the sustainment community's ability to see and create operational readiness and lethality through advanced technology and modern processes.

Imagine being able to order supplies, manage ammunition, and complete transactions with the same ease and speed as ordering a food delivery or paying bills on your phone. The Army is working to deliver that level of operational readiness with the Enterprise Business System-Convergence (EBS-C) program. EBS-C is a modern, agile, cloud-based solution designed to deploy sustainment capabilities quickly, reduce costs and risks, and provide easy access to users at all levels. It will converge five of the Army's current logistics and finance systems into one platform with the opportunity to replace dozens more. By leveraging a commercial-as-possible, military-as-necessary approach, EBS-C will use commercial industry software with simplified and standardized business processes to update the Army's logistics and financial operations. An open-architecture design means the EBS-C solution will evolve and grow with the Army's changing needs while keeping up with technological advancements, ensuring that the system remains relevant and effective for Soldiers and users from factory to foxhole.

What Can Ammunition Operators Expect to Gain from EBS-C?

Bottom line: EBS-C will allow sustainment operators to see a true, real-time picture of supplies, ammunition, parts, and equipment from one platform. It will provide end-to-end visibility of those assets, from the tactical level to the national level, ensuring that every supply decision aligns with the bigger picture. This visibility will empower commanders, civilians, and Soldiers to allocate supplies more effectively and to respond more quickly to emerging needs. Additionally, as a cloud-based solution, EBS-C will resolve accessibility and connectivity issues that the sustainment community currently faces, while having a centralized data repository that enhances collaboration from units to ammunition supply points and offers advanced analytics to support data-driven decision making.

EBS-C will provide ammunition operators at more than 80 supply points with one system for all ammunition management, whether it is for training or deployments, tanks or rifles. It will also improve data accuracy, provide unmatched visibility into ammunition activities' more than $60 billion worth of Class V munitions at all levels, automate workflows, and simplify access and requests. For example, suppose an ammunition stock control civilian at Fort Campbell issues a can of 5.56 mm rounds to a Soldier on post for training. Currently, the paper process requires them to print the Standard Army Ammunition System (SAAS) file and give it to a munitions handler, who then goes to the building where the can is located and pulls it off the shelf. They take the can to the issue warehouse, where it is given to the Soldier and all the paperwork is signed. The munitions handler returns to the ammunition stock control civilian with the signed paperwork, which must then be manually entered into SAAS to complete the transaction. EBS-C will automate this workflow using tablets, software, and a standard process to follow the can of 5.56 mm rounds from issue to receipt.

When Will Operators Be Hands On?

This year the Army will launch its first capability release to two pilot sites, Fort Campbell, Kentucky, and Camp Shelby, Mississippi , tackling the challenge of managing ammunition through manual processes. This release will focus on improving the management, storage, and transportation of Class V ammunition worldwide via ammunition supply activity management and Army organic transportation. From there, EBS-C will continue to deliver small and frequent capabilities, eventually scaling to nearly 200,000 users and providing an integrated logistics and financial solution for all classes of supply.

It is important to focus not only on when operators will use EBS-C but also on how they are involved in its development. This solution is not being created in the isolation of the Pentagon by engineers, architects, and non-sustainers. The EBS-C team collaborates closely with the sustainment community to co-create the system. Through interviews, user experience surveys, user videos, and virtual sessions observing users at work, the team gained first-hand insight into how sustainers perform their jobs and the challenges they face. Additionally, with two chief warrant officers on staff, the EBS-C team has direct access to Soldier expertise and experience, enabling them to quickly pull in Soldiers at all levels to ask questions and ensure the solution meets user needs.

EBS-C is more than just a system upgrade — it is a mission-critical Army transformation effort aimed at streamlining and improving the continuous flow of supplies, ammunition, and equipment to support large-scale combat operations and multidomain operations. Through both technology and improved back-end workflows and processes, EBS-C will provide sustainment Soldiers and civilians with a modernized platform that strengthens operational readiness and lethality, improves sustainment

U.S. Paratroopers assigned to 1st Squadron, 91st Cavalry Regiment, 173rd Airborne Brigade, carry ammunition boxes during a mortar live fire exercise at the 7th Army Training Command's Grafenwoehr Training Area, Germany, Jan. 22, 2025. (Photo by Markus Rauchenberger)

operations, and saves their most valuable commodity: time.

The platform will also empower users to work with greater efficiency, accuracy, and speed while enabling leaders to make swift, informed decisions to ensure Soldiers have the resources they need anytime, anywhere. By sharing insights on current challenges and opportunities for improvement, the ammunition community plays a critical role in shaping a solution that meets their needs, equipping the Army of 2030 to outpace adversaries and meet the demands of the modern battlefield through EBS-C.

In all, EBS-C is transforming the way the Army sustainment community sees and creates operational readiness and lethality with unprecedented clarity, while continuously adding and modernizing its features to get equipment and supplies to Soldiers where and when they need them, more rapidly than ever before, and with the most accurate and analytical data the Army has ever seen.

For more information about EBS-C and to learn how you can get involved, visit:

LinkedIn: *https://www.linkedin.com/company/75494523/admin/dashboard/*

Web: *https://www.eis.army.mil/programs/ebs-c*

Nikki Cabezas serves as the acting director of the Enterprise Business Systems-Convergence Multi-Functional Capabilities Team, a cross-functional team chartered by the Undersecretary of the Army. She also serves as the director of Financial Information Management, Assistant Secretary of the Army (Financial Management and Comptroller) (ASA[FM&C]). She was a project manager on the DoD Information Technology and Business Systems Reform Team. She is a certified Scrum product owner and knowledge manager. She graduated from the College of William & Mary with a Bachelor of Arts degree in political science and a Bachelor of Science degree in accounting.

CW2 Chris Cummins serves as the ammunition warrant officer for 3rd Brigade Combat Team, 82nd Airborne Division, at Fort Bragg. He also serves as the U.S. Army Forces Command appointment subject matter expert for Enterprise Business Systems-Convergence. Before switching to the Army, he was the U.S. Air Force combat air forces munitions automation manager. He completed the Warrant Officer Advanced Course. He also maintains Information Assurance Technical Level 2 and Information Assurance Management Level 1 certifications. He holds a Bachelor of Science degree in information technology from American Public University.

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