THE ARMY'S OFFICIAL PROFESSIONAL BULLETIN ON SUSTAINMENT

WINTER 2026

ARMY SUSTAINMENT

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DATA-CENTRIC SUSTAINMENT

TRANSFORMING AND CONVERGING SUSTAINMENT WARFIGHTING SYSTEMS WITH C2 NEXT

ASPB ARTICLE OF 2025

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PB 700–26–01 Headquarters, Department of the Army • Approved for public release; distribution is unlimited.

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ON THE COVER

"Data-Centric Command and Control: Transforming and Converging Sustainment Warfighting Systems with C2 Next is the theme of the winter 2026 issue of *Army Sustainment Professional Bulletin*."

Strykers staged while awaiting vehicle updates during Ivy Sting III on Fort Carson, Colorado, Dec. 4, 2025. (Cover photo by SPC Cecilia Jasinski)

ARMY SUSTAINMENT
PB 700–26–01
VOLUME 58, ISSUE 01
WINTER 2026

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WEBSITE: *WWW.ASU.ARMY.MIL/ALOG*

Army Sustainment (ISSN 2153–5973) is a quarterly professional bulletin published by the Army Sustainment University, 562 Quarters Road, Fort Lee, VA 23801-1705.

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.

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!

DID YOU KNOW?

Our new "Did You Know?" section is a platform for units and service members to showcase initiatives that enhance formations and operating procedures. By sharing your successes, you're not just highlighting your hard work, but also helping other units avoid duplicating efforts.

Let's make sure no one has to reinvent the wheel.

BUILDING A DATA-CENTRIC SUSTAINMENT ENTERPRISE

■ *By LTG Christopher O. Mohan*

The demands of large-scale combat operations are clear: our warfighters require reliable and timely sustainment support to maintain a decisive advantage. In my last column, I challenged the Army sustainment enterprise (ASE) to transform into a data-centric enterprise, leveraging advanced analytics and artificial intelligence (AI), to streamline processes and maximize resources. Today, we are answering that challenge by integrating our efforts into one of the Army's most important priorities: Next Generation Command and Control (NGC2). This is how we move from simply using data to making data the foundation of our warfighting decisions.

NGC2 represents a fundamental shift from rigid, stove-piped hardware to a flexible software architecture built on a common data layer. For sustainers, this is revolutionary. No longer are logistics data separate reports or different screens; they are woven into the common operating picture alongside intelligence and operational data. The goal is to provide commanders with the information they need to make faster, better-informed decisions, where the ability to sustain a fight is as visible as the fight itself. This is our mandate, and the ASE is leading the Army in leveraging data and analytics to meet it.

Within the ASE, we are building powerful applications that feed and leverage this new ecosystem. This data-centric approach starts at the tactical edge. Applications like ParaLine empower Soldiers by cutting inventory times in half and ensuring clean, accurate data flow up from the field. New AI-assisted maintenance applications provide 24/7 expert-level troubleshooting, freeing up our logistics assistance representatives to focus on the most complex challenges. This ground-truth data then directly feed strategic decision tools. While not an application for the individual Soldier, Weapon System 360 is a key example, consuming data to give AMC and senior sustainers the enterprise-wide visibility needed to make critical decisions about the supply chain. This is the model for how sustainment plugs into the larger C2 ecosystem.

This is where we turn visibility into action. When data highlight a critical shortage, advanced manufacturing provides an agile solution. Through collaborative efforts, we can now use digital 3D models to create on-demand replacements, dramatically reducing readiness gaps. In a contested environment where traditional supply lines are no longer guaranteed, this ability to produce critical parts at the point of need is not just efficiency — it is a warfighting imperative. A key example of this agility was our collaboration with the 101st Airborne Division, where our organic industrial base turned direct Soldier feedback into rapidly prototyped tactical drones, delivering transformative capabilities at the speed of relevance.

NGC2 is the architectural backbone for our Army. Our role in the ASE is to deliver powerful applications and agile sustainment that are predictive and precise, all fueled by clean data. By converging these systems, we are transforming sustainment into a proactive, integrated partner in the fight, ensuring we can deliver combat readiness and give commanders the dominance needed to deploy, fight and win — anytime, anywhere.

LTG Christopher O. Mohan currently serves as the commanding general of U.S. Army Materiel Command. He was commissioned into the Army from Appalachian State University in Boone, North Carolina, where he graduated as a Distinguished Military Graduate. 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 goal is to provide commanders with the information they need to make faster, better-informed decisions, where the ability to sustain a fight is as visible as the fight itself.

THE ARMY MEDICAL ENTERPRISE

Embracing Decision Advantage

"Soldiers are our greatest asset, and they alone are the reason we are still the most powerful Army in the world."
— Secretary of the Army Daniel Driscoll at the Association of the U.S. Army Conference, October 13, 2025

■ *By LTG Mary K. Izaguirre*

Our nation depends on a strong Army to deter conflict and, if required, fight and win decisively. The foundation of our strong Army is the American Soldier. Whether preparing for large-scale combat, securing the homeland with operations on the southern border, or enhancing interoperability with our allies and partners around the world, the American Soldier trusts that the best medical care in the world will be on the battlefield at their time of need. To provide optimal medical support to operations and keep faith with Soldiers and their families, the Army Medical Enterprise is transforming from being data driven to embracing data centricity.

Why Decision Advantage Matters

As the integrator of health services and health protection for the total Army, the Office of the Surgeon General published a decision advantage strategy in March 2025 to synchronize, coordinate, and deliver authoritative medical information to support the Army's lethality, agility, and survivability. In the complex environment of multi-domain and large-scale combat operations, decision advantage must enable commanders to visualize operational medical capabilities; clear the battlefield of casualties; prevent and mitigate disease and non-battle injury; return wounded, ill, and injured Soldiers to the fight; and resupply tactical formations engaged in the close fight.

The practice of evidence-based medicine, whether in military treatment facilities or in tactical units around the world, is inherently data driven. However, data-driven decision making must transform into data centricity for decision advantage to matter. Multi-disciplinary data champions from across Army Medicine are laying the foundation to position medical data as a core asset, supported by systems and technologies integrated with the Army's Next Generation Command and Control (NGC2) efforts, to drive advanced analytics and artificial intelligence (AI). Working with corps and divisions to determine the enterprise requirements for medically informed decisions will conserve the fighting strength. Transforming to a data-centric enterprise will enable Army leaders to analyze the effectiveness of manning, training, and equipping the medical force and to prioritize resources to target desired outcomes.

Commanders must incorporate data beyond Army systems to make holistic Soldier-centric decisions. That is why data from the Department of War's electronic health record, Military Health System (MHS) GENESIS, must integrate with Army readiness, training, operations, and logistics data to unlock decision advantage. Integrating MHS GENESIS with data from Army installation support services will also strengthen the ability of systems, such as the Exceptional Family Member Program, to better support Army families.

Building the Foundation

Data-centric transformation starts by acknowledging that Army Medicine must operate from the Army's primary data platform, Army Vantage, which is a cultural shift from how Army Medicine has traditionally managed enterprise data. Consolidation of trusted and timely data in Vantage enables the development of medical data products, providing leaders at all echelons with actionable insight to enhance mission effectiveness.

Adopting the Scrum framework, with support from the Army's Offices of the Chief Information Officer, the Chief Technology Officer, and the Chief of Staff of the Army, U.S. Army Medical Command (MEDCOM) developed the Medical Roles of Care Dashboard in under five weeks using source system data from Integrated Personnel and Pay System–Army, Global Combat Support System–Army, Defense Readiness Reporting System–Army, and the Army organization server. The Medical Roles of Care Dashboard provides a holistic overview of active duty, Guard, and Reserve medical personnel assigned to Roles 1 through 4, unit locations, medical evacuation platform slants for the HH60 helicopter, the M1133/M113 personnel carrier, the M997A3 ambulance, and critical medical equipment slants for defibrillators, ventilators, and x-rays. By the time this article is published, the data product for this dashboard should be registered in the Army Data Catalog, reducing duplication of effort to create similar insights across the force.

Vantage data also feeds advanced analytics and frontier algorithms both within and outside the Vantage platform. Integration of personnel and equipment data with live casualty data from the Battlefield Assisted Trauma Distributed Observation Kit–Joint (BATDOK-J) into command-and-control platforms, such as Maven Smart System (MSS), enhances battlefield situational awareness, improving patient regulation, allocation of evacuation assets, and visibility into medical logistics supply chains. Army Medicine embraced continuous transformation throughout 2025 to achieve BATDOK-J integration.

In April 2025, the 101st Airborne Division provided feedback on the shortcomings of BATDOK-J to operate on the Army's Integrated Tactical Network. MEDCOM worked with U.S. Army Western Hemisphere Command (formerly Forces Command), joint, and Army organizations to accelerate a fix. In September 2025, a short five

To provide optimal medical support to operations and keep faith with Soldiers and their families, the Army Medical Enterprise is transforming from being data driven to embracing data centricity.

months later, MEDCOM and the 82nd Airborne division's successfully transported live BATDOK-J data through the division's Tactical Assault Kit server into MSS at the Joint Readiness Training Center. As BATDOK-J scales across the Army in 2026, further integration with MSS will enable decisions on triage, evacuation, reconstitution, resourcing, and relative combat power.

Complementing MEDCOM-led data efforts is the embrace of advanced analytics and AI by medical leaders across the Army. I Corps developed the Automated Battlefield Trauma System (ABTS) in collaboration with the Department of War's Joint Trauma System. With testing at multiple I Corps exercises and units in the Indo-Pacific, ABTS estimates the number of casualties by severity to perform predictive courses of action recommendations that inform evacuation and resupply decisions. Likewise, the 101st Airborne Division developed a digital medical status reporting system, built on Microsoft Power BI, using real-time operational reports and environmental variables to predict disease and injury trends. Data-centric products from innovative medical leaders are improving corps and division medical support to operations, with lessons, techniques, and processes that can transform the entire Army.

Way Ahead

While the Army Medical Enterprise poured the foundation of our data-centric transformation in 2025, we are poised to accelerate the adoption of new systems and processes designed to integrate analytics and AI-enabled tools into every medical operation in the years ahead.

As the joint force adopts the Operational Medicine Care Delivery Platform (OpMed CDP) software as a digital-first capture of patient care at joint Roles 1 to 3, the Army is working to automate deployment of OpMed CDP through the Army Unified Directory Services, supporting the Secretary of the Army and Chief of Staff of the Army's initiative to reduce the reliance on contracted field service representatives. OpMed CDP, together with BATDOK-J, will provide medics and clinicians with documentation, clinical decision support, and data transmission capabilities integrated with MHS GENESIS.

The Army partnered in the early 2020s with then Department of Defense's Joint Artificial Intelligence Center to explore the application of AI/ML predictive medical readiness. By alerting clinicians to predictive interventions, entry into the disability evaluation system could be reduced, thereby increasing the readiness of the Army. The Army must work with the other Services and the Defense Health Agency to operationalize AI/ML capabilities to increase the readiness of our forces through predictive preventive treatment.

Finally, continued integration into NGC2 ensures that health service support and force health protection data inform tactical, operational, and strategic decision making. Exercises such as the 4th Infantry Division's Ivy Sting, the 25th Infantry Division's Lightning Surge series of experimentation, and the 101st Airborne Division's Lethal Eagle will refine the delivery and consumption of medical data in NGC2's data, integration, and application layers.

The Army Medical Enterprise will continue to rapidly advance analytics and AI capabilities in 2026, focused on optimizing medical support to operations. Our agile, adaptive, and innovative Soldiers and civilians are leading both bottom-up and top-down modernization to transform Army Medicine into a data-centric enterprise, earning the trust of the American Soldier and their family to be ready anywhere, always.

Combat Ready Care. This We'll Defend.

LTG Mary K. Izaguirre is the 46th surgeon general of the U.S. Army and the commanding general of U.S. Army Medical Command, Joint Base San Antonio–Fort Sam Houston. Previously, she served as commanding general of U.S. Army Medical Readiness Command, East. She deployed multiple times to Iraq and Afghanistan. She is a doctor of osteopathic medicine, is board-certified in family medicine, and is a fellow of the American Academy of Family Physicians. She has three master's degrees: one in public health from the University of Washington; one in military arts and science from the U.S. Army Command and General Staff College; and the third in national security and resource strategy from the Eisenhower School for National Security and Resource Strategy.

MAXAMIZING COMBAT READINESS

Leveraging SABIR for LSCO

■ *By MAJ Ian Morris and CPT Brooks Seeger*

The Army's pivot to preparing for large-scale combat operations (LSCO) against near-peer adversaries places a premium on Soldiers and formations that are ready well before battles commence. LSCO present the most demanding challenge the Army must prepare for, requiring divisions and corps to deploy rapidly and fight immediately, often with little notice. Meeting this standard calls for precise and continuous personnel readiness management and accurate strength reporting at every echelon. Leaders must be able to anticipate requirements and coordinate solutions at an exceptional pace, yet today's human resources (HR) professionals often burn hours creating local versions of products without enterprise-level consistency, time they should spend advising commanders and preparing their formations.

The Integrated Personnel and Pay System–Army's (IPPS-A's) Service for Analytics and Business Intelligence Reports (SABIR) leader's dashboard addresses this critical challenge by consolidating data from multiple authoritative data source (ADS) systems into a single interactive interface. Rather than requiring users to navigate a patchwork of HR systems and trackers, the dashboard provides a unified, near-real-time snapshot of a unit's personnel status. Commanders and HR professionals can instantly identify non-deployable personnel, pinpoint critical military occupational specialty (MOS) shortages, and visualize projected strength levels accurately, all capabilities essential to LSCO. The dashboard enables leaders to make sense of complex operational environments and understand their organization's ability to execute its mission under demanding conditions. In this way, it transforms personnel management from a reactive, labor-intensive process into a combat-power enabler with the speed and complexity required for LSCO.

At its core, the dashboard's most impactful feature is its comprehensive support for pre-deployment operations. By aggregating personnel, medical, and training feeds from IPPS-A and other ADS into a single display, the dashboard eliminates the daily slide drill, replacing outdated spreadsheets with a near-real-time, authoritative personnel common operational picture (COP). Users can immediately access their organization's current and projected strengths, by-name non-deployables, and mission-critical personnel metrics, seamlessly drilling down into subordinate units or rolling up data to view the entire formation. This proactive visibility allows commanders to validate manning levels, identify emerging MOS shortfalls months in advance, and redirect critical personnel to address gaps. For commanders and HR professionals alike, this efficiency returns valuable hours to mission analysis and planning, directly aligning with the Army's requirements for timely personnel readiness management and standards for unit status reporting.

TRADOC's sustainment concept insists that a future sustainment COP must carry live personnel services data so commanders can optimize unit and personnel readiness and match skills to emerging requirements. The leader's dashboard is the pre-deployment embodiment of that mandate. High-level snapshots become actionable through detailed drill-down capabilities, enabling immediate identification of Soldiers facing medical, administrative, or legal barriers to deployment. Indicators from the Medical Operations Data System, duty-limiting profiles, and commander-approved waivers allow leaders to swiftly sort personnel by category and take action to adhere to Soldier readiness processing (SRP) timelines. Additionally, the dashboard identifies Soldiers pending permanent change of station, expiration term of service (ETS), or dwell non-availability statuses, empowering commanders to consider deferments or waivers to preserve critical skills.

With visibility extending up to 365 days into the future, units can methodically plan medical readiness events, schedule training, and request early personnel fills, mitigating operational risks before they become critical issues. They can likewise use the tool to inject readiness data into routine military decision-making processes and run what-if analysis on the impacts of task organization changes on readiness and MOS gaps. The payoff is easiest to see at the tactical level, where an S-1 can turn hours of data hunting into minutes.

To illustrate, consider a battalion S-1 preparing for deployment.

Rather than requiring users to navigate a patchwork of HR systems and trackers, the dashboard provides a unified, near-real-time snapshot of a unit's personnel status.

Previously, generating a by-name red list required hours of manual data compilation. Now, using the dashboard, that same S-1 generates the list in seconds and recommends actions to leaders. Commanders observe readiness metric changes in near-real-time, recalculating deployable percentages without waiting for weekly roll-ups, creating a shared, current understanding of unit status. Pairing this with a deliberate data-quality battle rhythm that targets duty status, physical profiles, MOS validations, ETS, and date eligible for return from overseas updates ensures accuracy and drives accountability. This approach delivers tangible benefits: fewer surprises during SRP, timely cross-leveling of low-density specialties, and more substantial justification for resource requests. Thus, the leader's dashboard allows leaders to anticipate and forecast requirements, synchronize efforts across their organization, and integrate personnel solutions into operations planning.

Recognizing the contested and communication-degraded nature of LSCO environments, it is essential to clarify the dashboard's role. Currently fielded as a pre-deployment, Nonclassified Internet Protocol Router Network-based tool, the system does not intend to replace Secret Internet Protocol Router Network (SIPR)-based tactical systems used for force tracking and battlefield accountability during LSCO. Instead, its strength lies in enabling formations to build a validated personnel baseline before deployment. Units can export essential products, such as by-name rosters, deployability lists, and projected strength reports, to expedite personnel reconciliation at mobilization and reception stations. When built into a unit's pre-deployment battle rhythm, the dashboard helps ensure that personnel data feeding into theater systems are accurate, complete, and synchronized across the formation. This real-time shared understanding minimizes last-minute surprises and allows units to prepare for the fight with a clearer understanding of their combat power.

Looking forward, the Army can explore enhancements to improve the dashboard's resilience and utility under degraded network conditions. One promising route is the development of standardized last-known-good-data synchronization packages, which are snapshot reports of personnel strength and deployability that can be stored locally and referenced during connectivity loss or deliberately disconnected operations. Procedures to queue updates or personnel changes for future synchronization when communications are restored would enable users to maintain accountability in austere conditions. Hosting the application on secure, SIPR-based environments or fielding a lightweight disconnected mode are longer-term possibilities that could further increase its value. While not part of the current fielded capability, such enhancements would support the Army's broader goals for decision support and data-driven operations in contested LSCO scenarios.

The IPPS-A leader's dashboard fundamentally redefines how commanders and HR professionals approach personnel readiness and management ahead of LSCO. By automating the integration and presentation of previously fragmented data, it frees HR professionals to focus on analysis and advising rather than manual data compilation. The dashboard's comprehensive readiness snapshot, detailed deployability insights, and proactive strength projections streamline administrative processes and directly support leader decision making. The dashboard delivers the clarity, accuracy, and speed that commanders require, equipping them with timely, actionable personnel information to sustain combat effectiveness in tomorrow's complex, fast-paced LSCO battlespace.

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NGC2

Data-Informed Sustainment Decision Making

■ *By COL Paul Smith*

"Data is the sword of the 21st century, those who wield it well, the samurai."

— Jonathan Rosenberg

As the Army prepares for the demands of large-scale combat operations (LSCO) against strategic competitors, the importance of sustainment forces cannot be overstated. Sustainment is the backbone of operational success, ensuring that forces remain supplied, mobile, and ready to fight. However, current command and control (C2) systems are ill-equipped to meet the challenges of LSCO. These systems are cumbersome, lack integration, and create data silos that hinder commanders' ability to visualize the battlefield holistically. Without modernized tools that enable informed decision making, sustainment operations across extended and contested environments will falter.

To address these challenges, the Army is advancing its Next Generation Command and Control (NGC2) initiative. NGC2 is not just a technological upgrade; it is a paradigm shift designed to empower commanders and sustainment forces with advanced analytics, unified data structures, open architectures, and resilient networks. By integrating sustainment into the broader operational picture, NGC2 ensures that logistics teams can anticipate and respond to the demands of LSCO with precision and speed.

From C2 Fix to NGC2: A New Foundation

NGC2 builds on lessons learned from past efforts like C2 Fix but represents a full-scale shift in how the Army approaches C2. Instead of simply modernizing legacy systems in a patchwork effort to address immediate concerns, NGC2 starts with a clean sheet approach, designed to support a fast-moving, complex battlefield environment.

NGC2's Full Stack Architecture

At the heart of NGC2 is a data-centric design. NGC2 brings everything together into a unified structure with four main layers:

- **Infrastructure Layer**: The hardware that hosts and supports the NGC2 software.
- **Transport Layer**: The networks that move data across the battlefield.
- **Data Layer**: Enables seamless data integration across warfighting systems, ensuring data are curated, cleansed, synchronized, and tagged for real-time use, enabling cross-functional collaboration.
- **Application Layer**: Where 90% of the Army will operate. Applications will leverage the NGC2 data layer to provide services to inform decisions across multiple warfighting systems.

This structure allows for scalable, flexible solutions that can evolve quickly through agile software development. The result is a system built to support rapid decision making and to extend mission command capabilities to the tactical edge.

Driving Innovation

Several major initiatives are pushing NGC2 forward:

- **Revised Acquisition Strategy**: The Army is pursuing an as-a-service model to ensure that both software and hardware remain relevant, leveraging commercial off-the-shelf technology for rapid updates.
- **Project Convergence Capstone**: Large-scale experiments that test innovation across the Army.
- **Transformation in Contact**: The 4th Infantry Division will serve as the prototype unit to demonstrate NGC2's full potential. The 25th Infantry Division and 3rd Armored Corps will test the NGC2 data and applications layers.
- **Mission Command System Collapse**: Several programs are being integrated into NGC2, consolidating efforts and saving resources.

What NGC2 Means for Sustainment

"You will not find it difficult to prove that battles, campaigns, and even wars have been won or lost primarily because of logistics."

— President Dwight D. Eisenhower

Sustainment forces are at the forefront of the Army's transformation into a data-centric approach. Planners from U.S. Army Combined Arms Support Command (CASCOM) conducted months-long reviews, with elements from the C2 cross-functional team advising on the development of the infrastructure and transport layers for sustainment units and writing requirements documentation, calling for the integration of the business and warfighter mission areas. This shift is particularly transformative for sustainment units, which have historically operated with siloed enterprise business systems.

It is imperative to understand how the C2 landscape is changing, what lessons have been learned from past efforts, and how sustainment forces can take advantage of the new capabilities NGC2 provides. As the Army undertakes this revolutionary approach to improving C2, commanders across the Army have noted long-standing shortfalls between the integration of sustainment and mission command systems and are aggressively pursuing change with NGC2.

Sustainment in a Connected Command Environment

Historically, logistics teams faced significant challenges in integrating their data and planning considerations into the broader operational picture, often operating in silos that hindered coordination. CASCOM directly addresses this issue through the Sustainment Warfighting System (SWS), which will be a key component of the NGC2 application layer. By leveraging the NGC2 data layer, SWS applications ensure that sustainment data are synchronized with other warfighting systems, providing a unified operational view. For example, predictive analytics within SWS applications can forecast resupply needs based on operational tempo, casualty rates, battle damage assessments, and historical consumption patterns, enabling logisticians to preemptively position resources and avoid mission delays.

Integrating the NGC2 data layer with data from the business mission area (such as Global Combat Support System-Army, Integrated Personnel and Pay System-Army, and the General Fund Enterprise Business System) and the warfighter mission area (such as Mounted Mission Command, Android Team Awareness Kit, and Maven Smart System) ensures end-to-end supply chain visibility. NGC2 addresses LSCO challenges, such as extended lines of communication, contested environments, and distributed operations. Artificial intelligence/machine learning (AI/ML)

algorithms optimize route planning, load configurations, and resource allocation to reduce waste and improve efficiency.

Sustainment forces can leverage NGC2 to maintain operational reach and endurance by incorporating data from additional warfighting systems. AI/ML can adapt routes based on threat reports, protection assets, and adversary unmanned aircraft system activity, recommending logistics packages and asset use based on risk. This integration enables precision sustainment, delivering the right resources to the right place at the right time.

Benefits for Sustainment Forces

NGC2 offers several game-changing benefits to sustainment teams:

- **Improved Situational Awareness**: A common data layer gives logisticians a clearer understanding of the battlefield and operational needs.
- **Smarter Planning Tools**: Automated decision support tools enhance logistics reporting and enable predictive resupply planning.
- **Faster Execution**: Removing data silos reduces delays in decision making, helping sustainers respond in real time. Integration of AI/ML in course of action development reduces cognitive demand on staffs.
- **Flexible Networks**: NGC2 can operate over line-of-sight, beyond-line-of-sight, 4G/5G public networks, and in other configurations, increasing its resilience.
- **Interoperability with Allies**: NGC2 ensures that allied and coalition forces can securely exchange data and coordinate logistics.

Potential Challenges

While NGC2 offers transformative capabilities, its implementation is not without challenges. Key hurdles include equipping timelines, integration with legacy systems, and cyber security risks. NGC2 infrastructure acquisition is an ongoing process that lacks programs of record for much of the overall architecture. Transitioning from legacy systems to NGC2 will require careful planning to avoid operational disruptions. As a data-centric system, NGC2 must be resilient against cyber threats. The Army is investing in robust cyber security measures to safeguard its networks.

By proactively addressing these challenges, the Army ensures that NGC2 remains a reliable and effective tool for sustainment forces.

Conclusion

NGC2 represents a transformative leap forward in how the Army approaches mission command and sustainment. By breaking down data silos, integrating advanced analytics, and leveraging AI/ML capabilities, NGC2 empowers sustainment forces to operate with unprecedented speed, precision, and adaptability.

As the Army prepares for the complexities of LSCO, sustainment forces must embrace this transformation. Active engagement in NGC2 development — through feedback, experimentation, and innovation — will be critical to ensuring the system meets the demands of the battlefield.

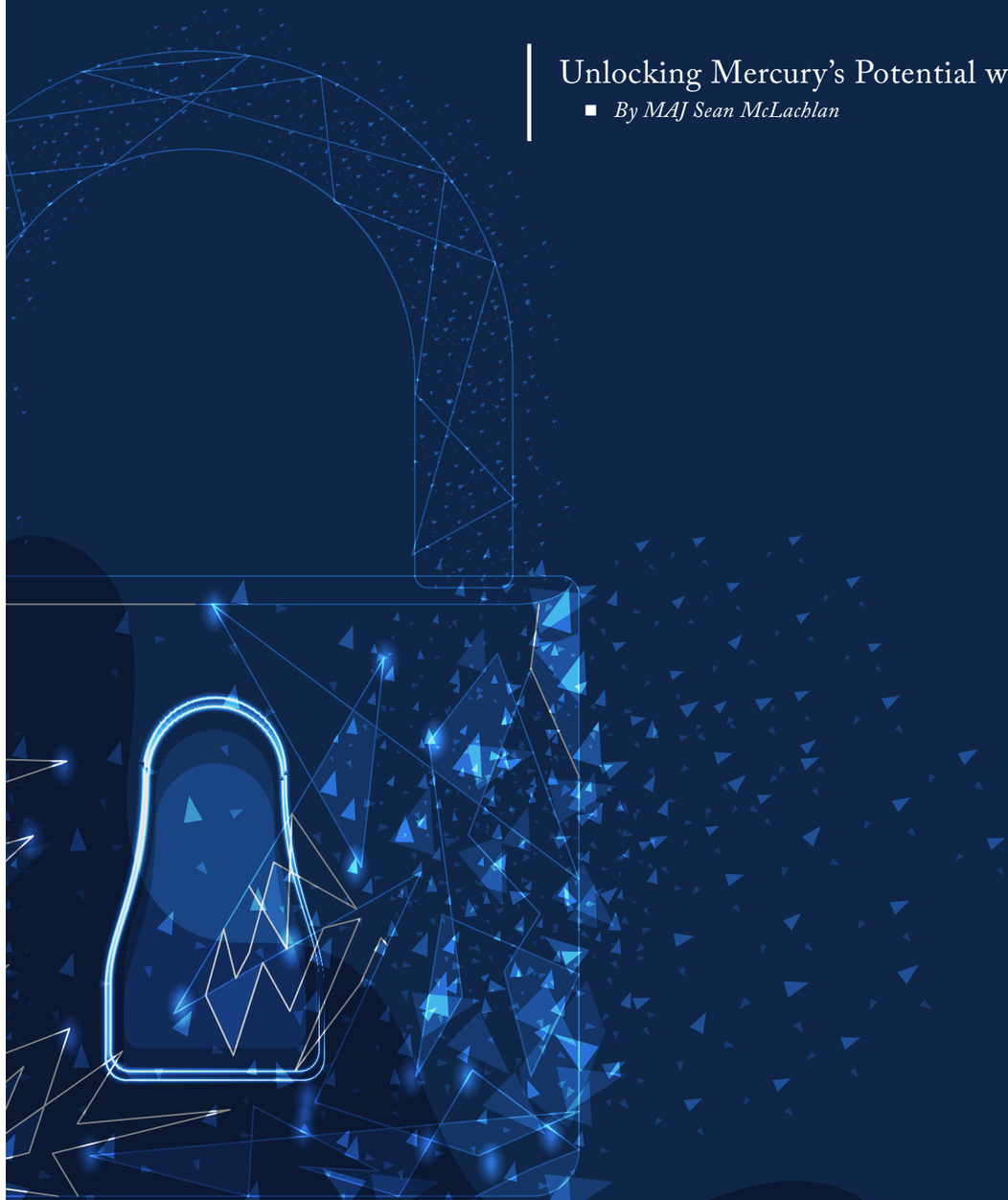
In the battles of tomorrow, data will be decisive. Those who wield it effectively will shape the outcome of conflicts. With NGC2, the Army is not just modernizing its systems; it is building a foundation for victory in the 21st century. Sustainment forces have a pivotal role to play in effectively integrating this transformation, ensuring the force remains mobile, lethal, and ready for the next fight.

COL Paul Smith has served in a variety of leadership and staff positions in his 24-year career. He is currently the director of the Transformation and Lessons Learned Directorate at Fort Lee, Virginia. His previous leadership positions include battalion commander for the 61st Quartermaster Battalion, 13th Expeditionary Sustainment Command; executive officer and support operations officer for the 412th Aviation Support Battalion, 12th Combat Aviation Brigade; and company commander, Headquarters and Headquarters Detachment/A Company, 101st Forward Support Battalion, 1st Brigade, 1st Infantry Division. He has a master's degree in military arts and sciences from the Command and General Staff College, a Master of Business Administration from the University of Mary, and has completed his Army War College Fellowship at Princeton University.

DATA-CENTRIC Command and Control

Unlocking Mercury's Potential with C2 Next

■ *By MAJ Sean McLachlan*



Every warfighting function depends on logistics, but sustainment has always faced a time-distance problem. Commanders maneuver in hours while logisticians plan in days. By the time a logistics estimate is built, briefed, and disseminated, it risks being outdated. The Army's current planning paradigm is anchored to the doctrinal days of supply (DOS) factor. DOS offers a useful baseline but fails to capture the demands of tailored, task-organized units fighting in large-scale combat operations (LSCO).

The Army's Mercury logistics estimate tool is a major step forward for sustainment planning. It enables logisticians to generate demand forecasts for tailored unit configurations far more rapidly than manual staff work. A support operations (SPO) officer or unit S-4 can input the actual mix of personnel, vehicles, and weapons into Mercury and generate tailored sustainment estimates in minutes. Yet Mercury remains static. It depends on manual entry of unit data and produces a product that does not change unless the user re-runs the model. This is a critical limitation in LSCO.

The Army already has the data sources to close this gap. Global Combat Support System-Army (GCSS-Army) tracks equipment readiness and parts status. The Vantage platform, powered by Palantir, aggregates personnel and equipment readiness information across multiple Army enterprises. Additionally, the Maven Smart System (MSS) provides commanders with a dashboard for visualizing data feeds at echelon. What is missing is the integration.

This article argues for linking Mercury into Vantage, GCSS-Army, and Maven under the Army's emerging C2 Next framework. By doing so, sustainers could move beyond static, doctrinal estimates to real-time, unit-specific demand forecasts. More important, Mercury could continuously update and publish logistics synchronization matrices (LOGSYNCMATs) inside Maven dashboards, providing commanders and staff with a shared, adaptive sustainment picture. With the addition of adaptive artificial intelligence (AI), Mercury could evolve from a calculator into a co-planner, anticipating requirements, recommending contingencies, and keeping sustainment aligned with operations in real time.

Mercury Today: A Tool for Tailored Estimates

Mercury's core strength is its ability to produce tailored sustainment estimates for units. Instead of relying on doctrinal averages, logisticians can input the actual mix of equipment and personnel into the tool to identify a fixed DOS for that unit. If an infantry battalion fields 30 Infantry Squad Vehicles (ISVs) instead of none or carries a drone fleet not accounted for in doctrine, Mercury can model those changes and produce refined estimates of Class III, V, and IX consumption. Commanders can see how attaching a High Mobility Artillery Rocket System (HIMARS) battery or armor company team changes the resupply requirement. SPO shops can compare multiple task organization options rapidly.

But Mercury is user dependent. The staff officer must manually enter personnel densities, weapon counts, and full mission capable (FMC) rates. This input process is laborious, prone to error, and quickly outdated. A logistics status (LOGSTAT) showing 90% FMC in the morning may be reduced to 70% by nightfall after combat losses. This manual dependence limits Mercury's operational value. In LSCO, staff officers will be unable to keep pace with operations through manual updates.

The Gap: Static Products in a Dynamic Fight

Sustainment planning has always struggled with the gap between static estimates and dynamic realities. The LOGSYNCMAT, usually produced in Excel or PowerPoint, is meant to capture the intent of the sustainment fight by laying out when, where, and how units will receive resupply. But building that product can consume hours of staff time, and it is usually outdated by the time it is briefed. Every sustainer knows the frustration this creates. Fuel projections, for instance, may look sound on paper, only for a battalion to burn through Class III at a far higher rate than expected. A HIMARS battery that was expected to fire sparingly may suddenly have a surge of missions, spiking its Class V requirements.

In each of these cases, the static product sitting on the commander's desk does not reflect the reality unfolding in the fight. Unless the staff rebuilds the plan from scratch, the LOGSYNCMAT remains a snapshot frozen in time while the battlefield moves on without it.

Maven as the Sustainment Dashboard

MSS offers a way to break this cycle, not as a logistics system but as a shared dashboard environment that pulls disparate data streams into one place. Its real power lies in visualization. Maven allows commanders and staff at every echelon to see the same information at the same time. For sustainment, this means Maven can serve as the home for a LOGSTAT workshop, where units input their consumption rates and stockage levels as they change throughout the day. Rather than waiting for a single roll-up each evening, updates flow continuously into the system.

The effect is profound. Stovepipes collapse. Reports are automatically aggregated across levels of command. Sustainers see a living reflection of the battlefield rather than a stale snapshot. Yet the strength of Maven — its ability to capture and display the flood of data — is also its limitation. Visualization alone does not turn information into action. The question remains: how do sustainers convert a stream of LOGSTAT updates into a coherent distribution plan? That is where Mercury enters the picture.

Linking Mercury to Vantage, GCSS-Army, and Maven

The next step is to connect Mercury to existing Army data systems. The concept is simple. GCSS-Army provides equipment readiness: on-hand counts, FMC status, and parts availability. Vantage provides personnel strength, duty status, and equipment readiness metrics. Maven provides live LOGSTAT inputs from units in the fight.

If Mercury could pull these data streams automatically, sustainers would no longer need to manually adjust unit densities. Mercury would continuously reflect the real composition of the unit: how many Soldiers are present for duty, how many vehicles and weapons are FMC, and what levels of supply are on hand. With that foundation, Mercury can combine unit readiness data with live LOGSTATs to recalculate demand and distribution requirements.

Reimagining the LOGSYNCMAT

The LOGSYNCMAT has long been the central tool for synchronizing sustainment. But it has always been manual, static, and quickly outdated. Integrating Mercury into Maven changes that.

In this model, units update LOGSTATs in Maven workshops. Mercury ingests those LOGSTATs, combines them with Vantage/GCSS-Army data, and recalculates requirements. Mercury generates an updated LOGSYNCMAT automatically. The LOGSYNCMAT is published back into Maven, visible to all commanders and staff.

The LOGSYNCMAT thus becomes a living product, updated continuously as conditions change. Commanders can see in real time when resupply is triggered, when it is projected to arrive, and how future operations will be impacted.

Adaptive AI: Mercury's Future Potential

Mercury today is a powerful calculator, but its true potential lies in becoming something more. At present, it does not employ AI, yet the Army must look toward a future where adaptive AI is woven into its design. With AI, Mercury could evolve from a tool that merely tabulates requirements into one that anticipates problems and recommends solutions. This matters because anticipation is at the very heart of sustainment. In LSCO, demand rarely follows neat, linear patterns. Adaptive AI would allow Mercury to recognize those nonlinear trends and project their impact on the distribution plan before shortages materialize. As updated LOGSTATs flowed in through Maven, Mercury could immediately adjust the sustainment estimate and rebuild the LOGSYNCMAT.

Such a system would also strengthen continuity and economy of effort. By pulling live data from Vantage and GCSS-Army, Mercury would ensure the LOGSYNCMAT reflects real personnel counts, FMC rates, and on-hand equipment, removing the guesswork and manual manipulation that bogs down staff work today. Resupply missions would be prioritized and sequenced in a way that avoided waste. In practice, commanders would no longer operate on assumptions; they would see a distribution plan based on reality,

Commanders maneuver in hours while logisticians plan in days. By the time a logistics estimate is built, briefed, and disseminated, it risks being outdated.

continuously updated and displayed in Maven alongside the operational picture. In this role, Mercury would become a co-planner. It would process the raw data of readiness and LOGSTAT reporting, transforming it into an actionable distribution plan and ensuring the plan would always be current. AI would accelerate the sustainment cycle of anticipate, decide, and act. Human logisticians would remain central, however, because they would validate the outputs, refine the details, and bring improvisation when the unexpected occurred.

A Pacific Vignette: Resupplying the Philippine Batanes Islands

Imagine a division task force spread across the Batanes Islands of the northern Luzon in the Philippines. On the island of Itbayat, an infantry battalion is burning fuel at a far higher rate than projected. At the same time, on the nearby island of Basco, a company has just lost several vehicles to enemy drone strikes. That sudden loss has changed both its Class IX repair part requirements and its Class III fuel profile almost overnight. In the current sustainment paradigm, these changes might take 12 to 24 hours to filter up into the division's sustainment plan, if they appear at all.

With Mercury integrated into Maven, however, the story unfolds differently. Units on both islands update their LOGSTATs directly through a dashboard workshop visible to every echelon. At the same time, GCSS-Army and Vantage feed live data on FMC vehicles and personnel status directly into Mercury. Mercury automatically recalculates demand based on this combined picture and generates a revised LOGSYNCMAT. Within minutes, Maven publishes the updated matrix across the division, showing commanders that rotary-wing resupply missions must now prioritize Itbayat's accelerated fuel burn while redirecting Class IX repair parts to Basco.

C2 Next: The Convergence Point

The Army's C2 Next initiative envisions a data-centric command and control framework where all warfighting functions converge on a shared data environment. Sustainment cannot remain siloed. Linking Mercury to Vantage, GCSS-Army, and Maven would place sustainment data inside the same decision environment as operations.

Three decisive effects would emerge: All echelons would see the same sustainment reality. There would be no more mismatched estimates between battalion, brigade, and division. Commanders would act on continuously updated sustainment forecasts instead of 24-hour-old rollups. Sustainment plans would adapt in stride with maneuver.

Implementation Pathway

Achieving this vision of Mercury as a continuously updated sustainment engine within C2 Next will not happen automatically. It requires deliberate investment, organizational change, and doctrinal adjustment. Five steps in particular, all achievable, stand out as essential to transforming Mercury into a fully integrated decision-support system.

- **Integrate Data Feeds** — The first and most critical step is building the technical connections that would allow Mercury to pull from GCSS-Army, Vantage, and Maven. Sustainment planning is only as good as the data it draws from, and right now Mercury depends on manual entry. By automating data feeds, the system would continuously ingest equipment status, FMC rates, personnel counts, and LOGSTAT updates without human intermediaries.
- **Embed LOGSTAT Workshops in Maven** — The second step is to standardize how units submit their status reports by embedding LOGSTAT workshops directly into Maven dashboards. Instead of nightly roll-ups or ad hoc reporting formats, every echelon would input consumption, stockage, and requirements through a common interface visible across the formation.
- **Develop AI Modules** — Once the data foundation is secure, Mercury must evolve with adaptive AI modules designed specifically for sustainment. These modules would not replace logisticians but would amplify their ability to anticipate and respond. For example, AI could forecast nonlinear changes in demand when operational tempo increases, highlight emerging shortages before they reach crisis, or recommend adjustments to the LOGSYNCMAT based on new LOGSTATs.
- **Train Logisticians** — The Army must educate logisticians at every echelon on how to supervise, validate, and refine AI-enabled outputs. This does not mean abandoning traditional staff skills. SPOs will still need to understand how to build estimates manually, but it does mean shifting the emphasis from creating products to interpreting and adjusting them.
- **Experiment in Exercises** — The Army must deliberately experiment with Mercury-enabled sustainment at combat training centers, during Joint Pacific Multinational Readiness Center rotations, and in major bilateral/trilateral exercises like Yama Sakura. These environments offer the perfect laboratories to stress-test the system in conditions that replicate LSCO, including communications degradation, enemy interdiction, and the friction that comes with maneuver.

Conclusion

The Army can unlock Mercury's true potential by linking it directly to Vantage and GCSS-Army for live personnel and equipment readiness data, to Maven for continuous LOGSTAT inputs, and by publishing updated LOGSYNCMATs back into Maven dashboards for all commanders to see.

The impact of this integration would not just be technical but also operational. Commanders would gain a sustainment picture that would no longer be a snapshot but a living reflection of the fight. Mercury would become an engine that would not only process data but would also highlight anomalies, forecasts shortfalls, and recommends adjustments to the distribution plan in stride with operations. Human logisticians would remain indispensable. They would bring judgment, creativity, and improvisation that no machine can replicate, but AI would ensure that the sustainment enterprise would keep pace with the tempo of maneuver.

In LSCO, where complexity, dispersion, and contested communications can overwhelm static planning, this capability could prove decisive. The side that adapts its logistics picture the fastest will win. By investing in Mercury's integration under C2 Next, the Army can ensure we are the side that wins.

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MAX IMIZ ING SURVIVABILITY

Integrating Maneuver Capabilities into Support Companies

■ *By CPT Timothy Blickle*

The Army continues to modernize and adapt its fighting formations to meet the demands of large-scale combat operations (LSCO) through Transformation in Contact. As the Army restructures and evolves to dominate multidomain operations in a LSCO environment, sustainment forces will continue to be frontline enablers who extend maneuver commanders' operational reach, ensure freedom of action, and prolong operational endurance. The foundations that support these actions are defined by Field Manual 4-0, Sustainment Operations, as the principles of sustainment.

The eight principles of sustainment include the principle of survivability, which is a key component of maintaining the other principles of sustainment in current and future operational environments. The purpose of this article is to examine a case where maneuver capabilities were incorporated into a forward

support company (FSC) to maximize survivability, and to discuss the lessons learned for future implementation.

The Problem: Lack of Survivability against Peer Threats in Sustainment Units

It was cold, rainy, and dark when a simulated platoon cut through a side trail and caught a majority of my distribution platoon by surprise, decimating them and then quickly retrograding back into the safety of the winding trails that make up the Joint Multinational Readiness Center. This occurred on only the fourth day of Combined Resolve 19, a major exercise with the 101st Airborne Division, which saw a myriad of enemy threats penetrate our screen along boundary seams, resulting in the exploitation of the relatively unprotected sustainment assets positioned rearward of the forward line of own troops. This was not the only example of enemy armored assets conducting precise, penetrating strikes against blue forces. One of the adjacent FSCs was taken prisoner by enemy armor. Another instance saw multiple opposing force (OPFORs) T-72s infiltrate and destroy the brigade support area.

Currently, FSCs are allocated minimal convoy protection platforms (CPP) according to their modified table of elements. For example, I was authorized no wheeled CPPs in my armored brigade combat team FSC. Of my seven authorized weapons-mountable platforms, six were M88A2 heavy recovery vehicles, and one was an Armored Multi-Purpose Vehicle (AMPV) for my company headquarters. The highest caliber weapons I could mount were the M2 .50 caliber machine gun and the MK19 grenade launcher, neither of which posed a threat against OPFOR main battle tanks or lightly armored vehicles. Of all my vehicles that could mount a crew-served weapon, only the AMPV made any technical sense to attach to my most-critical tactical platoon, the distribution platoon, which would leave my company headquarters unprotected during logistics package (LOGPAC) movements.

Our Solution: Maneuver Capability Integration

Our lack of protection assets was solved by virtue of opportunity: my assigned battalion transitioned to fully manning squads with the Army's implementation of the 19C military occupational specialty. As a result, the rifle company executive officer's M2A4 Bradleys were unmanned and potentially moth-balled in the battalion motor pool. After speaking with my battalion commander on my company's vulnerabilities, we established a radical new idea: create distribution platoon security by manning the "extra" M2A4s with excess distribution platoon personnel, thus creating extremely lethal and self-sufficient LOGPACs.

The training for these two crews was the same for their maneuver counterparts. The Soldiers assigned to the vehicles were selected by a combination of personality, movement stability, and competency. They were given all requisite phases of daytime and nighttime drivers' training and conducted all six tables of gunnery. Each of our two rifle companies absorbed a crew under its wing for training, drilling the needed capabilities into them until they were as skilled as any other crew. The results showed: both crews qualified through Gunnery Table VI, and one of our crews was among the top 10 Bradley crews in the entire brigade.

These two Bradley crews brought incredible capabilities to my FSC. Their weapons systems, the M242 Bushmaster, a coax M240 machine gun, and the tube-launched, optically tracked, wire-guided missile launchers, gave me the capability to defeat any peer threat. Their communications systems, mainly joint battle command platform (JBCP) capability, helped enable my company to have the highest quantity of JBCPs operating for any logistics company in the brigade. Their thermal optics systems gave me increased field trains command post (FTCP) visibility and security. Finally, the mere presence of an M2A4 on a LOGPAC was enough to serve as a deterrent to any OPFOR who might have considered ambushing a LOGPAC.

These capabilities spoke for themselves during our brigade's force-on-force exercise. While operating as the OPFOR, my company destroyed an enemy Abrams M1A2 SEPv3 and M2A4 with zero losses to sustainment assets. Additionally, these assets allowed me to ensure my battalion commander's freedom of reach by enabling me to create a well-protected and far-forward logistics element that maximized responsiveness and continuity as our battalion began its counterattack. Finally, in the event of an OPFOR attack on a key command node, it gave the battalion operations cell a break-glass capability to support them without having to pull maneuver forces out of engagement areas.

Lessons Learned

After the first iteration of Gunnery Table VI and crew situational training exercises, we codified various lessons learned into our planning and preparation, which resulted in a much higher level of success in the second iteration. One change was incorporating a mechanic as the third crew member on each track. Logistically, this gave two personnel back to the distribution platoon to operate wheeled vehicles and helped maintain the overall readiness of the distribution platoon's vehicles.

A second change was managing crew rest cycles for the M2A4 crews to avoid crew burnout. Instead of having both M2A4s operate on each LOGPAC, one M2A4 crew moved with the LOGPAC while the other remained rearward at the FTCP for defense and crew rest. M2A4 crews swapped roles with LOGPACs, ensuring continuity of survivability assets on LOGPAC and FTCP defense.

Finally, crew members were given interviews and were briefed by me and my command team so they knew the importance of their roles. This face-to-face interaction helped to overcome individual Soldier hesitancy and increased overall buy-in.

Drawbacks to Our Solution

No idea is perfect, including this solution. Mechanically, the M2A4 is slower over even terrain than wheeled vehicles and creates a more detectable presence when moving due to its size. Additionally, it created more robust mechanical and logistics requirements to support the distribution platoon in the FTCP, which occasionally meant backward support convoys from the unit maintenance collection point.

Culturally, there was a measure of buy-in and tactical competence that took about 10 months to ingrain into the company. Sustainers generally have very little experience in dedicated fighting platforms, and it took multiple gunnery iterations and very dedicated and patient infantry professionals to build the confidence in my Soldiers.

Finally, logistically, I admit that this solution does not work for every unit in the Army. A perfect storm of shorted infantry Soldiers, surplus sustainers, an outstanding M2A4 operational readiness rate (ORR), and a less-than-stellar wheeled vehicle ORR created the necessary conditions to facilitate this radical experiment.

Conclusion

In conclusion, due to the combination of lack of survivability systems present in an FSC and the shifting battlefield that sees sustainers playing a more frontline role, embedding maneuver assets into sustainment units is a feasible and highly successful tactic to ensure continuity of support for maneuver commanders. This case posits that sustainment units can continue to conduct standard logistics tasks while maintaining a more lethal and survivable posture. While this particular solution does present some drawbacks, it fills a gap that is currently present in ensuring the survivability of sustainers in LSCO environments.

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Featured Photos

Top: An 88M Bradley gunner assigned to India Company conducts preventive maintenance checks and services on the Bradley's M242 Bushmaster, March 2025, Fort Stewart, Georgia.(Photo by SSG Derek Fridman)

Middle: Members of India Forward Support Company and the 3-15 Infantry Battalion commander pose with the company's M2A4s at the conclusion of the division's force-on-force exercise, March 2025, Fort Stewart, Georgia. (Photo by LTC Kenton Komives)

Bottom: A Bradley assigned to India Company, 3-15 Infantry Battalion, conducts logistics release point security during battalion-level force-on-force operations, February, 2025, Fort Stewart, Georgia. (Photo by CPT Timothy Blickle)

C2 NEXT FOR Coalition Sustainment

Lessons from Yama Sakura 89

■ *By MAJ Sean McLachlan*

Large-scale combat operations (LSCO) in the Indo-Pacific will never be fought by the U.S. alone. Any conflict will be a coalition fight, conducted with partners on shared terrain against a peer adversary. This reality was tested and reinforced during Yama Sakura 89, a trilateral command post exercise held in Itami, Japan, in early 2025. The exercise brought together the U.S. Army, the Japan Ground Self-Defense Force (JGSDF), and the Australian Army under a parallel command structure.

The exercise highlighted what we already knew: coalition sustainment is both a strength and a challenge. While we trained shoulder to shoulder, we did so with parallel systems that could not yet fully integrate. Instead of weakening the coalition, however, these challenges clarified the work ahead. Yama Sakura 89 gave us a valuable opportunity to identify gaps in interoperability and take tangible lessons back to our formations.

The Gap: Parallel Networks, No Shared Picture

Each nation entered Yama Sakura 89 with its own command and control (C2) backbone. The U.S. operated through the Cooperative Maritime Forces Pacific (CMFP). The Japanese relied on their national system. The Australians employed the CMFP. These systems were strong within their own formations but operated in parallel rather than converging into a single sustainment picture. The result was not one view of the battlefield, but three. Unfortunately, this fragmentation created challenges in the very areas where clarity was most critical.

Route deconfliction was the first and most visible friction point. Without a shared digital overlay, convoy movements risked overlap and/or conflict until analog coordination solved the problem. Commodity tracking proved equally difficult. Fuel, water, and ammunition data could not be easily compared across systems in real time, slowing decisions on where to mass or redistribute interoperable resources. Combat power visibility suffered, too, with sustainers forced to extrapolate demand signals without a common picture of force disposition or operational tempo. The most significant demand was the use of common-user land transportation assets for troop transportation and casualty evacuation.

If coalition sustainment is to keep pace with LSCO, we must deliberately build systems that fuse data across nations.

The real lesson of Yama Sakura 89 is not that these frictions existed but how we overcame them. Coalition sustainers fell back on one of the Army's oldest and most reliable tools: the liaison officer (LNO). By embedding LNOs into partner formations, we created human bridges between disparate C2 systems. These officers carried information by hand, translated data into analog products, and physically laid maps and reports side by side until a common picture emerged. This gave us the shared understanding we needed in the moment. But it came at a cost: slow processes, heavy manpower demands, and a fragility that would not hold up under the relentless tempo of LSCO. LNOs proved, once again, the value of adaptability and human initiative. Yet, the fact that we had to rely on this age-old solution underscores the point: while LNOs will always be indispensable, they cannot remain the primary mechanism for achieving coalition sustainment interoperability.

Relying on LNOs reminded us of an enduring truth: people can bridge gaps that technology cannot. But LSCO will not give us the time or space to depend on analog methods as our primary solution. If coalition sustainment is to keep pace with LSCO, we must deliberately build systems that fuse data across nations. Shared route overlays, common commodity dashboards, and integrated combat power visualizations are not luxuries; they are the baseline requirements for fighting and winning together. Exercises like Yama Sakura 89 highlight both the resilience of our sustainers and the urgent need to move beyond ad hoc solutions. The way ahead is to channel the same ingenuity that carried us through this exercise into deliberate investments in coalition C2 interoperability, so that in crisis or conflict we are not just adapting but are synchronized from the start.

Why This Matters in LSCO

Sustainment velocity is decisive. Ammunition, fuel, water, and repair parts must move forward in synchronized distribution chains or combat power will stall. In the Indo-Pacific, no operation will be fought by

the U.S. alone. Every campaign will depend on partners and allies — not only for access and basing, but also for shared sustainment responsibilities. That reality makes it imperative that coalition sustainers can see one another's routes, supply demands, and critical stock levels. Without that visibility, the risks multiply. Convoys may overlap and duplicate effort, leaving some units oversupplied while others wait. Coalition elements could unknowingly converge on the same road space, exposing themselves to fratricide or enemy interdiction. One nation may accumulate commodities while another quietly exhausts its reserves, simply because demand signals remain invisible. Most critically, a coalition without shared sustainment data cannot mass effects when and where they are needed. This shortfall undermines deterrence before the fight and diminishes combat power once the fight begins.

Yama Sakura 89 made these challenges tangible, but it also showed us the opportunity. Several examples brought the point into sharp focus. U.S. sustainers and the JGSDF planned logistics package (LOGPAC) routes in their respective national systems. Only by sitting down together could we align movements — an analog drill that underscored how essential a digital coalition route overlay will be in the future. Fuel and ammunition reporting offered a similar lesson. The JGSDF tracked fuel in liters, while the U.S. did so in gallons, and the Australians could not view either system digitally. By comparing reports side by side, we forced ourselves to think through how automated translation tools could accelerate coordination in the next fight.

Each of these friction points revealed not only a vulnerability but also a pathway forward. They taught us that coalition sustainers are fully capable of overcoming obstacles with ingenuity, trust, and teamwork — but also that we cannot rely on manual fixes alone. The real lesson is that shared data systems are not an abstract goal but a requirement. By building on the human collaboration that we demonstrated, and by embedding those lessons into future training and modernization, we can ensure that in the next fight, partners and allies will not just adapt together at the table — they will fight together from a common picture.

C2 Next: What a Data-Centric Future Looks Like

The Army's concept of C2 Next envisions a future where data flows seamlessly across echelons and partners, creating a shared decision environment. For sustainment, this means building a coalition logistics common operating picture (LOGCOP) that does the following:

- Visualizes sustainment demand and supply in real time. A dashboard where fuel, ammo, water, and repair part levels are visible across the coalition, regardless of origin system.
- Normalizes data across partners. AI-enabled translation layers that reconcile gallons to liters, NATO symbols to JGSDF icons, or English labels to Japanese text automatically.
- Integrates routes and movement control. Shared overlays that allow planners to see all LOGPAC movements across coalition divisions, reducing risk of congestion or compromise.
- Builds role-based access. Each nation controls what data it shares, but the coalition benefits from the aggregate picture. Sensitive data can be masked while still contributing to the whole.
- In many ways, this is the natural progression of what we proved at Yama Sakura 89. Coalition sustainers demonstrated that trust, transparency, and teamwork can overcome system gaps. C2 Next simply takes that same spirit and scales it through technology, turning liaison-driven workarounds into automated, real-time collaboration. A coalition LOGCOP would not replace the human relationships on which sustainment depends; it would amplify them, ensuring that every partner fights from the same picture. That is the future of sustainment in LSCO.

Recommendations for Future Exercises and Operations

- Use CMFP as the common denominator. Future exercises must deliberately treat CMFP, or its eventual successor, as the baseline environment for coalition sustainment. National systems will and must continue to operate in parallel, but CMFP gives us a shared layer where all partners can contribute. Establishing this common denominator early ensures that every participant has a place to plug in, even if their national systems remain distinct. Over time, this practice will normalize CMFP use as the coalition standard for sustainment C2.
- Rehearse building coalition LOGCOPs. Even partial feeds of sustainment data into a coalition LOGCOP are valuable. Exercises provide the perfect venue to practice fusing what information is available, however incomplete, into a shared product. This not only trains staff on the mechanics of integration but also reveals where technical and procedural gaps remain. By rehearsing LOGCOP development in training, we build muscle memory for how to create a coalition sustainment picture quickly under wartime conditions.
- Standardize data translation. The challenges posed by differences in measurement units, symbology, and language were among the clearest lessons from Yama Sakura 89. Training events must incorporate automated translation tools that reconcile gallons to liters, English to Japanese, or NATO symbols to JGSDF equivalents. Practicing with these tools under exercise pressure helps sustainers trust the outputs and refine workflows. Standardizing data translation in peacetime ensures that these frictions are minimized in combat.
- Exercise digital sustainment rehearsals. Just as maneuver forces rehearse operations on a digital map before stepping off, sustainers must rehearse convoy routes, commodity forecasts, and demand signals across coalition systems before execution. Digital sustainment rehearsals would allow commanders to see where convoys risk congestion, where supply might not align with demand, and how to adjust before wheels are on the road. By building this into exercise battle rhythm, we would normalize sustainment rehearsals as a routine part of coalition planning and ensure that shared data is current and correct.
- Codify standard operating procedures (SOPs). Perhaps the most important step is to capture these lessons in standing procedures. Each command must develop and rehearse SOPs that dictate how to integrate partner sustainment data, what systems are used, who validates the feeds, and how the information is shared across echelons. Codified SOPs would ensure that coalition integration would not be left to chance or improvisation but would become part of how every unit fights. The benefit would be twofold: partners would gain confidence that their data would be used effectively, and U.S. formations would build predictability into coalition sustainment operations.

Conclusion: Better Postured for the Future

Yama Sakura 89 did not expose failure. It revealed opportunity. By working through friction points, the U.S., Japanese, and Australian armies proved their commitment to sustaining the fight together. The exercise made one fact undeniable: shared terrain requires shared data. Because we identified these gaps in training, we are now better prepared to close them in war. C2 Next gives us the framework to get there. With it, coalition sustainment will not be a patchwork of analog fixes but a unified system that delivers the speed, precision, and resilience LSCO demand.

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A DUAL APPROACH TO REPLACING THE HUMVEE

By MAJ Scott Wolfe

In an era of high-cost tactical vehicle programs, the U.S. military is under increasing pressure to modernize cost-effectively. In 2023, the Army awarded AM General a $230.8 million dollar contract to produce the Joint Light Tactical Vehicle (JLTV) as a replacement for the Army's aging High Mobility Multi-Wheeled Vehicle or Humvee. With a price tag of $300,000 to $400,000 per JLTV, it is expected to cost billions of dollars over the next decade to replace the Humvee. The Commercial Utility Cargo Vehicle (CUCV) and the Light Service Support Vehicle (LSSV) programs were cost-efficient, commercially derived vehicles that supported a wide range of non-combat military operations. The Army must reinstate a modernized CUCV/LSSV program to provide a low-cost, reliable, and logistically flexible vehicle fleet for non-combat roles, thereby freeing up advanced platforms like the JLTV for missions that truly require them.

The military has a long history of using commercial off-the-shelf (COTS) acquisitions to meet its operational needs. In the 1970s, the military acquired some 40,000 militarized Dodge trucks to support units operating in noncombat operations. By the early 1980s, the CUCV replaced these initial COTS vehicles. General Motors (GM) delivered roughly 70,000 CUCVs to the military throughout the 1980s. The CUCV came in several variants and performed multiple roles, such as command post vehicles, troop transports, ambulances, and logistics. The truck was based on the GM Blazer chassis and has retained some of its aftermarket value with civilian customers due to its offroad capability and utility. In the early 2000s, GM updated its vehicle design offered to the military to be based on the Silverado, Tahoe, and Suburban. The vehicle was redesigned as the LSSV. While it is rare to see a CUCV or LSSV driving around base or the training area in the U.S., there are still several countries that actively employ the LSSV.

The two- and four-seat utility vehicles are ubiquitous across all Army organizations, from division band companies to light infantry companies. In all organizations, they perform similar supply, administrative, and command and control functions. To give some perspective on the costs associated with equipping our rear-echelon support units with the Army's current utility vehicles, a headquarters and headquarters company (HHC) for a medical command has over $3 million in Humvees, and an HHC for a theater engineer command has over $6 million in Humvees. Those costs will double because the Army plans to eventually replace all Humvees with JLTVs.

A new CUCV/LSSV could easily save the Army half or more of what it costs to procure our current up-armored Humvees. The savings go even further than just the initial procurement costs. Repair and replacement parts from commercially available vehicles will reduce the overall lifetime costs of maintaining a CUCV/LSSV fleet. A final financial bonus from adopting a CUCV/LSSV fleet is that when a vehicle meets the end of its military service life, the Army can recoup part of its investment by selling them as used vehicles to civilian outdoor enthusiasts, as was done with previous versions of CUCVs and LSSVs. Cutting costs by modernizing the utility vehicle fleet will allow the Army to better fund higher priority modernization efforts where viable COTS alternatives are not an option.

Many support roles (logistics, transport, training, administrative movement, etc.) do not need mine-resistant or JLTV-level protection. In large-scale combat operations, support troops will not be exposed to the same level of threats as they were during operations in the war on terrorism. Many units will operate in areas far beyond the reach of direct fire and artillery. Many also already depend on combat or combat-support units to provide security and force protection during movements outside a logistics support area or base. Modern COTS trucks are highly customizable and can be adapted for a wide range of tasks and threat levels.

COTS vehicles can be procured and fielded quickly. Having dual-utility vehicles for combat and support units would allow for overall quicker acquisition because vehicle manufacturing takes place

In large-scale combat operations, support troops will not be exposed to the same level of threats as they were during operations in the war on terrorism.

at different facilities. Overall modernization would dramatically speed up. The Army could field combat and support units simultaneously instead of fielding them unit by unit. Additionally, a utility vehicle based on a civilian chassis would have parts already fully integrated into civilian supply chains, which would decrease wait times and back-order parts issues that plague specially designed military vehicles. Training for a vehicle based on a commonly driven civilian one would be easier.

Countries around the world actively use COTS utility vehicles in their militaries for everyday and tactical use. The Mercedes G Wagon has been used in over 60 countries worldwide in a variety of roles. The British use a militarized version of the Land Rover. These vehicles are standard issue and play pivotal roles in everyday training and operations in these countries. Although the U.S. divested its CUCV/LSSV programs decades ago, we continue to utilize COTS vehicles in an ad hoc and mission-specific manner. Soldiers use non-tactical vehicles while operating in the relative safety of Kuwait and South Korea or in the remote areas of Syria and Jordan. In 2020, the Army awarded a $66 million dollar contract to Africa Automotive Distribution Service Ltd. to provide J8 Jeep tactical vehicles, a militarized version of the Jeep Wrangler, for operations in South and Central Commands.

Reintroducing a modern CUCV/LSSV program would provide the Army with a practical, economical, and mission-fit alternative for non-combat operations. Giving the right unit the right type of vehicle improves readiness by speeding up modernization efforts and provides a vehicle that allows the unit to accomplish its mission. The Army must launch a pilot procurement program to assess the performance and value of COTS-based utility vehicles in current operational contexts and adopt a dual approach to replacing its fleet of utility vehicles.

MAJ Scott Wolfe is currently the Assistant Professor of Military Science at California State University–Fresno. He has a Master of Arts in Teaching from Liberty University. He has completed the Support Operations and the Supply Chain Management courses in addition to the Maneuver Captains Career Course and Command and General Staff College–Common Core courses.

Featured Photos

Top Left: A Humvee assigned to the 41st Field Artillery Regiment, drives through the wash rack at the agricultural wash station at Grafenwöhr Training Area, Germany, Oct. 24, 2024. (Photo by SGT Gianna Elle Sulger)

Bottom Left: SFC David Henderson and SFC Jed Hathaway, of the 2nd Mission Command Training Detachment, 1st Brigade, 91st Training Division, splash their Humvee through a creek while conducting an Observer Coach/Trainer mission at Fort Hunter Liggett, California, June 12, 2024. (Photo by SFC Kurt Grohman)

Right: Soldiers assigned to Headquarters and Headquarters Company, 3rd Division Sustainment Troops Battalion, 3rd Division Sustainment Brigade, 3rd Infantry Division, fire an M2 machine gun mounted on a Humvee during a live fire range in Swietoszow, Poland, Dec. 20, 2023. (Photo by SPC Elsi Delgado)

From REGULATION to Reality

Modernizing Army Sustainment Policy to Move with the Mission, Not Against It

■ *By CW5 Gregory W. Besaw*

Today's Army must be fast and flexible. Modern warfare and operational demands of large-scale combat operations (LSCO) have outpaced Cold War-era logistics frameworks, and the Army's ability to sustain the fight now hinges as much on policy and doctrine as on weapon systems and information technology platforms. For too long, we have been using rules written for a different kind of Army, and now, in today's landscapes, they are slowing us down.

To bridge the gap between regulation and reality, Army policy must shift from rigid mandates to an agile, outcome-based framework that empowers commanders and Soldiers at the tactical edge, enabling fast mission decisions and execution while maintaining compliance and accountability.

The Problem: Too Much Red Tape

Many of today's logistics policies still focus on making sure every form is filled out perfectly and every detail is correct. Since today's LSCO and digital battlefields are fast moving, these strict policy rules can force commanders to choose between doing things by the book versus getting the job done. In the most critical moments, including responding to a near-peer engagement in Indo-Pacific Command or resupplying border operations under contested logistics conditions, legacy policies can cause dangerous delays and decision paralysis.

The Army recognizes that its regulations do not support Soldiers' reality. Commanders on the ground should not be forced to choose between mission success

and policy compliance. Yet, that is exactly what many commanders frequently face.

The Solution: Focus on Mission Reality, Not Regulation Mandates

To ease that burden, the Army is shifting to a new way of thinking. Instead of telling commanders exactly how to do something, leaders are telling them what must be accomplished and letting commanders figure out the best way to do it. This outcome-based approach gives commanders more freedom to quickly adapt to changing situations.

The Army's Enterprise Business Systems–Convergence (EBS-C) program is leading this change in thinking. EBS-C works to modernize Army logistics and finance systems, including improving processes and policies, making Army operations simpler and more efficient, closer to how retail suppliers like Walmart and Amazon operate.

For too long, we have been using rules written for a different kind of Army, and now, in today's landscapes, they are slowing us down.

With input from EBS-C, the Army has already taken steps to align policy with today's mission set. The following are among the most significant are revisions to several key Army regulations (ARs):

- **AR 710-4, Property Account-ability:** Less paperwork and more use of digital systems like accountable property systems of record to track equipment. Even more simplifications are planned for 2026.
- **AR 735-5, Relief of Responsibility and Account-ability:** New digital tools, such as electronic financial liability investigation of property loss (eFLIPL) make it easier and faster to report and resolve lost items. Enhancements to eFLIPL this year added the inquiry adjustment loss process for minor losses when negligence or misconduct is not involved, and more enhancements are in development for the future.
- **AR 710-2, Secondary Item Policy and Retail Level Mana-gement, and Department of the Army Pamphlet 710-2-2, Supply Support Activity Supply System: Secondary Item and Retail Level Procedures:** Using handheld devices and digital records at supply support activities to improve accuracy and efficiency.
- **AR 700-84, Issue and Sale of Personal Clothing:** Updates to coincide with the rollout of the Soldier Equipping and Asset Management system for managing clothing and equipment.

These changes have one thing in common: they create a more flexible environment for Soldiers to achieve mission success without compromising compliance.

Working Together to Improve Policy

The Army is also changing how it creates policies. EBS-C works directly with Soldiers, commanders, and users to understand their needs and challenges. This co-creation process ensures that policies are practical and useful. We listen to the people who use these rules and make changes based on their feedback. Agile teams spot gaps between old rules and new needs and share those insights to help update Army policies. This teamwork allows for faster improvements, better field-informed decisions, and policies that support readiness while still following the rules.

It is also important to note the impact these changes are having outside EBS-C and the sustainment community to support broader Army and War Department (DOW) priorities. For example, EBS-C, with input from its Soldier and user base, was part of a team that worked to reduce overly detailed regulatory constraints to allow off-the-shelf software acquisition rather than needing costly customization to meet Army needs. This aligns with Presidential Executive Order 14265, Modernizing Defense Acquisitions and Spurring Innovation in the Defense Industrial Base, which mandates modernization in federal procurement. It also supports readiness at the strategic level, whether in ammunition resupply, Organic Industrial Base operations, or supporting the defense industrial base.

Challenges Ahead

Even with these improvements, there is still work to be done. We know that adopting new processes takes time. Right now, inspectors sometimes still request hard copies of documents from field units, even when digital outputs are available. However, EBS-C, along with Headquarters, Department of the Army G-4, is working to fast-track the acceptance of these new initiatives by ensuring that staff across the enterprise are aware of and using these automated workflows where available. The team also hopes to soon use DOW-approved collaboration tools (like Wikis) and artificial intelligence to rapidly reconcile doctrine, policy, and systems documentation to keep policies up-to-date and easy to understand.

The Bottom Line: The Army Needs Policy That Moves with the Mission, Not Against It

Ultimately, EBS-C's goal is to create sustainment policies that do the following:

- Focus on the why and what, not just the how.
- Provide commanders with the flexibility to quickly adapt to changing situations.
- Use common standards to ensure everyone can seamlessly work together.
- Are easy to update as technology and missions evolve.
- Are based on inputs from the field.

Sustainment is not just about moving supplies — it is about giving Soldiers a strategic advantage in every environment. EBS-C and Army leaders are working to modernize policies so they support both regulation and reality in the field, without sacrificing the success of one for the other. If a policy is not executable at the tactical edge, then it is not fit for the future fight. The ability to move, adapt, and supply in real time depends on having policies that move with the mission, not against it.

CW5 Gregory W. Besaw serves as the Soldier advocate for the Enterprise Business Systems–Convergence Multifunctional Capabilities Team, detailed from Headquarters, Department of the Army G-4. He is a strategic policy and procedures author with extensive experience in property accountability and sustainment operations. He holds a master's degree in logistics management from the Florida Institute of Technology and is a certified Demonstrated Master Logistician.

CAPTAINS CAREER CORNER

REVOLUTIONARY PRINCIPLES

The Mission Command of COL William Prescott

■ *By CPT Juan C. Jaico, Jr.*

On June 17, 1775, the impact of British naval guns and the steady advance of seasoned troops threatened to shatter the colonial siege of Boston. Directing an effective engagement within a hastily improvised fortification on Breed's Hill, COL William Prescott, commanding 1,200 Massachusetts militiamen armed with limited ammunition and raw resolve, seized the initiative by ordering, "Wait until you see the white of their eyes." His leadership presence and clear directives under fire forged cohesion among the inexperienced militia.

In the span of three British assaults, the militia delivered coordinated, massed volleys that blunted the British attack and inflicted over 1,000 casualties on the enemy, reshaping British perceptions of colonial resistance in the early days of the American Revolution. Prescott's actions exemplify how adaptive leadership and command principles can shape the tactical outcomes against a superior force. He successfully executed the mission command principles of competence, shared understanding, disciplined initiative, and risk acceptance.

History

William Prescott, born in Massachusetts in 1726, served in provincial militia campaigns during King George's War in 1745 and the French and Indian War in 1755, earning recognition for field engineering and leadership. In 1774, Prescott was commissioned colonel of the Pepperell regiment of Minutemen, and in 1775, the Massachusetts Committee of Safety placed militia around Boston under the command of GEN Artemas Ward. On the night of June 16, 1775, Ward ordered Prescott to occupy Charlestown. The Charlestown peninsula showed two predictable landing sites: Copp's Hill and the Mystic River shore, constraining British operational options and directing any assault into narrow corridors. Recognizing this, Prescott deliberately occupied Breed's Hill to exploit its steep slopes and muddy flanks, which canalized

enemy formations into predesignated kill zones. He also integrated lessons from earlier colonial skirmishes, adapting fortification techniques to the irregular militia.

Under the cover of darkness, he oversaw the construction of a 160-foot redoubt and connecting breastworks, then coordinated musket drills. Despite the chaos of construction at night, he organized sentries and rotating digging teams to maintain operational security and endurance. He inspected each sector, ensuring that the trenches and fortifications conformed to his design for effective engagement. British eyewitness accounts later noted the militia's readiness at first light. This rapid fortification also sent a message that colonials were no longer content to besiege Boston but were prepared to seize the initiative and contest control of the high ground.

At dawn, British ships opened fire as Prescott moved among the works, adjusted barriers, and rallied Soldiers. After three assaults and a famous close-range volley, the exhausted militia withdrew to Cambridge, having inflicted heavy losses on the British forces at the cost of over 400 American casualties, a testament to effective defense and emerging colonial command proficiency.

Competence

Competence as defined by Army Doctrine Publication (ADP) 6-0, Mission Command: Command and Control of Army Forces, is "tactically and technically competent commanders, subordinates, and teams," which are "the basis for mission command. An organization's ability to operate using mission command relates directly to the competence of its Soldiers." Prescott's understanding of field fortifications, musketry, and small-unit leadership embodied competence and underpinned every decision.

His 30-year militia career began at age 17, serving at Louisbourg in 1745 and Fort Beausejour in 1755, where he perfected rapid entrenchment and coordinated volley fire. Drawing on this experience, he engineered a hexagonal redoubt 8 feet high on all faces, flanked by angled breastworks to deflect British fires and mask dead ground. Additionally, he supplemented his technical skills with hands-on training, such as demonstrating trench digging, followed by live-fire demos in adjacent fields so his militiamen understood the importance of volley timing and barrel alignment. This direct mentorship accelerated battlefield proficiency and exemplified leader presence as a force multiplier.

Prescott's real-time corrections, such as shouting measured cadence commands and repositioning of muskets, ensured that even his inexperienced militiamen performed like seasoned troops at critical moments. His presence during battle also bolstered morale. Soldiers dug deeper, adjusted traverses, and prepared coordinated fire sectors. Without competent leadership, massed volleys would have lacked cohesion, and the redoubt might have collapsed under British cannon fire. This level of professional expertise fostered confidence among the militiamen, directly influencing their willingness to hold fire until the decisive moment.

Prescott's engineering choices also reveal a solid grasp of terrain advantages on the battlefield. His proficiency ensured structural integrity and fire discipline. Transitioning from personal craft to the collective purpose, Prescott forged a shared understanding of intent, terrain, and mutual support across his inexperienced militiamen.

Shared Understanding

Shared understanding within the scope of ADP 6-0 is that of "an operational environment, an operation's purpose, problems, and approaches to solving problems." Prescott created a unified mental model through clear commander's intent and aligning subordinate awareness of terrain and timing. He ordered company and platoon leaders to the redoubt's edge, declaring the task as delaying the enemy by massed volleys at close range, conserving ammunition and protecting the flanks. He sketched likely landing beaches along the Mystic River and identified fire sectors for each unit. Throughout the night, lieutenants relayed these instructions to squads, rehearsing the volley rhythm that would occur at 50 yards.

By distributing hand-drawn terrain sketches to his lieutenants, Prescott created a common operational picture at the platoon level, mirroring today's digital common operational picture that synchronizes situational awareness across echelons. Additionally, subordinate leaders marked firing points with entrenching tool handles, creating visual anchor points for untrained militiamen. On the battlefield, this shared understanding synchronized fire: when British troops charged through smoke into open ground, every musket erupted in a single, disciplined wave, scattering the first two assault columns.

Prescott's clear intent and continuous reinforcement prevented piecemeal firing, absorbed the shock of naval and infantry pressure, and welded individual actions to a cohesive defense. Additionally, the rehearsal drills that occurred before execution refined volley timing and fostered mutual trust. By aligning the force cognitively, Prescott set conditions for decentralized adaptation; subordinates innovated local defenses without fracturing overall unity toward achieving the end-state.

Prescott's actions exemplify how adaptive leadership and command principles can shape the tactical outcomes against a superior force.

Disciplined Initiative

ADP 6-0 defines disciplined initiative as "the duty individual subordinates have to exercise initiative within the constraints of the commander's intent to achieve the desired end state." Under Prescott's clear intent, junior leaders exercised disciplined initiative. On the left flank, CPT Thomas Knowlton observed British infantry attempting a riverine landing. Remembering Prescott's intent to channel attacks into kill zones, Knowlton ordered his men to create a section of rail fence, forcing the enemy column into a single file. Simultaneously, LT John Moore redirected a two-pound swivel gun to cover a gap in the fortification, firing into the enemy's open flank. These autonomous measures relieved pressure on the center and slowed British envelopment, enabling the main fortification's massed volleys to strike a compressed target. Moreover, CPT William Brodie established a sharpshooter position atop a collapsed wall on the right flank that enabled targeted fire on British officers. Additionally, SGT John Parker improvised a reserve volley line behind the main fortification when ammunition ran low in forward positions.

Prescott's guidance provided the framework for local adaptations. Each platoon acted in concert with its overarching scheme, preserving ammunition and maintaining lethal effect. By trusting subordinate judgment, Prescott multiplied combat power without micromanagement. Having empowered initiative among junior leaders and subordinates, he then balanced opportunity with the calculated risk required to seize the high ground.

Risk Acceptance

ADP 6-0 demands recognition that operational risk can never be fully eliminated; commanders must weigh risk against potential gain. Prescott chose Breed's Hill over the more defensible Bunker Hill. He considered terrain and the impact of directly challenging British naval dominance against the inherent risks. Prescott also evaluated alternative schemes, such as delaying fortifications until dawn, which risked exposure to naval bombardment, or reinforcing

Bunker Hill, which lay beyond effective threat to the British fleet. He concluded that a nighttime operation on Breed's Hill offered the optimal balance of risk and operational effect.

Another part of risk assessment is found in the quartermaster records, which indicate the militia stockpiled roughly 20,000 musket rounds, far fewer than a British infantry brigade's daily expenditure. This forced Prescott to ration fire and meticulously plan volley sequences, which aligns with sustainment considerations in risk acceptance.

Prescott's professional rapport with GEN Ward, honed during earlier service, afforded him the authority and latitude to conduct nighttime entrenchment without explicit approval. Although some council members feared naval counterfire, Prescott convincingly argued that a bold fortification at that location would disrupt British operations and bolster colonial morale before the winter siege.

Under the cover of darkness, Prescott's militiamen worked under the arc of naval searchlights and the risk of discovery. Prescott's acceptance of risk on the line signaled to every militiaman that he was sharing their fate. Primary accounts emphasize the confusion inherent in the nighttime operation, showcasing Prescott's leadership in mitigating disorientation.

At the third British assault, Prescott's risk calculus paid dividends: the enemy suffered approximately 1,054 casualties, which was more than double the colonial losses, losing momentum for three critical assaults before the militia withdrew. By embracing risk to achieve surprise and terrain advantage, Prescott forced the British into a frontal attack under lethal conditions. His risk calculus underscores that seizing opportunities often requires tolerance for exposure and uncertainty. His deliberate positioning under British guns illustrated an understanding of risk-reward tradeoffs central to the conduct of operations.

Conclusion

In conclusion, COL Prescott executed the mission command principles of competence, shared understanding, disciplined initiative, and risk acceptance. His technical competence in rapid entrenchment and fire discipline established resilient defenses under naval bombardment. By articulating intent with an emphasis on terrain, he ensured shared understanding, melding a synchronized, diverse militia element into a unified lethal force. Trusting subordinate leaders to act within his intent unleashed disciplined initiative. Prescott's deliberate acceptance of risk seized the operational initiative and inflicted disproportionate casualties on trained British troops. The preservation of Breed's Hill as a monument underscores the battle's symbolic importance in American heritage. The actions observed in the Battle of Bunker Hill affirm that mission command principles are a lived practice, honed under pressure and adversity.

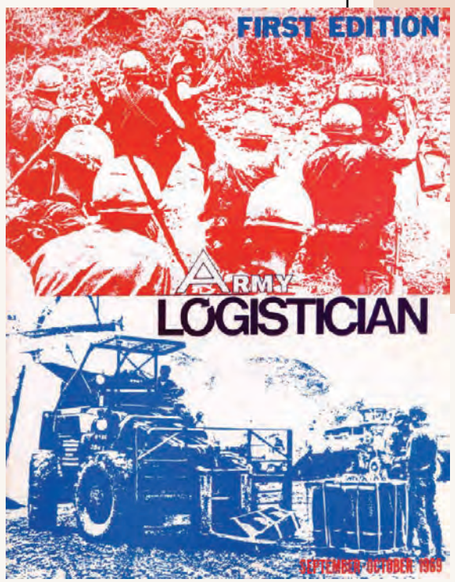
The foundational principles Prescott demonstrated remain just as relevant for today's complex battlefield. Future leaders who cultivate deep expertise, foster shared understanding, empower disciplined initiative, and embrace calculated risks can transform their teams into resilient, decisive forces that achieve bold objectives and inspire lasting commitment.

CPT Juan C. Jaico Jr. is currently a student in the Logistics Captains Career Course at Army Sustainment University in Fort Lee, Virginia. He previously served as executive officer for a forward support company supporting a field artillery battalion in the 10th Mountain Division in Fort Drum, New York. He served as an operations officer in 10th Mountain Division G33 in support of Operation European Assure, Deter, and Reinforce in 2023. He is a graduate of the Basic Officer Leaders Course under the Ordnance branch. He has a Bachelor of Arts degree in psychology from City University of New York, York College.

Featured Art

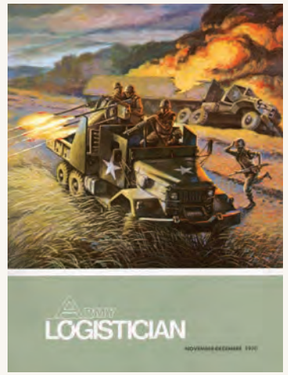
Left: This painting depicts General Burgoyne prepared to surrender his sword to General Gates. Gates, showing respect for Burgoyne, refuses to take the sword and instead offers hospitality by directing Burgoyne to the tent to take refreshment; the American flag flies in the wind at the top of the tent. (By artist John Trumbull)

Right: Redoubt at the Battle of Bunker Hill, June 17, 1775. Colonel Prescott is accurately depicted in his long coat, minus his floppy hat he wore that day. ("Bunker Hill" By artist Don Troiani)



Unlocking the Lessons of the Past

■ *By CPT (P) Garett H. Pyle*



Telling stories to each other is an aspect of humanity that has truly withstood the test of time. Stories have always been the way in which we have shared information and taught the next generation the lessons of the past.

For generations, this was accomplished only by word of mouth around a fire. Then, as we began to write the stories down, they became able to outlive us. The onset of the printing press expanded this capability. With the endless possibilities of technology, now our stories can be shared across the globe in seconds by a variety of means. Thus, the sharing of information and our stories knows no bounds. Well, except for one area.

We have become so reliant on technology and the World Wide Web that the information and stories that

were physically written down in our past are locked away from efficient access. While physical libraries still hold this information, it is unavailable to those who cannot physically go to the locations. Additionally, researching those catalogs of information can take an enormous amount of time, depending on your project.

For instance, the branches of the Army have had journals in publication for well over 100 years, with some dating back into the late 1800s. The *Army Sustainment Professional Bulletin (ASPB)* has been in publication since 1969. That amounts to hundreds upon hundreds of journals with thousands of published articles. The problem is that most of these publications are not searchable on the internet but are locked away solely as physical copies in a branch library. If the library does have a digital scanned version of the publication, it may not have the metadata needed for a user to find it with an internet search. If this information remains locked away, we risk repeating the same mistakes of our past and reinventing the wheel all over again. Thankfully, the Harding Project recognized this situation and acted quickly to provide a solution.

Combat Chronicles Hold the Key

The Harding Project was designed to renew the Army's professional journals and discourse across the force. It was designed around four pillars, which are stewardship, education, archives, and modernization. Today we look at the archives pillar, the goal of which is to improve archive accessibility by consolidating, splitting, tagging, and indexing journals by articles on a platform that eases search and citation of Army journals. Part of this has been achieved with the Line of Departure website, which has become the centralized point for all Army professional journals, articles, podcasts, and overall discourse.

Launched on October 11, 2024, the Line of Departure website provides a single access point for all branch journals that is easy to navigate, web-first, and mobile-friendly for all users. The content is available in the web programming language HTML and downable PDFs. Thus, every Soldier of every rank can consume the information in the manner of their choosing.

Soldiers can now read articles while waiting in line at the chow hall, waiting for their turn during the monthly uranalysis, or during their weekly leader's time training. This website meets Soldiers where they are.

Another prime aspect of the Line of Departure is that all the Army's professional journals are located there. The website is constantly fed by each of the journals, so there is always new content. This broadens our overall knowledge and understanding by reading articles from other branches. No longer does this information exist in a vacuum, nor is it separated by branch. It is no longer just contained at the senior level either. The most junior Soldier can read these articles and then write about the innovations they have discovered that will benefit the entire force.

The creation of this website was just the first step, but we needed something more to help with the thousands of articles of our past. Thus, the Harding Project partnered with the Army Software Factory to develop a program that enables the Army branch journals to be accessible for the modern user. They developed a system called Combat Chronicles.

Combat Chronicles is an Army Software Factory application developed for the Harding Project. It uses artificial intelligence (AI) to unlock more than 5,000 historical journals and more than 100,000 articles by automating metadata and text extraction, saving thousands of manual hours and unlocking a century of peer-reviewed research. This breakthrough makes the Army's intellectual body of knowledge searchable and accessible, giving warrior scholars and senior leaders rapid, evidence-based insights that directly inform strategic decisions, enhance leader development, and ensure relevance in today's complex, multi-domain operations.

I can personally attest to how efficient this system is. So far, I have completed 20 years of journals in the system: 1969 through 1988. This encompasses 116 journals and 2,050 individual articles or content. That is just 20 of the 56 years, 116 of the 322 journals, and 2,050 of the nearly 6,000 articles we have published in our time as a publication.

The articles I unlocked have not been easily accessible in the past. While we have an archive of journals on our website, anything pre-1996 only has the table of contents available to download. You must physically visit the Army Sustainment University library to read these older articles.

The Harding Project, through the use of Combat Chronicles from the Army Software Factory, is now making access to the articles possible. Once we complete the extraction of articles and embed the metadata needed to ensure they are searchable and accessible, these articles will be available on the internet for everyone to access. We are still determining how they will be incorporated on the current platforms such as Line of Departure and the *Army Sustainment* website. So, stay tuned as we continue to bring the stories of our past to you.

Now, if you read my previous articles on AI, "Is Efficiency Worth Sacrificing Our Humanity?" from the spring 2025 issue of *ASPB*, or "GPT: The Death of Creativity and Critical Thinking" from the fall 2025 issue of *ASPB*, you know my feelings on AI. As I stated previously, AI must be used only in limited and restricted ways and not for generating content. Combat Chronicles is an aspect of AI that does not hinder our humanity or creative thinking. It enhances our ability by increasing the number of articles we can archive. It would take hours to split a PDF journal into individual PDF articles. This does not even include adding metadata to the file. Now, of course, the system is not perfect. I must constantly fix article names and the page breaks in each journal. However, I am saving an immense amount of time by using this system while not sacrificing my humanity. In essence, this system is exactly what AI should be used for, but it still needs the human element to review and check everything for accuracy.

Lessons Learned from the Past

We have countless articles written that remain important, even critical, to today's challenges. For instance, the concept of large-scale combat operations is not new. Many of the articles I have been reviewing from the '70s and '80s discuss this concept and how to conduct sustainment operations. There is no reason to reinvent the wheel. Because of the war on terrorism, most of those in uniform today, including myself, did not know a world outside counter-insurgency operations until recently. But the answer to so many of the challenges we face have already been written. We just have to find them.

This is why the work we do is so critical. We are unlocking the lessons of the past by making them accessible and searchable.

The Past Paving the Way for the Future

My plea for everyone today is to take any opportunity you can to expand your knowledge and tool kit with the lessons of the past. Let us not repeat any mistakes of the past because we failed to learn from them. Information is available at a moment's notice. That is why we developed the "Blast from the Past" section of *ASPB*, to highlight past articles that provide lessons for today's Soldiers and show the importance of those who came before us. The past has paved the way for the future. We must take advantage of the stories written before us to find our way.

While we continue to unlock these articles of the past so they are accessible and searchable, please continue to write your stories of today so that current and future generations can learn from you. Just like those from the '70s and '80s help us today, let us help our children's generation by telling the stories we are living through. Transformation in Contact is a prime example. A lot is happening currently, and we need your stories so that we can all learn together. The team here at *ASPB* is ready to help you. Please reach out to us if you need any assistance with telling your story. We would love to help.

CPT (P) Garett H. Pyle is the Military Editor-in-Chief for the Army Sustainment Professional Bulletin and has been selected as the first Sustainment Center of Excellence Harding Fellow at Fort Lee, Virginia. He joined the Army Reserves in 2012 as an O9R (Simultaneous Membership Program Cadet) where he simultaneously attended ROTC at Washington & Jefferson College, where he commissioned in 2016 in the Transportation Corps. He holds a Master of Arts degree in transportation and logistics management from American Military University. He is an Honor Graduate of both the Transportation Officer Basic Course and the Logistics Captains Career Course.

Featured Photos

Top: ASPB cover Sept-Oct 1969.

Left: ASPB cover Nov-Dec 1970.

Middle: ASPB cover Nov-Dec 1974.

Right: ASPB cover Nov-Dec 1980.

LOGISTICS SCENARIO EXERCISE

MISSION COMMAND
at the Tactical Edge

■ *By MAJ Ramón E. García Rodriguez and CPT Taylor Strom, Captains Career Training Department*

Situation

During Operation ICARUS, Task Force (TF) DAGGER (2nd Brigade Combat Team, 1st Infantry Division) initiated offensive operations to seize objective (OBJ) SEAHAWKS. As part of the operation, 1st Battalion, 32nd Infantry Regiment (1-32 IN), 1st Brigade Combat Team, 10th Mountain Division, was tasked to clear alternate supply route (ASR) FEVER, a narrow, mountainous route canalized by terrain and degraded by monsoon rains. This route lies well forward of the brigade support area (BSA) LIFELINE, creating a sustainment gap between maneuver elements and their logistical lifeline.

The terrain restricts mounted movement, limits helicopter landing zone (HLZ) suitability, and exposes sustainment convoys to enemy reconnaissance, indirect fires, and potential sabotage by special-purpose forces and insurgents. Despite these constraints, 1-32 IN must maintain tempo, secure OBJ MARINERS, and support the wet gap crossing at OBJ RIVER.

Mission

Sustain 1-32 IN's clearance of ASR FEVER and seizure of OBJ MARINERS by applying mission command principles to overcome distance-based sustainment challenges, ensuring uninterrupted support in a contested large-scale combat operations (LSCO) environment.

Coordinating Instructions

- TF 299th Brigade Support Battalion (BSB) establishes BSA LIFELINE west of Phase Line APPLE. Priority of support: TF 1-18, TF 2-70, TF 1-63, and 1-32 IN.
- 1-32 IN receives 1 x Hippo, 1 x load handling system (LHS), and operators from the BSB to augment organic water storage and transportation capacity.
- TF 82nd Brigade Engineer Battalion provides route clearance along ASR FEVER and establishes traffic control points (TCPs).
- Logistic status (LOGSTAT) reports indicate 1-32 IN has two days of supply of Meals Ready-to-Eat, 6,950 gallons of Class IIIB, 1 pallet of Class IX, and multiple Class IV requests for blocking positions and defense.
- No HLZs are available in the area of operations; aerial resupply is not feasible during this operation.
- Sustainment convoys must traverse degraded terrain under threat of unmanned aircraft systems, electronic warfare, and indirect fires.

Question

How can mission command principles be applied to sustain 1-32 IN's clearance of ASR FEVER, given the extended distance from the BSB and the threat environment?

FORWARD FABRICATION

Strengthening Autonomous Vehicle Sustainment Through Mobile Manufacturing, Training, and Resource Recycling

■ *By CPT Jack Orion Harden-Ploeger*

In every war, long-term engagements have demonstrated the complexity of logistical planning. However, throughout the ongoing Russia-Ukraine War, a systematic evaluation of modernized logistics pathways conducted through modernization equipment testing has been taking place, particularly regarding autonomous and semi-autonomous deployment systems such as drones. These autonomous deployment systems are frequently rendered ineffective due to warfare modernization challenges, electronic suppression, and systematic material limitations.

A significant example of the logistical challenges with semi-autonomous vehicles is found with the current technological requirement to have a direct-line fiber-optic connection between the drone and warfighter to bypass electronic jamming systems, which significantly reduces their capabilities. Despite these limitations, autonomous systems remain essential. To sustain autonomous systems in contested environments, the Army must implement mobile manufacturing units, initiate targeted training, and recycle battlefield waste into usable filament.

To sustain autonomous systems in contested environments, the Army must implement mobile manufacturing units, initiate targeted training, and recycle battlefield waste into usable filament.

Mobile Adaptive Manufacturing Units (Field-Deployable Production)

The Army must create mobile adaptive manufacturing units capable of 3D printing and machining critical parts production in forward-deployed areas to overcome sustainment delays and resource constraints in autonomous vehicle operations. Material shortfalls in forward environments restrict both the repairability and combat effectiveness of autonomous vehicles. The Russia-Ukraine War has demonstrated that centralized repair depots and supply lines are frequent targets for attack and are often destroyed or cut off. These constraints have forced the deployment of single-use drones that cannot be repaired in the field due to material shortages. Mobile adaptive manufacturing units directly address this gap.

Test cases such as the Defense Advanced Research Projects Agency expeditionary fabrication program and the Marine Corps' containerized 3D printing labs have proven that deployable production can reduce or eliminate material shortfalls by providing immediate, on-demand replacement parts. As noted in the article "3D Printing Solutions for Contested Medical Logistics" in Military Review, May-June 2024, "Robust 3D printing capabilities would provide a secondary logistics chain and allow rapid replacement of broken or non-serviceable items."

Additive manufacturing in theater has already shown success in cutting repair times and restoring operational capabilities. By bypassing vulnerable supply chains and enabling Soldiers to repair or replace mission-critical components on site, these mobile systems allow autonomous platforms such as drones and unmanned ground vehicles to redeploy more rapidly.

The Navy estimates the implementation cost savings to be significant, with up to 97.5% contracting cost reduction and a manufacturing cost reduction of 30% fabrication and 10% labor respectively. Compared to the long-term benefits, modularization through containerized units

A 3D-printed protective sleeve rests on the print bed after fabrication by Allied Trades Soldiers assigned to the 325th Light Support Battalion, 3rd Mobile Brigade, 25th Infantry Division, during Joint Pacific Multinational Readiness Center 26-01, Nov. 4 2025, Schofield Barracks, Hawaii. (Photo by SSG Andre Taylor)

with 3D printers, computer numerical control machines, and extruders offer significant long-term benefits.

Mobile manufacturing will strengthen the Army's ability to sustain autonomous equipment without relying on traditional supply chains. In contested environments where convoys are vulnerable or access is limited, the ability to fabricate mission-critical components on site reduces downtime and keeps systems operational. By enabling repair over replacement, mobile manufacturing ensures that autonomous platforms remain effective and combat-ready throughout extended operations.

Targeted Training for Sustainment Personnel on Advanced Manufacturing

Autonomous vehicle sustainment cannot succeed without Soldiers who are trained to operate and maintain advanced manufacturing systems. The Army's Holistic Health and Fitness (H2F) program has proven that targeted, pre-deployment training initiatives improve readiness, and this model must be adopted to prepare sustainers for the technical demands of mobile manufacturing. NATO partners such as the United Kingdom's Ministry of Defense have already integrated additive manufacturing instruction into logistics training pipelines, ensuring their soldiers can troubleshoot and employ this equipment in expeditionary operations. Additionally, the effectiveness of new sustainment technologies is ultimately determined by operator proficiency.

Even the most advanced mobile manufacturing systems risk underutilization without trained personnel. By introducing structured training through institutional instruction, unit-level exercises, and hands-on practice, the Army can transform sustainers into proactive problem solvers capable of repairing autonomous vehicles in contested environments. The cost of this initiative is relatively low when applying the H2F deployment cost as the estimation at $57 million per year. This solution will require updates to existing curricula, vendor partnerships, and additional training hours, yet the benefits will include significantly enhanced operational readiness and reduced downtime for autonomous systems.

Targeted training will equip the Army to sustain autonomous equipment where technical demands exceed traditional logistics skills. In forward environments, where time and precision are critical, having Soldiers capable of operating advanced manufacturing systems will ensure immediate response to equipment failures. By building technical expertise, targeted training can keep autonomous platforms functional, adaptable, and ready for continuous deployment.

In-Field Recycling and Additive Material Reuse (Trash-to-Filament)

The Army must strengthen autonomous vehicle sustainment by converting battlefield waste into usable resources for additive manufacturing. In Ukraine, drones are frequently relegated to single-use systems because repair materials are unavailable in forward areas. Civilian programs such as Precious Plastic have already proven that low-cost extrusion machines can recycle plastic bottles and packaging into 3D printer filament, while Navy and Marine innovation cells have tested similar systems aboard ships and at forward operating bases. Expeditionary logistics increasingly depends on sustainability and in-field resource reuse.

Recycling waste into manufacturing inputs will enable Soldiers to produce replacement drone parts, unmanned aerial vehicle housings, or repair components without relying on vulnerable supply convoys. This approach will reduce downtime for autonomous platforms and decrease battlefield waste. Earlier expeditionary fabrication testing by the Marine Corps confirmed this program's significant cost savings.

Implementing this technology is critical for sustaining warfare. In forward areas where traditional supply lines are unreliable, converting discarded plastics into filament will give Soldiers the ability to produce mission-critical components on demand. This capability will reduce downtime, minimize resupply needs, and keep unmanned systems functional in combat zones. By integrating recycling into the sustainment process, the Army will extend the life of autonomous equipment and reinforce its logistical independence in contested environments.

Conclusion

The Army can solve this logistics deficit through three mutually reinforcing measures: deploying mobile adaptive manufacturing units to provide on-demand production, training sustainment personnel to operate and troubleshoot these technologies, and recycling battlefield waste into usable materials for additive manufacturing. The Russia-Ukraine War demonstrates the vulnerabilities of autonomous systems in resource-constrained environments, revealing sustainment challenges that the Army must be prepared to overcome. To realize their full potential, autonomous platforms require a logistics approach that is resilient, decentralized, and capable of adapting in contested environments. Together, these solutions will reduce reliance on vulnerable supply convoys, extend the service life of autonomous platforms, and ensure that sustainment keeps pace with future combat operations. Addressing sustainment constraints today will directly allow the Army to leverage autonomous vehicles — not as disposable assets, but as enduring capabilities that enhance lethality, flexibility, and operational tempo in multi-domain operations.

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Featured Photo
SPC Masson A. Nicholson, a 91E Allied Trade Specialist, assigned to the 325th Light Support Battalion, 3rd Mobile Brigade, 25th Infantry Division, removes a newly manufactured 3D-printed part from the build plate during Joint Pacific Multinational Readiness Center 26-01, Nov. 4, 2025, Schofield Barracks, Hawaii. (Photo by SSG Andre Taylor)

At the Crux of Readiness

Why QA/QC Is Essential to Army Maintenance Success

■ *By CW5 Sibley S. Haamid II*

A frequently used acronym in the Army is QA/QC, meaning quality assurance and quality control. The terms are often spoken as if they are interchangeable or have the same meaning and function. This article establishes their discernible differences and where they both fit in the making of Army materiel readiness.

Although this article is aimed at the maintenance community, the QA/QC process serves a role in any functional area that provides a service or produces a product. Whether the area is personnel management, field feeding, maintenance, law enforcement, medical, communications, etc., if there is a customer on the other end, they will want a positive outcome and/or a functioning product.

Just as correctly defining the problem is the first step in problem solving, distinguishing between QA and QC is essential to understanding effective quality management.

QA is a proactive process dedicated to ensuring quality standards are met before a product reaches the end user. Essentially, QA serves as the foundation of a comprehensive quality management program, encompassing a structured set of activities that uphold product or service specifications and prevent defects before they occur.

QC is a subset of QA and is a primarily reactive process. It focuses on identifying and addressing defects that occurred or were overlooked during the maintenance and repair process. QC ensures that final outcomes align with established standards, correcting any deviations before delivery. In short, it is the inspection function of the quality management program.

With the above in mind, the process of repairing equipment is inherently reactive; it responds to failures that compromise the functionality or safety of equipment. By integrating both QA and QC effectively, units can minimize failures and enhance reliability.

Throughout my years in the maintenance arena, I have found that the QC process is at the crux of a successful materiel readiness program. It ensures equipment is maintained to the highest standards, reducing failures, improving efficiency, and sustaining operational effectiveness. A well-structured QC framework not only catches overlooked issues but also fosters a culture of precision and accountability in every phase of maintenance. QA/QC will be used throughout this article, but it largely refers to the QC process.

QA/QC During Repair Processes

During the repair process, equipment goes through several status changes within the Global Combat Support System-Army. E status (awaiting final inspection) is the prime opportunity to apply quality controls before declaring equipment is "full mission capable" and meets Army maintenance standards 10/20. If the equipment fails QC checks, it goes into 8 status for rework. At this point, the QA inspector may want to investigate the cause of the failure. This might determine that more training is required; instructions were unclear; supervision was lacking; the wrong skill level was used for the job; proper tools were lacking; or many other possibilities as the cause. Whatever the reason, the QA inspector must enact measures to prevent repeat failure of the same nature.

Composition of a QA/QC Team

The unit's QA/QC team consists of senior maintenance personnel and personnel with the greatest amount of technical knowledge and experience in their field. Two to three experienced maintenance personnel should be enough to run an effective QC program. This section may consist of different maintenance military occupational specialties (MOSs) to have experience covering multiple types of equipment. QA/QC inspectors will continue to gain knowledge and increase their expertise outside their MOS, since exposure to different equipment will create the need for research. One of the members can have a novice to intermediate skill set and assume an apprentice-like position. Training the next generation to carry the torch is a must. QA/QC members should receive additional training in various improvement methodologies such as Lean, Six Sigma, Kaizen, Total Quality Management, and others. Again, the QA team leader oversees the QC team and conducts spot checks and tests against set benchmarks.

Another effective development technique is assigning onboarding personnel to spend one or two weeks in each maintenance section or commodity shop. This rotational approach enhances their familiarity with diverse systems, workflows, and best practices. Commodity shops — such as automotive, armament, communication and electronics, recovery, and specialized equipment sections — offer hands-on experience tailored to the unit's operational needs.

This method broadens their technical expertise and fosters adaptability, cross-functional collaboration, and a deeper understanding of the maintenance ecosystem. Over time, personnel develop a well-rounded skill set that strengthens overall readiness and efficiency.

At least one member should be duty exempt because a complete shutdown of this section would bring maintenance production to a halt while waiting for final inspections to be completed. If no member is duty or tasking exempt, scheduling should avoid disruption of maintenance workflow and operations. Shutting down QA/QC sections creates bottlenecks in

the chain, heavily impacting total turnaround time (TAT). TAT is the time equipment is accepted by maintenance as not mission capable until it is repaired and returned to the operator.

Additionally, the QA/QC team leader should attend maintenance and commodity-shop meetings to provide insight into workflow throughput and quality and training issues, and to identify any required corrective measures.

QA/QC and Operator-Level Parts

QC should be applied with all maintenance transactions. How many times has one heard the term "operator-level parts"? The process for such parts is not exempt from QC. How can the maintenance manager ensure the part was installed correctly or even installed at all, if no one verifies the corrective action before removing faults from the DA Form 5988-E, Equipment Maintenance and Inspection Worksheet or the Equipment Situation Report?

Picture a tactical vehicle rolling through post with one high beam glaring and the other dimly shining on low. It is a familiar sight and a clear sign of a preventable mistake. This happens when a part is handed to an untrained Soldier with the assumption that the installation will be done correctly, without any verification.

Dusting off the trusty TI-84 calculator, let us crunch the numbers on just how many ways a headlight installation can go wrong. With three wires and three plugs, there are six possible permutations, and only one is correct. That is a one-in-six chance of getting it right for a single headlight. Now, add a second headlight into the mix, and the chance of errors is even higher.

To complicate matters further, 24-volt and 12-volt headlights look identical, which means that even if you nail the wiring, you might still be using the wrong component. All in all, the odds of not making a mistake are stacked against untrained personnel.

Imagine the frustration when a seemingly simple installation turns into a game of trial and error, where every connection is a gamble for untrained Solders. It is a reminder that sometimes even the most straightforward tasks can harbor hidden complexities.

Neglecting to perform QC checks on all maintenance work often results in wasted man-hours repeatedly addressing the same fault. Without proper verification, errors go unnoticed, costing time, resources, and operational efficiency.

Shortening the Learning Curve

Continuous improvement can be seen as a positive second-order effect. As mechanics put effort into passing technical inspections of the QC section with a first-time go, their quality of work will improve. For junior maintenance personnel, the turn-in and final inspection process can be a challenging experience. They arrive confident that everything is in order, only to be met with a detailed breakdown of overlooked issues. This moment, while frustrating, is also a valuable learning opportunity, helping them understand proper equipment maintenance and documentation. Over time, with experience and mentorship, they develop the innate ability to navigate inspections more smoothly. Additionally, this higher standard reduces the frequency of errors and minimizes the need for rework.

The following excerpt from Army Techniques Publication (ATP) 4-33, Maintenance Operations, further illustrates the Army's stance on its Total Army Quality Management program:

"Total Army quality management is a management technique used to supplement QC procedures by motivating all personnel to produce high quality work the first time. A functional total Army quality management program becomes evident when Soldiers display the motivation and initiative to inspect their own work and take immediate corrective action to resolve QC problems. Units should always apply total quality management in all functions."

QA/QC and the Commander's Responsibility

A well-designed dispatching policy should incorporate QA and QC measures to safeguard vehicle operators, other road users, and pedestrians. By systematically identifying faults and preventing breakdowns, these measures enhance safety and improve operational reliability. Ensuring vehicles are in optimal condition increases the likelihood of mission success, reducing mechanical failures and unforeseen issues. In accordance with the recently released Army Regulation (AR) 600-55, The Army Driver and Operator Standardization Program (Selection, Training, Testing, and Licensing), "mechanics conduct a joint inspection (QA/QC) with operators to determine if there are any faults." QA/QC sections must have a scheduled time to conduct dispatching QC checks, or else their workload will become erratic. Additional planning is required when dispatching convoys or entire units for training exercises. Dispatching large elements is generally a time-consuming event. Mechanics from other sections with the appropriate MOS may be employed when conducting QC checks on numerous vehicles. The major goals are safety and the reduction or elimination of recovery operations throughout the battlespace.

Under Investigation? Call QA/QC

The QA/QC team's specialized knowledge in maintenance and equipment operations makes them an invaluable asset when conducting investigations. Their ability to analyze maintenance records, assess component functionality, and understand service histories allows them to provide crucial insights into incidents involving equipment damage or personnel injuries. Their objective, technical perspective can help uncover root causes, identify preventive measures, and ensure accountability in processes like financial liability investigations of property loss, commander's inquiries, and inspector general investigations. Their role extends beyond investigation support; they also provide the official estimated cost of damage, which also serves as the initial assessment if there is financial loss to the government. This critical function ensures accurate reporting and helps inform decisions regarding repairs, replacements, and accountability measures. An actual cost of damage is later required if an individual is held liable for government losses.

Summary

In summary, QA and QC are both integral parts of a holistic quality management program. AR 702-11, Army Quality Program, covers the primary tenets, definitions, and characteristics of the Army's quality management guidelines.

QA/QC can be applied at various points of the workflow process, such as when validating faults, during the repair process, in stages, and at the final inspection of the job order. QC checks are paramount to any unit's maintenance program. QA/QC creates the opportunity to catch errors, increase mission success, reduce recovery missions, and enhance mechanic's knowledge.

If you are a commander — whether at the company, battalion, brigade, or deputy commanding general-support — I encourage you to visit unit maintenance facilities to assess the effectiveness and functionality of their QA/QC program. Take time to familiarize yourself with sections 4-85 through 4-94 of ATP 4-33 — just two pages that can provide valuable insights.

These sections may help in developing questions to ask QA/QC sections during site visits, maintenance terrain walks, and command maintenance discipline inspections. Strengthening the QA/QC process at the ground level ensures operational efficiency and enhances overall readiness.

Leadership is not just about strategy. It is about visibility and involvement. Will you take the step?

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MODERNIZING
Army SSA Metrics

Industry Lessons and Data-Driven Solutions

■ *By CPT Danielle M. Turner and CPT Timothy R. Maginn*

Supply support activities (SSAs) are critical components of Army sustainment and the supply chain. However, outdated metrics can hinder their ability to optimize operations, identify bottlenecks, and forecast resource allocation. What if Army warehouses could operate with the same efficiency as Amazon Logistics?

This research explores how lessons from industry and data-driven methodologies can modernize SSA performance metrics. By introducing tailored key performance indicators (KPIs) like transfer order performance (TOP) and leveraging real-time dashboards, this research demonstrates how SSAs can achieve greater transparency, effectiveness, and responsiveness. A proof of principle using one year's worth of data from an Army SSA highlights the practical applications of these recommendations, offering a roadmap for improving sustainment operations across the Army.

Why Current Metrics Fall Short

The Army currently uses customer wait time (CWT) as a primary metric for evaluating SSA performance. CWT measures the time it takes for a requisition to be fulfilled, from order submission to receipt of material. While this provides an adequate overall view of supply chain health, it often fails to capture the nuances of warehouse operations.

For example, the outbound delivery (OBD) segment of CWT involves 18 factors, only eight of which are directly managed by the SSA. This means that delays in OBD may be caused by external factors, making it difficult for SSA managers to pinpoint and address issues.

The lack of granularity in CWT creates challenges for decision making. SSA managers require metrics that focus on processes they can control, such as picking, cross-docking, and issuing. Without these insights, it becomes difficult to identify bottlenecks, allocate resources effectively, or improve workflows.

Lessons from Industry

Private-sector warehouses, such as those operated by Amazon Logistics and Virginia Commonwealth University (VCU) Health, offer

valuable lessons for improving SSA performance. These organizations' practices were observed, and key leaders were interviewed, to identify tailored KPIs to track specific processes and outcomes.

For example, Amazon monitors on-time dispatch and first-day delivery success using real-time dashboards that allow managers to make immediate on-the-floor adjustments. Similarly, VCU Health tracks dead stock to ensure critical supplies are available when needed. These custom-built KPIs are tailored to the needs of the organization, allowing for constant surveillance of critical sub-metrics and materials. In the case of VCU Health, monitoring deadstock is of the upmost importance. Deadstock is defined as stock in a supply chain that has high unsold, unusable, or obsolete inventory that sits in storage. Because of the mission-critical nature of the healthcare industry, it is vitally important for the supply chain to identify stock that is not being used or is expired. These characteristics are very similar to the needs of the Army's supply chain needs.

The key takeaway from industry research is the importance of actionable metrics. High-performing warehouses measure what they can directly influence, using these insights to drive operational improvements. This approach inspired the development of TOP and other actionable KPIs as proposed metrics for Army SSAs.

A Data-Driven Approach to SSA Metrics

TOP is a time-based metric that tracks the execution speed of warehouse actions, such as picking, cross-docking, and issuing. This metric was born from the research conducted and developed by the authors of this article. Unlike CWT, which is influenced by several external factors, TOP focuses solely on processes within the SSA's scope of physical responsibility. This makes it a more reliable indicator of warehouse performance.

To validate the effectiveness of TOP, a proof of principle was conducted using data from an active-duty Army installation SSA from March 2022 to March 2023. The analysis revealed that 76.47% of out-of-tolerance (over one day from initiation to execution) transfer orders were attributed to pick rates, highlighting a bottleneck in warehouse operations. It is important to note that the data does not account for non-duty days. The data was further analyzed using visualization tools, which allowed for drill-down capabilities to isolate specific issues.

The data can be shown over time to exhibit correlations between a unit's major movements (deployment, redeployment, major training events, etc.) and SSA processing performance (with zero open transfer orders during a duty day being the standard). While some KPIs might reveal that an SSA is not meeting a certain standard, tailored KPIs like TOP show leaders the precise location, process, or personnel that is contributing to a specific weakness. High put-away times are also correlated with high inventory loss, which is another way TOP can be used by SSA leaders.

This granular analysis enables SSA managers to implement targeted corrective actions, such as reallocating personnel to areas experiencing slower-than-expected pick rates. When paired with CWT, TOP provides a more complete picture of warehouse performance. While CWT offers a macro-level view of supply chain health, TOP delivers actionable insights at the micro (SSA/warehouse) level, empowering managers to address inefficiencies in real time.

Other KPIs were also organized into a tiered hierarchy aligned with leadership roles and levels of supply chain responsibility. The tiers include Up and Outs, Down and Ins, and Both. The category identifies metrics that are intended to be monitored by SSA accountable officers (AOs) and briefed at the brigade level. This structure creates a clear micro-to-macro system of accountability and enables leaders across the sustainment enterprise to quickly drill down to the source of performance issues.

Recommendations for Improvement

To modernize SSA performance metrics, this research proposes three key recommendations:

1. **Adopt a Tiered KPI Hierarchy**: A tiered approach links micro-level metrics, such as TOP, to macro-level outcomes like readiness. This structure allows SSA managers to monitor granular details while providing senior leaders with a high-level view of performance. For example, pairing TOP with CWT offers both detailed and broad insights, enabling more effective decision making. It also allows leaders to hold parties accountable for shortfalls.
2. **Prioritize Actionable Metrics**: SSA evaluations must focus on metrics that fall within the direct control of the AO and their staff. Metrics like TOP and picking productivity present immediate means for operational improvement, unlike broader measures such as authorized stockage list composition, which are generally managed at higher organizational levels. AOs can also use tailored KPIs to monitor the effectiveness of their workforce to target area weak points within their SSAs and Soldiers who might need additional assistance, retraining, or digital resources.
3. **Standardize KPI Dashboards**: The Army must continue to develop standardized dashboards that integrate directly with systems like Global Combat Support System–Army. These dashboards simplify data visualization and enable real-time decision making, reducing the burden on SSA managers and promoting consistency across units. Whether it is the Sustainment Enterprise Analytics tool or a dashboard built in Army Vantage (where the research for this paper was conducted) it is recommended that these tools are consolidated and standardized to provide solidarity and a shared understanding across the force.

Areas for Future Research

While this study demonstrates the value of metrics like TOP and visualization tools, it also highlights a critical gap in the Army's ability to generate, analyze, and standardize data at the unit level. SSA managers often lack the bandwidth, resources, or technical expertise to manipulate raw data and create actionable insights on demand. This limitation underscores the need for trained data analysts within units to bridge the gap between raw data and decision-making tools.

For example, VCU Health successfully paired supply chain managers with data analysts to create dashboards that track critical metrics like deadstock. This collaboration enabled managers to focus on operational improvements without the burden of mastering complex visualization platforms.

Additionally, further studies could examine the integration of predictive analytics into SSA metrics. By linking KPIs to demand forecasting models, SSAs could provide early warning signals for inventory shortages or overages, allowing for proactive adjustments that sustain readiness.

Investing in data-centric capabilities at the unit level will enhance SSA performance and ensure the Army remains adaptive and prepared to meet the challenges of modern warfare.

Conclusion

Modernizing SSA performance metrics is not just about improving efficiency; it is about transforming the Army's approach to sustainment in the face of today's data-driven battlefield. The ability to make rapid, informed decisions based on actionable insights is critical to maintaining readiness and operational agility. Metrics like TOP, when paired with real-time dashboards, provide the transparency and granularity needed to optimize warehouse processes and empower leaders at all levels.

As the Army continues to adapt to the demands of modern warfare, embracing data-centric methodologies will be imperative. By investing in tools, training, and personnel to support data-driven decision making, the Army can ensure that its sustainment practices remain agile, efficient, and capable of meeting the challenges of large-scale operations. These efforts will enhance SSA performance and strengthen the Army's ability to sustain combat readiness in an increasingly complex operational environment.

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Answer

Mission command enables sustainment success by decentralizing decision making, empowering subordinate leaders, and fostering disciplined initiative. The competence of sustainment leaders and forward support company (FSC) personnel is critical. Sustainers must anticipate requirements to ensure operational continuity despite degraded lines of communication.

Shared understanding can be achieved by synchronized LOGSTAT reporting, terrain analysis, and enemy threat overlays between the BSB and 1-32 IN, creating a unified operational picture.

Clear commander's intent from TF DAGGER is imperative to guide sustainment actions in isolation. This intent defines success, establishes boundaries for initiative, and allows sustainers to act decisively when conditions change.

Mission orders must emphasize the desired outcomes, such as maintaining tempo without prescribing how FSCs achieve them. This empowers subordinate sustainers to adapt their methods based on the terrain, threat, and opportunity they are facing.

Disciplined initiative is reflected in 1-32 IN's FSC pre-positioning assets at TCPs along ASR FEVER, using LHS and Hippo systems to extend reach. When faced with degraded terrain and enemy interdiction, sustainers take action without waiting for further guidance.

Risk acceptance reflects a command climate that values initiative, trusts subordinate judgment, and prioritizes operational tempo over perfect conditions.

Mutual trust between the BSB and 1-32 IN reinforces decentralized execution, allowing sustainers to act decisively and adaptively in support of maneuver operations.

Analysis

Distance is a doctrinal friction point in sustaining LSCO. As maneuver forces extend beyond the BSA or tactical assembly areas, the risk of delay, disruption, and degradation increases. In the case of 1-32 IN, the clearance of ASR FEVER is both a tactical requirement and a logistical challenge due to distance. The route is narrow, mountainous, and exposed, yet critical to enabling the seizure of OBJ MARINERS and the wet gap crossing at OBJ RIVER.

Traditional sustainment models rely on proximity, predictability, and protected lines of communication. In LSCO, these collapse. Sustainment must be anticipatory, adaptive, and decentralized, and mission command provides the framework to do so.

By empowering 1-32 IN's FSC to execute sustainment actions forward, TF DAGGER preserves tempo and mitigates risk. The use of pre-positioned assets and tailored sustainment logistics packages reflects shared disciplined initiative. The synchronization of LOGSTAT, terrain analysis, and enemy threat overlays reflects shared understanding. The acceptance of risk in pushing supplies forward reflects trust and operational necessity.

This approach aligns with Field Manual (FM) 4-0, Sustainment Operations, with emphasis on ensuring freedom of action, extending operational reach, and prolonging endurance. It also reflects the principles of mission command laid out in FM 6-0, Commander and Staff Organization and Operations, particularly in contested environments where centralized control is untenable.

As shown in the table, the comparative chart between "More Control" and "Less Control" illustrates the operational shift required to sustain 1-32 IN along ASR FEVER. In this scenario, the terrain is unpredictable; the unit is experienced; and the mission demands rapid, decentralized action -- all indicators that favor a "Less Control" approach. Mission command principles such as competence, mutual trust, disciplined initiative, commander's intent, mission orders, and risk acceptance empower sustainers to operate effectively under these conditions. Rather than relying on top-down synchronization, sustainment leaders orchestrate support through implicit communication, reciprocal understanding, and flexible execution. The table reinforces that in LSCO environments like this one, sustainment success depends not on rigid control, but on adaptive leadership and empowered teams.

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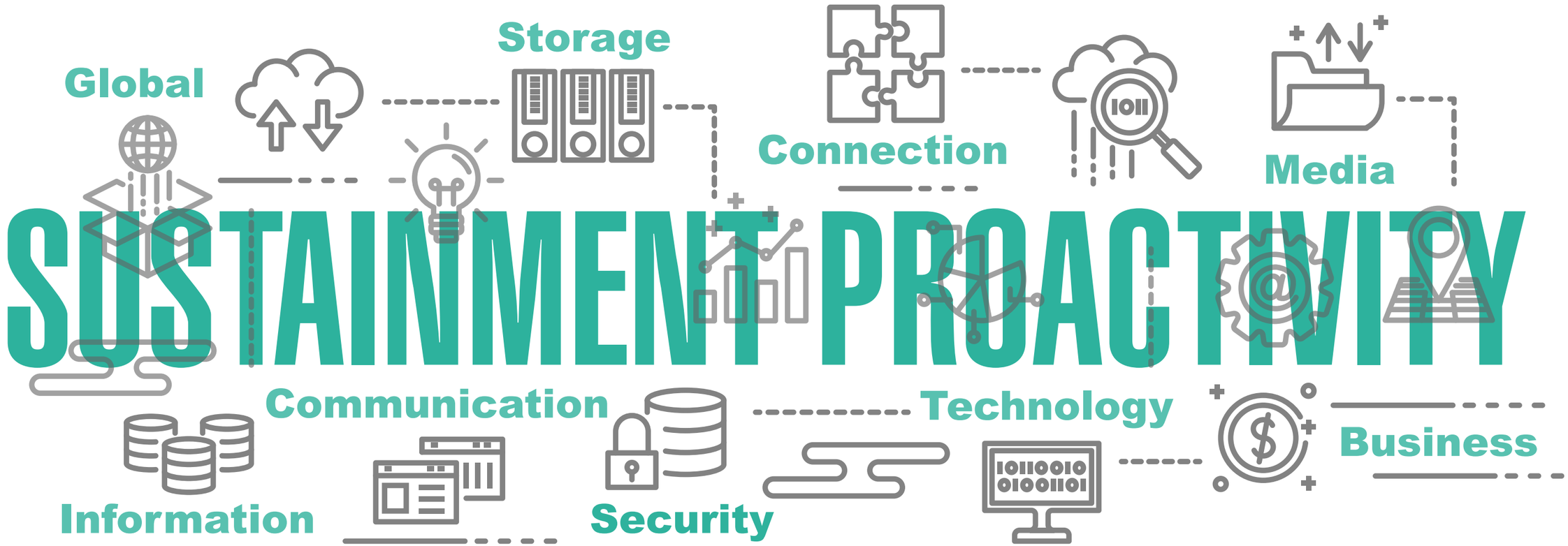
ASU WRITING COMPETITION WINNER



Using Data-Centric C2 to Predict Convoy Failures

By 2LT Nicholas R. Thierfeldt

You are tasked to lead a 40-truck convoy resupplying combat troops at the front during large-scale combat operations. The mission is critical, and every vehicle must complete it as quickly, efficiently, and safely as possible. The enemy has repeatedly demonstrated their intent to destroy any line of communication to isolate friendly forward units. With limited information, you rely solely on word of mouth to decide which vehicles to send. To err on the side of caution, you treat every vehicle as equally unreliable. But what if there were a tool to visualize and quantify the reliability of each truck before the convoy ever rolled out?

Background

In modern sustainment operations, both readiness and performance of a unit depend on proactive foresight rather than reactive response. Convoys are the backbone of logistical movement. Yet, a convoy's success often depends on the reliability of its vehicles. A single truck failure can delay delivery timelines and create tactical vulnerabilities for both the convoy and the area of operations. According to Field Manual (FM) 4-0, Sustainment Operations, "Sustainment leaders must visualize and prepare resources for future operations." In this new age, the Army can adapt this logic within command and control (C2) through data-centric decision tools. This article presents a machine learning (ML) model using synthetic data to demonstrate how predictive maintenance can enhance convoy readiness within a C2-integrated sustainment framework.

Civilian World Transportation

Private companies are not immune to real-world variables that disrupt logistical routes. ML algorithms have been shown in several civilian studies to achieve exceptionally high precision, accuracy, and recall. Civilian transportation systems already apply ML to predict operational delays, optimize scheduling, and reduce costs. The consistently high

predictive accuracy across civilian transportation sectors shows the value of ML algorithms for sustainment planning.

Army Application

The Army can apply similar predictive models to enhance convoy predictability and maintenance readiness under C2 modernization. Much like civilian logistics systems, military convoys generate vast datasets, including diagnostics, route history, maintenance records, and breakdown statistics, which can be modeled to predict potential failures. FM 3-0, Operations, says, "Timely, accurate, relevant, and predictive intelligence enables decision making, tempo, and agility during operations." Although this FM 3-0 principle addresses predictive intelligence in terms of enemy activity, the same logic applies internally. Through data-driven analysis, sustainment leaders can generate predictive insight that directly enhances C2 capabilities.

Translating predictive sustainment into practice requires defining measurable variables that capture convoy reliability factors. Vehicle condition, operating environment, and maintenance history each influence failure likelihood. By structuring these data points into an ML algorithm, sustainment leaders can visualize where risk accumulates and anticipates disruptions before they occur. Just as FM 4-0 emphasizes anticipation and preparation of resources, ML algorithms can enable commanders to forecast maintenance risks and key metrics essential to operational planning.

Testing Parameters

To model predictive reliability within a convoy, several synthetic key variables were selected to reflect the vehicle condition and environmental stressors. These variables included truck age, days since last service, ambient temperature, load percentage, and terrain difficulty. Every parameter represents a measurable factor that influences mechanical reliability and convoy performance. For example, increasing load percentage or ambient temperature increases strain on a truck's engine and braking system, while steeper terrain correlates with higher failure probability. The synthesized data was generated to preserve operational security while still maintaining realistic proportional relationships between variables. A small dataset was used, consisting of 120 driving instances across 30 trucks and three convoys. The ML algorithm tested and predicted against these parameters.

Results

The model was tested across multiple alert thresholds to evaluate how accurately it predicted vehicle failures within simulated convoy scenarios. An alert threshold is the minimum predicted probability that triggers a maintenance warning. For example, if the model predicts a 25% chance of failure, it generates an alert. Accuracy, precision, and recall were analyzed to determine the optimal balance between early detection and false alerts. A logistic regression model was selected for its ability to interpret and balance these variables effectively. These variables are defined as follows:

- **Accuracy**: the overall percentage of correct predictions, indicating how often the model correctly identified both failures and non-failures.
- **Precision**: how often predicted failures were true failures.
- **Recall**: the rate at which the model successfully identified actual failures.

The most balanced performance occurred at a 25% alert threshold, achieving 75% overall accuracy. Precision was 22%, meaning roughly one in five alerts corresponded to a true failure, while recall was 50%, indicating that half of all actual failures were successfully detected.

Although the most effective model did not capture every failure, its ability to correctly predict half of all breakdowns using a small synthetic dataset demonstrates meaningful operational potential. Even partial foresight enables proactive decision making for the mission and, based on civilian research using ML algorithms, would only improve with larger quantities of real-world data.

Of 120 cases, 90 trucks were correctly identified as operational; 15 generated false alarms; eight failures were missed; and seven were accurately predicted as genuine failures.

At a 25% alert threshold, the model demonstrated a balanced level of conservatism, generating alerts early enough to be useful without overwhelming the operator with false positives. This threshold can be adjusted based on commander preferences, maintenance capacity, or risk tolerance. The logistic regression model demonstrated the trade-off between sensitivity and selectivity. At a 10% threshold, the model generated 54 false alerts but captured the largest number of true failures. In contrast, at a 50% threshold, it was accurate 87% of the time in predicting non-failures but failed to identify any actual failures. In short, the 10% alert threshold was very cautious and often gave false alerts, whereas the 50% alert threshold never gave an alert since the ML algorithm was never 50%+ sure of a failure.

Operational Implication

Predictive analytics extend a commander's ability to visualize future sustainment challenges before they come to fruition. Rather than reacting to breakdowns as they occur, leaders can plan reroutes or maintenance windows based on model outputs. This aligns with FM 4-0, which emphasizes anticipation as one of the key sustainment principles. This approach effectively creates a data-driven form of maintenance triage, allowing leaders to better prioritize higher-risk vehicles and conserve resources for those most critical to mission success.

Commanders could adjust alert thresholds based on resource availability and mission tempo, mirroring how operational risk is managed in other sustainment functions. For instance, a 10% threshold may be appropriate during high-risk missions where failure costs are severe, while a 25% or 50% threshold may be used during routine operations to reduce false alerts and information overload. In addition, unit warrant officers, truckmasters, and maintenance platoon sergeants could use this data to make maintenance decisions that help to meet the commander's intent. Using data analysis through an ML algorithm, leaders could fast-track vehicles with a higher chance of failure for maintenance and send the trucks with the lowest likelihood of breakdown on the most critical missions.

Conclusion, Limitations, and Discussion

Predictive modeling offers a powerful opportunity to enhance sustainment readiness through data-driven anticipation rather than reaction. As this study demonstrated, even a simple logistic regression ML algorithm can detect patterns that mirror real-world convoy risk. The 25% alert threshold demonstrated the most balanced performance, providing commanders with an analytical early warning option that can be tuned based on mission risk and available resources.

However, the ML algorithm in this study operated solely on synthetic data. The dataset included just 120 simulated driving instances across three convoys. This limited sample size reduced the model's predictive reliability. In real Army operations, ML algorithm performance would improve significantly because more authentic, high-quality data would be introduced over time. This emphasizes the importance of providing real data to predictive systems whenever legally and tactically possible. Feeding the model with incomplete or inconsistent data, or no data at all, will undermine the Army's ability to use newer data-driven technology, just as poor maintenance logs or missing dispatch records can compromise a convoy. The more accurate the data, the more effective the sustainment.

An ML algorithm could integrate with a real-time dashboard through an application programming interface, automatically feeding commanders actionable data to enhance C2. Key sustainment leaders could then apply their experience and judgment to interpret the tool's outputs and incorporate them into operational decisions. By pairing data-driven insight with leader experience, the Army could turn information into readiness and make every mile of convoy movement more effective in achieving mission success.

2LT Nicholas R. Thierfeldt currently serves as a logistics officer attending the Army Sustainment University's Basic Officer Leadership Course at Fort Lee, Virginia. He earned his commission through Officer Candidate School at Fort Benning, Georgia, following the completion of Basic Combat Training at Fort Jackson, South Carolina. His home unit is the 419th Transportation Company in Salt Lake City, Utah. He holds a Project Management Professional certification, a Master of Business Administration degree from Amberton University in Garland, Texas, and is pursuing a Ph.D. in business at the University of the Cumberlands.

LET'S MAKE INNOVATIVE IDEAS

UGVs Resupplying the Front Line

■ *By CPT Connor James*

As militaries worldwide study the evolving conflict in Ukraine, many are racing to integrate battlefield innovations into their formations. While the use of first-person-view drones has gained the most attention, one of the most transformative changes — particularly for infantry operations — is the growing role of unmanned ground vehicles (UGVs) in tactical resupply.

Ukraine has taken the lead in this field, using large numbers of low-cost UGVs to support infantry near the front line. These systems are helping to reduce casualties while ensuring that frontline troops remain supplied during sustained combat.

For the U.S. Army, adopting similar systems could revolutionize sustainment for infantry brigade combat teams, particularly in contested environments where manned resupply puts paratroopers at risk.

Infantry Problem Set

Currently, most U.S. Army tactical resupply is conducted by manned vehicles. While these convoys are protected by convoy protection platforms, they still expose troops to ambushes, improvised explosive devices, and aerial drone threats. In a future high-intensity fight — especially in an attritional environment like Ukraine — this model is not sustainable.

Moreover, current U.S. Army UGV programs are expensive and unsuited for disposable or high-turnover logistics tasks. Without cost-effective, adaptable alternatives, infantry units may face critical resupply gaps when the risk to human drivers is too great.

UGVs in Action

Ukraine's widespread use of UGVs offers a compelling model. Some Ukrainian brigades conduct

most of their tactical resupply with unmanned systems, using them to push food, ammunition, and water directly to the front. In doing so, they reduce exposure to enemy fire and preserve manpower.

The most direct benefit for U.S. infantry formations would be risk reduction. A UGV can navigate to a forward position without requiring a crew or an escort. If destroyed or immobilized, the vehicle becomes a relatively inexpensive loss — and its location could be used as a target reference point for follow-on fires, especially with drone overwatch.

UGVs could also support disaggregated infantry teams, such as the hunter-killer teams tested by the 173rd Airborne Brigade during Exercise Saber Junction 24 in Germany. These six to 12 paratrooper teams operated independently for up to 72 hours, often beyond traditional supply lines. A small, camouflaged UGV could quietly move to a predetermined cache site, remaining concealed until the team linked up for resupply.

During the same exercise, Darkhorse Forward Support Company of 1-91 Cavalry Regiment developed new tactics to support the deep fight and resupply dispersed elements near the front line. Conventional convoys were too large and too exposed to operate freely. In such cases, small-profile UGVs were able to move from brigade rear elements to dispersed logistics nodes or directly to combat elements, minimizing detection.

If a unit engaged in a firefight urgently needed resupply, UGVs could push forward without waiting for an entire distribution platoon to assemble a convoy. This flexibility could be a game-changer for light infantry companies operating under contact or in austere terrain.

Fratricide and Force Protection

Manned resupply missions require detailed coordination to avoid fratricide, especially when delivering supplies to troops in contact. The use of UGVs reduces this burden, since no crew is onboard. Infantry can remain focused on fighting without worrying about friendly vehicles or recovering damaged crewed assets. If a UGV is disabled, it does not endanger paratroopers or require immediate recovery.

U.S. Efforts and Cost Constraints

The Army is testing UGV capabilities, such as autonomy kits for Heavy Expanded Mobility Tactical Trucks. These kits allow a crewed vehicle to lead up to seven autonomous ones. While this innovation enhances efficiency, it is still crew dependent and expensive.

Another program, the Small Multipurpose Equipment Transport, is designed to follow dismounted infantry and carry 2,000 pounds of gear. However, early models cost around $100,000 each. For context, Ukrainian UGVs like the Vepr cost roughly $8,000 to $20,000 and can carry up to 600 pounds, sufficient for basic infantry resupply.

Whether delivering a basic load of ammo, water, or communications gear, a single UGV could extend the fight or sustain an isolated team just long enough for it to succeed or survive.

Ukraine's latest UGV, the Gimli, has not had its specs released but is expected to match or exceed the Vepr's capabilities at a similar cost. These price points allow Ukrainian forces to treat UGVs as expendable, an approach that is crucial in high-risk logistics roles. In contrast, the U.S. acquisition system is slower and geared toward durable, multi-year platforms rather than low-cost, disposable assets.

Army Chief of Staff GEN Randy George has acknowledged the challenge, saying the concept of a program of record may not fit rapidly evolving autonomous systems. Instead, the Army needs faster procurement pathways to stay relevant.

Capacity and Limitations

UGVs are not a perfect solution. Their payload is limited compared to manned vehicles. A Vepr might carry enough 7.62 mm linked ammunition to support a machine gun squad, but for larger items like water or fuel cans, the volume and weight constraints become a factor. For example, a 600-pound-capacity UGV could deliver roughly 66 gallons of water or 28 cases of MREs. For an airborne infantry company, it would be about one day's supply of food, but only about half a day's supply for water.

Still, when paired with pre-staging or multiple UGVs, this can be sufficient for short-term or emergency needs. While not a replacement for traditional trucks, UGVs offer a valuable complement in dangerous or hard-to-reach areas.

Complementary Systems: UAS vs. UGV

The 173rd Airborne Brigade has also begun testing aerial delivery systems like the Flying Basket 3 and 4, which can deliver 220 to 440 pounds via unmanned aircraft systems (UAS). These systems were used during Swift Response 25 to cache food, ammo, and batteries for infantry training in Lithuania.

However, aerial systems are even more expensive than UGVs — ranging from $82,000 to $110,000 per unit — and are more vulnerable in denied airspace. They also consume significant battery power, requiring robust charging infrastructure. In contrast, ground-based UGVs are simpler to maintain and undetectable by enemy air defense.

A balanced approach is necessary. In relatively secure rear areas, manned resupply remains the most efficient method. For contested or high-risk zones, UGVs offer a way to maintain logistics without endangering Soldiers. In emergencies or permissive environments, UAS platforms provide speed and flexibility. The key is matching the method to the mission.

Infantry Implications

For infantry companies operating at the front, especially airborne and light units, resupply has always been a challenge. Small UGVs offer a lifeline in high-threat areas where traditional methods may be impossible. Whether delivering a basic load of ammo, water, or communications gear, a single UGV could extend the fight or sustain an isolated team just long enough for it to succeed or survive.

In dispersed operations, UGVs could enable new tactics and formations. Infantry leaders could commit smaller elements farther forward, confident they can be resupplied without pulling back or exposing a larger force. This would open the door to more agile and lethal infantry maneuvers.

Conclusion

The Russia-Ukraine War has shown how low-cost, expendable UGVs can enhance frontline logistics and reduce Soldier exposure. For the U.S. Army, especially light infantry units, the time to adapt is now. Investing in inexpensive, rapidly fielded unmanned systems will increase survivability and operational tempo in future conflicts.

UGVs will not replace every manned vehicle, but they can fill the deadly gap between the front line and the logistics train. If the Army wants to win the next fight, it must start building those bridges today.

CPT Connor James commands E Company, 2nd Battalion, 503rd Infantry Regiment, 173rd Airborne Brigade. He previously served with 7th Special Forces Group and deployed to Afghanistan in support of Operation Resolute Support. His formal military education includes the Logistics Captains Career Course, Transportation Basic Officer Leader Course, Ranger School, Airborne School, Static Line Jumpmaster, Military Freefall Parachutist Course, Unit Movement Officer Course, and the Joint Special Operations Logistics Course. He has a Bachelor of Arts degree from Texas A&M University.

Featured Photo
Soldiers assigned to 1st Engineer Battalion, 1st Armored Brigade Combat Team, 1st Infantry Division, advance toward their objective at Joint Multinational Readiness Center's Hohenfels Training Area, Germany, Oct. 21, 2025. (Photo by SGT Kammen Taylor)

A Solution to a Trillion-Dollar Problem, Not a Video Game

By Graham Markiewicz

The Army's Integrated Visual Augmentation System (IVAS) is undoubtedly impressive. It promises to give dismounted Soldiers the ultimate situational awareness, ease communications, and revolutionize small-unit tactics. However, it is said that tactics win battles, while logistics wins wars. Silicon Valley technologists have entered the defense space, promising to revolutionize combat through tools like IVAS. There is a risk that they misunderstand how the military works and thus overlook IVAS's greatest value as a transformative tool for sustainment, training, and logistics. As the military continues to modernize, maintenance and sustainment costs are becoming untenable, with one report estimating $100 billion per year for maintenance, repairs, and overhauls over the next 10 years. In constrained budgetary environments, we must curtail those costs, and in the right hands, IVAS could do just that.

In 2009, when my infantry platoon returned from a patrol in the Konar River Valley in Afghanistan, Soldiers fired up the Xbox from the safety of a forward operating base and played Call of Duty. In many instances, this behavior seemed like an odd continuation of the firefights we had just experienced. The soundtrack was the same, and the missions mirrored one another. But in video games, there is no refueling, no refit, no maintenance. Combat is romanticized, and even a realistic portrayal of battle is a misunderstanding of warfare. There is a focus on lethality without survivability or sustainment in support. I think those Soldiers were coping by disassociating from the violence they had just carried out. There is another major difference between our patrols and their game: there is no respawning in the real world.

For many years, IVAS has been a $22 billion solution in search of a problem. The contract was first awarded to Microsoft, maker of the HoloLens. Earlier this year, that contract was transferred to Anduril, founded by Palmer Luckey, the creator of the Oculus. Now, Meta, with the Quest line of products, is entering into a partnership on IVAS.

Each new partnership may bring technical sophistication but risks treating a military program like building an immersive entertainment system. I fear this is now a program run by people whose understanding of battle comes from video games. Therefore, they may overlook the daily realities of a force struggling to inventory gear, train junior maintainers, and keep aging equipment operational. Applying the Silicon Valley mindset to national security has been incredibly disruptive, and in a world where disruption is a positive, it is incredibly lucrative. But these changes are evolutionary, not revolutionary.

As the saying goes, the military runs on the creativity of privates

and the signatures of colonels. The infantry is only 10% stumbling around in the woods looking for land navigation points but 90% inspections and layouts. The augmented reality capability of IVAS has the potential to make equipment inventories faster and more effective. It might also upskill individuals with relatively little experience or training. This means cutting weeks off specialized schools for maintenance crews, allowing junior enlisted to do the work of professional warrant officers. It also means less time spent in the depot for maintenance work that line units do not have the expertise to perform.

As the saying goes, the military runs on the creativity of privates and the signatures of colonels.

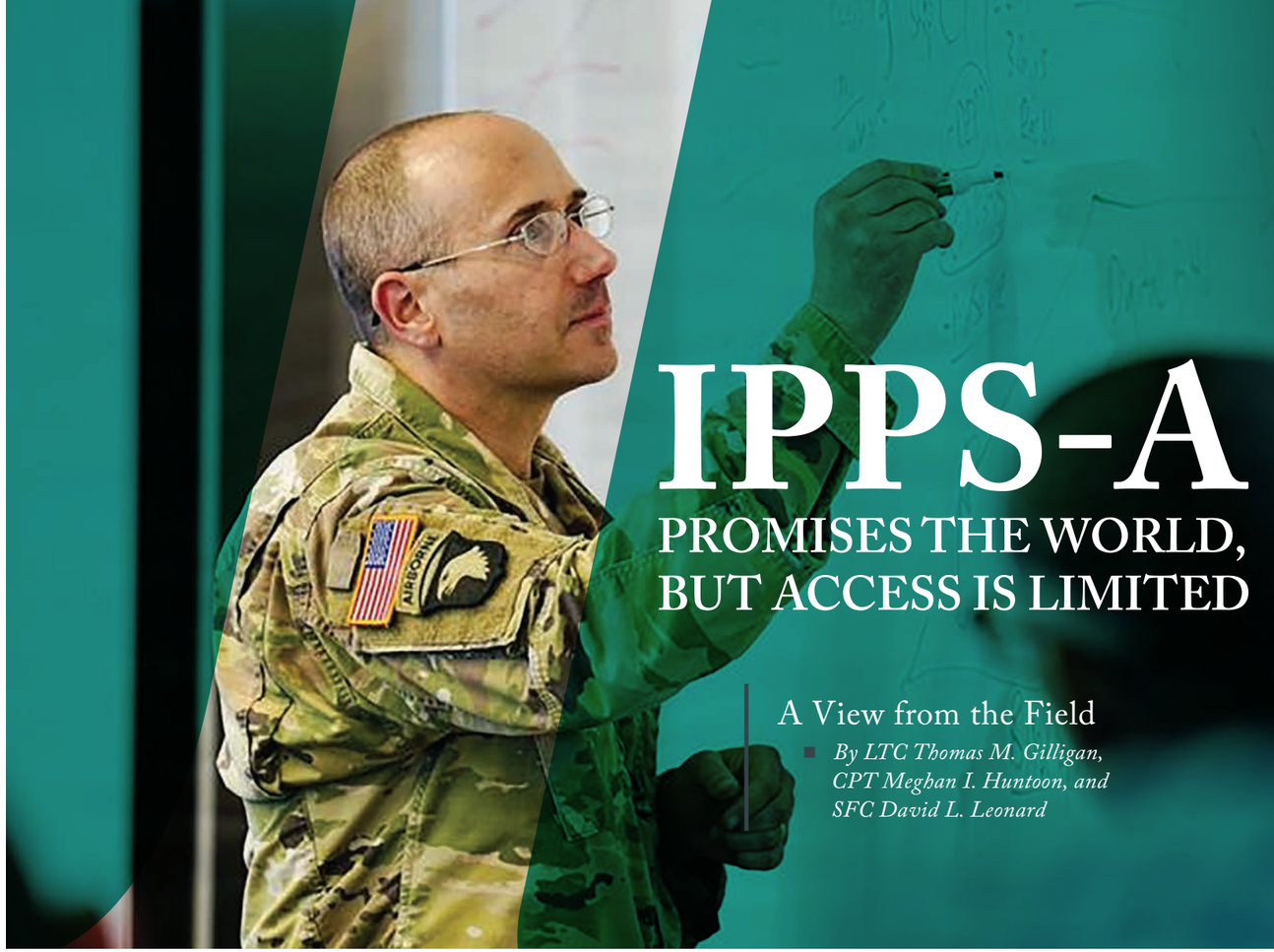
Companies like Gridraster are already performing similar tasks on the notoriously complicated wiring harnesses of the V-22 Osprey. This capability can increase the accuracy of maintenance and repairs while decreasing the time needed for those repairs. Just last year, the Government Accountability Office found that 44 out of 45 aircraft in our military are facing maintenance challenges; 32 of those are delays in depot maintenance, while 27 platforms are experiencing a shortage of trained personnel. The Air Force alone has reported a fleet-wide mission-capable rate of 62%. With numbers like these, we must use this capability. IVAS has the potential to transform how we inventory gear, train maintainers, and shorten repair timelines. If we dismiss it as a Silicon Valley gimmick, we will miss what it could really be: a tool to restore readiness across the force.

IVAS is not a program in a vacuum. It is a test of whether Silicon Valley can learn to serve the military it is trying to equip. The greatest military breakthroughs of the next decade will not come from better sensors but from smarter logistics. If we want IVAS to succeed, we must stop chasing the flashy and start solving the real problem: readiness.

IVAS is not just a futuristic headset; it is a logistical force multiplier. If we treat it as a gimmick or a gamified novelty, we will miss its most valuable application: enabling the sustainment enterprise to be leaner, quicker, and more effective. A focus on lethality must not be an abandonment of sustainment and survivability. In an era where trained personnel are scarce; maintenance backlogs are growing; and defense dollars are constrained, the real power of IVAS is not in how it changes the firefight but how it changes everything that happens before and after. The Army does not need another gadget. It needs solutions that solve real, trillion-dollar problems. IVAS could be such a solution if we let it.

Graham Markiewicz is currently the executive director of the Security and Democracy Forum. He is an attorney and national security policy professional who has served as a defense policy advisor in both the U.S. House of Representatives and the U.S. Senate. He previously served as an Infantry officer in the Army, deploying twice to Afghanistan with the 10th Mountain Division and completing Airborne, Air Assault, and Ranger schools. Most recently, he worked at the U.S. Agency for International Development, where he advised on oversight and congressional investigations. He holds a Bachelor of Science degree from the U.S. Military Academy at West Point and a Juris Doctor from Boston College Law School.

Featured Photo
A Soldier from 3rd Platoon, Blackhorse Company, 2-3 Infantry Regiment, 1-2 Stryker Brigade Combat Team wears upgraded Integrated Visual Augmentation System goggles while pulling security during a movement-to-contact urban raid exercise on Joint Base Lewis-McChord, Washington, August 24, 2022. (Photo by SPC Chandler Coats)



IPPS-A
PROMISES THE WORLD, BUT ACCESS IS LIMITED

A View from the Field

By LTC Thomas M. Gilligan, CPT Meghan I. Huntoon, and SFC David L. Leonard

Almost three years ago, the Army released the Integrated Personnel and Pay System–Army (IPPS-A) across all components. IPPS-A promised to streamline personnel and pay actions by consolidating the many cumbersome systems into a single web-based platform. Soldiers were promised a system where they would be able to monitor their personnel actions, which would keep human resources (HR) professionals and Army leaders accountable and reduce processing delays. HR professionals were promised a system that would ease the processing burden and increase the visibility of submitted actions. Army leaders were promised a system that would improve readiness, simplify their role in personnel actions, and offer seamless processing of actions across units and components.

These lofty promises were offered to a somewhat cynical group of Soldiers who rightfully had their doubts. IPPS-A can deliver on these promises. However, IPPS-A has been stifled by bureaucratic roadblocks to access. Only by acknowledging those roadblocks and removing them, or carving a path around them, will IPPS-A reach its full potential to streamline personnel actions Army-wide.

We write from the perspective of our recent experience as a mobilized battalion S-1 team. For context, we mobilized as part of a Reserve battalion staff that provided support to 10 multi-component downtrace companies across two continents. While in theater, we supported two downtrace Reserve companies, an

active component company, and a handful of Reserve units in the rear, and we were a direct report unit to an active component higher. Of the forward companies we supported, one fell under a different battalion in the rear; one fell under a different brigade in the rear; and one was from a different component entirely. Situations like this are not unusual when Reserve units mobilize. Our situation was the exact type of situation in which IPPS-A was designed to shine, but that was not our initial experience. In this article, we briefly share our experience and offer our suggested solution based on our view from the field.

When we arrived in theater, IPPS-A was not being used to action any actions that required processing by our higher command or to support forward downtrace companies. The S-1 team from the National Guard unit we replaced said they could not align IPPS-A to process actions through the forward chain of command. They had to process all awards, leave, flags, and other personnel actions on paper through legacy processes by leaning on support from the rear to update IPPS-A. We were disappointed that our fate would likely be the same.

Sending HR professionals forward to support multi-component units without World Access is like sending Soldiers into battle without bullets.

We set out to research how to make IPPS-A alignment possible, and we tried several leads. Our forward G-1 suggested that command and control (C2) alignment in IPPS-A might work. C2 is meant to allow a unit to pull other units under them for processing of actions. With C2, the host unit (in our case, the battalion) has C2 of downtrace units (in our case, the companies). Under C2 alignment, all submitted downtrace actions go directly to the battalion (or higher) S-1 pool for action. While this was a promising lead, it did not work. Our forward Reserve battalion could not align our active component downtrace because we could not see their Soldiers. Additionally, the active component higher could not hold C2 of us because our personnel actions for rear units would automatically go to the G-1 pool and overwhelm them with actions they would need to route back to our S-1 team for action. The multi-component nature of our mobilized unit rendered C2 an ineffective solution.

Our rear brigade S-1 team suggested using S-1 pool configuration in IPPS-A to build routing lists that would allow us to support our downtraces and submit actions to both forward and rear higher as needed. We set out to carefully create user-defined lists (UDLs), which would enable us to process actions. However, our downtrace units could not find our lists, and we could not find their Soldiers. Although the UDLs were present and aligned in the system correctly, we could not process actions through them, making this another dead end.

Although our forward G-1 and rear S-1 teams were actively trying to support us in aligning IPPS-A, we had made little progress halfway through our nine-month mobilization. We struggled to fully support our downtrace units and were forced to send them to their rear S-1 team for many actions. Furthermore, we prepared to submit DA Form 638, Recommendation for Award via email to process nearly 500 end-of-tour awards.

As we started to consider defeat in the battle for IPPS-A alignment, research led us to realize that we required IPPS-A World Access. World Access allows HR professionals to see Soldiers from all components and units. If a person is in the Army, an HR professional with World Access can view and action requests for them. If we had had World Access, we would have been able to support our forward downtrace units, and our forward higher would have been able to support us. An initial challenge was finding an individual who had the ability to grant us World Access and then convincing that person that we required it to effectively do our job.

Once we convinced a hesitant individual to provide our S-1 team with World Access, everything changed. We were able to process all actions for our downtraces through IPPS-A. Most notably, we were able to route awards seamlessly across components just the way IPPS-A was designed to do. We could support our forward downtraces and our forward higher could support us, all while allowing us to continue supporting our companies in the rear as needed. The roadblocks that had prevented us from leveraging IPPS-A to its full potential were removed.

We understand why the Army hesitates to give HR professionals World Access, even those who require it to effectively do their job. Indeed, the ability to look up, process actions, and modify records for any Soldier across the Army is a great responsibility, and such power must be granted with care. However, there are many situations that units will encounter in which granting World Access is the only effective solution at present. Sending HR professionals forward to support multi-component units without World Access is like sending Soldiers into battle without bullets. IPPS-A is an extremely effective weapon, but without ammunition it tends to be useless.

Given our experience in the field, we encourage the Army to grant World Access more freely when a Soldier's role requires it. Alternatively, we encourage the Army to change the design of IPPS-A so that World Access is not the only solution to supporting multi-component units. Of course, if that solution already exists, we strongly advocate for the Army to share it widely with the field. Furthermore, we aim to arm our fellow HR professionals with what they need to request to support multi-component Soldiers. Had we known what to request and whom to ask, we likely would have been granted access more quickly and been able to better support our Soldiers.

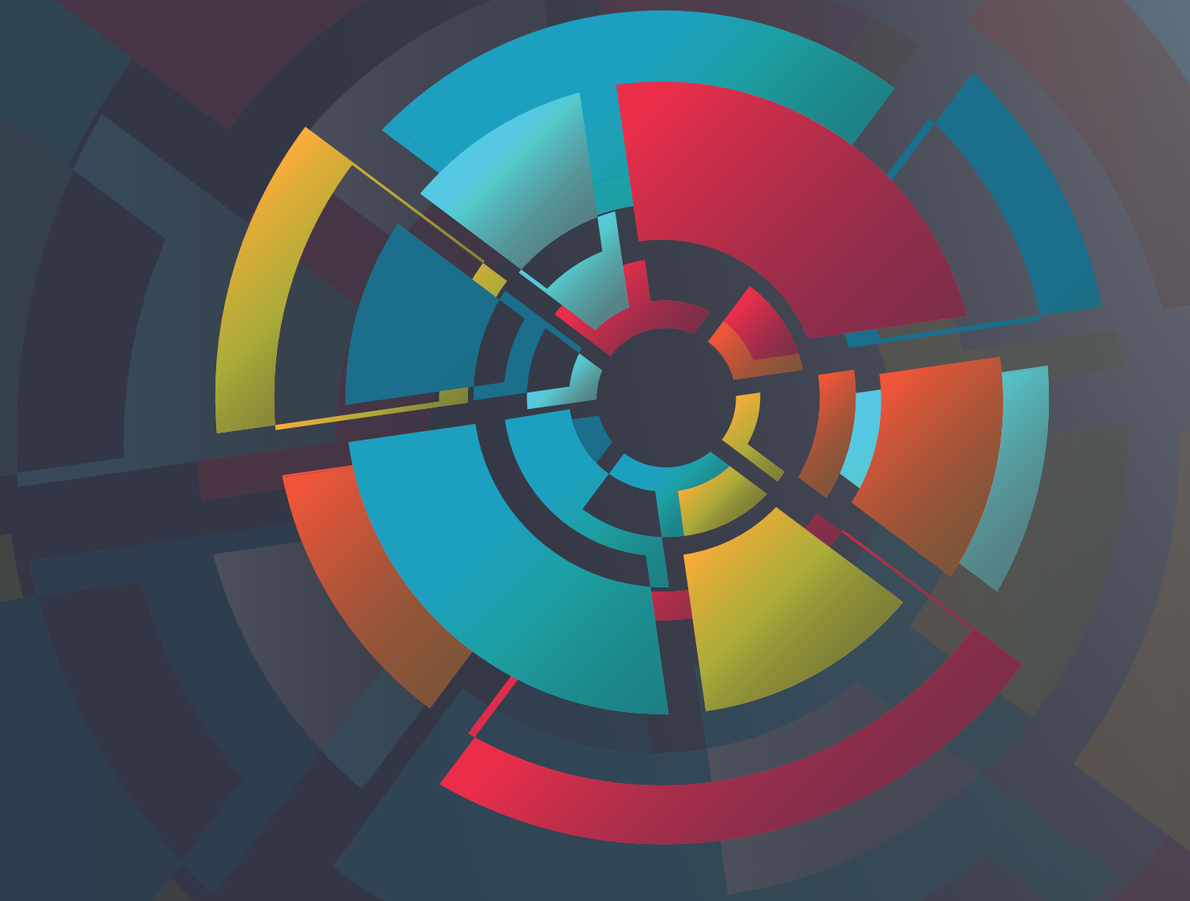
LTC Thomas M. Gilligan is a 19-year military police officer in the U.S. Army Reserve. He currently serves as the executive officer of the 317th Military Police (MP) Battalion (BN) as a reservist. He served as the executive officer for the 317th MP BN in support of Operation Atlantic Resolve. Prior to this mobilization, he was the commander of the 346th MP Detachment. He deployed in support of Operation Enduring Freedom as a military police company commander and as a platoon leader with the Multinational Force and Observers in support of continued peace between Israel and Egypt. He holds a Master of Arts degree in business from Webster University.

CPT Meghan Huntoon is an adjutant general officer in the U.S. Army Reserve. She currently serves as a human resources officer for the 103rd Sustainment Command (Expeditionary). Previously, she served as the forward battalion S-1 mobilized to Poland in support of Operation Atlantic Resolve. Prior to mobilizing, she served as commander of the Alpha Company, 3-378th Regiment Battalion, out of New Century, Kansas. In her civilian career, she serves as a research psychologist for the Military Civilian Transition Office. She holds a doctorate degree in industrial-organization and social psychology from Northern Illinois University.

SFC David Leonard is a military police officer in the U.S. Army Reserve. He currently serves as the operations and training NCOIC for the 800th Military Police Company as Active Guard Reserve. Previously, he served as the forward battalion S-1 NCOIC mobilized to Poland in support of Operation Atlantic Resolve. Prior to mobilizing, he served as the human resources NCO and operations NCOIC while mobilized to Cuba in support of Operation Enduring Freedom. He holds a Bachelor of Science degree in science from Bethel University.

Featured Photo
COL Matthew Paul, project manager for the Integrated Personnel and Pay System - Army at the U.S. Army Program Executive Office Enterprise, writes on a whiteboard during an Agile Program Increment planning session, July 8, 2025, in Arlington, Virginia. (Photo by Susan McGovern)

NGC2 AT THE TACTICAL EDGE



Enabling Predictive Logistics for Decision Dominance

■ *By COL Tyler D. Olsen*

At Project Convergence Capstone 5, Soldiers and leaders experimented with a new way of fighting, one where decisions were not driven by lagging reports but by real-time data flowing across a digital backbone known as Next Generation Command and Control (NGC2).

The Army's latest doctrine makes clear why this matters. Field Manual 4-0, Sustainment Operations, identifies predictive logistics as a doctrinal imperative, as essential to precision sustainment, decision dominance, and resilience in contested environments. The manual calls for a shift from reactive resupply to anticipatory sustainment, where commanders and sustainers use integrated data and forecasting tools to maintain tempo and operational reach. In the context of large-scale combat operations (LSCO), this shift is decisive because forces that can anticipate requirements and act more quickly than the enemy will maintain momentum.

NGC2, first developed as an experimental initiative under Army Futures and Concepts Command, is now progressing into prototyping and acquisition as the core architecture to realize that vision. Its aim is to integrate data, artificial intelligence (AI), and resilient communications into a single decision-support framework. For logistics commanders, this means moving from fragmented, delayed unit-based reporting to a common operating picture that is timely, accurate, and actionable. It is important to note that NGC2's role in predictive logistics is still in development. The Army is actively testing the system with the 4th Infantry Division (4ID), refining its capabilities and concepts as it prepares for Project Convergence Capstone 6.

From Data to Decisions

Sustainment remains the Army's warfighting function that ensures operational reach, freedom of action, and endurance. Predictive logistics is not a separate function but a capability nested within sustainment. It is an approach that applies data integration, forecasting, and AI and machine learning (ML) tools to enable anticipatory sustainment. In other words, sustainment is the doctrinal umbrella. Predictive logistics is the method that makes sustainment more precise, proactive, and resilient in contested environments. NGC2 is the enabler that allows predictive logistics to operate at scale, turning sustainment data into decision advantage.

NGC2 is built on four foundational layers: application, data, infrastructure, and transport. For logisticians, understanding these layers is key. They are not

abstract information technology concepts but the future backbone of predictive logistics.

- **Application Layer**: This layer is the interface that commanders and sustainers see. It provides dashboards and decision-support tools that transform raw data into predictive analytics and sustainment recommendations. Instead of a spreadsheet of fuel reports, a commander might see the following: "At current consumption rates, Bravo Company will need resupply in 18 hours — recommend pre-positioning fuel at X location." This is distribution management in action, informed by predictive tools.
- **Data Layer**: In NGC2, this layer serves as the system's engine room, integrating sensor and platform inputs into a unified operational picture. It ensures data are accessible across echelons, delivering real-time intelligence essential for predictive logistics. Leveraging AI and ML, it filters, validates, and prioritizes vast data streams, eliminating noise, confirming accuracy, and transforming raw inputs into structured, decision-ready insights. These refined data enable accurate forecasting, proactive maintenance, and optimized resupply, empowering commanders to act swiftly and maintain mission readiness in complex environments.
- **Infrastructure Layer**: This layer anchors computing, storage, and user devices at the tactical edge, enabling resilient, real-time data access in contested environments. This distributed setup empowers predictive logistics by supporting supply forecasting, equipment monitoring, and proactive maintenance while accelerating decision-making and keeping operations agile and mission ready.
- **Transport Layer**: This layer is the highway system. It ensures that all the data move securely and reliably, even under cyberattack or electronic warfare. For logisticians, this means confidence that predictive insights will still flow even in contested or denied, degraded, intermittent, or limited network environments.

Together, these layers transform sustainment data into decision advantage, helping commanders see further, decide faster, and act with greater precision.

Lessons Learned So Far

At Ivy Sting 1 in September 2025 at Fort Carson, Colorado, the first in a series of 4ID training exercises to incorporate NGC2, the Artillery Execution Suite (AXS) demonstrated how all four layers could be integrated into a single division-level command and control environment. By moving beyond legacy fires systems, such as the Advanced Field Artillery Data System, and replacing stove-piped networks with a unified digital backbone, the 4ID showed how data could flow seamlessly across the formation. Soldiers and leaders at every echelon of the fires process embraced AXS for its decisive advantage compared with legacy systems — from intel support and the targeting cell to the Joint Air-Ground Integration Center, the division artillery fire control element, the platoon fire direction center, and the AXS M777 section chief. It provided the ability to see and move data rapidly, ingest them into AXS, and apply them to improve effectiveness and lethality, without wasting time fighting their own systems.

The fires warfighting function was among the first to adopt these capabilities, showing how integrated data and applications accelerate targeting and decision making. The same approach is vital for predictive logistics, where NGC2 and future integration of AI/ML models rely on accurate, trusted data to forecast supply needs, anticipate equipment failures, and optimize resupply before shortfalls occur. Early experimentation shows predictive tools can shorten decision cycles and improve sustainment planning, but only when unit-level data are timely and reliable. Building confidence in AI recommendations requires training and repetition: units must learn not just to view dashboards but to interpret forecasts and turn them into actionable plans.

The success of AXS underscored that NGC2 is about giving commanders, sustainers, and warfighters time otherwise lost to fighting legacy logistics systems while also sharpening their ability to make faster, more informed decisions. These lessons will guide the next phase of experimentation.

Looking Ahead

4ID's Ivy Sting 1 marked the first success in the Ivy Sting series, proving the value of an agile, iterative approach to building NGC2. This milestone set the foundation for 4ID's culminating division-level training events, Ivy Mass, and ultimately Project Convergence Capstone 6, where predictive logistics will be tested at scale as a core enabler of decision dominance.

As the Army continues working with 4ID to refine NGC2, each iteration in training events incrementally adds capability, reducing the burden of legacy systems and giving commanders and sustainers time to focus on decisions rather than data wrangling. Future events, including Project Convergence Capstone 6 and beyond, are expected to incorporate AI/ML, autonomous resupply orchestration, cognitive decision support that simulates outcomes, and edge analytics capable of operating in disconnected environments. Because logistics decisions focus on readiness and resupply rather than lethal actions, logistics provides a lower-risk environment for building trust in AI-enabled decision support. Sustainment is a natural fit for the development of agentic AI, generating massive volumes of measurable data, from inventory and maintenance records to fuel use and demand forecasts that feed ML models to identify patterns and optimize processes at scale. These advances will strengthen logistics commanders' ability to make timely, informed decisions that directly support the warfighter.

To enable this evolution, the Army must continue to invest in requirements documents that are both technically rigorous and operationally grounded. These requirements must define how emerging capabilities are designed from the outset, ensure alignment with sustainment workflows, and establish how data are aggregated, flowed, and stored from tactical platforms into the NGC2 ecosystem. Just as importantly, they must address integration with enterprise business systems such as the Integrated Personnel and Pay System–Army and the Global Combat Support System–Army. Achieving this requires two-way data flow: not only pulling readiness, personnel, and sustainment data into NGC2, but also pushing refined, decision-quality data back into those systems to maintain accuracy and synchronization across the enterprise.

By treating requirements as living artifacts that guide this integration, the Army will ensure that personnel, readiness, and operational data are unified. This approach allows NGC2 to mature into a trusted decision-support system that delivers predictive logistics at scale, giving leaders both the time and the confidence to make faster, better decisions in support of the fight.

Conclusion

The Army's doctrine is clear: predictive logistics is essential to winning in LSCO. NGC2 provides the digital backbone to make it actionable, but it is still a prototype. For the logistics community, this means moving from reactive resupply to anticipatory sustainment is not a distant aspiration but an ongoing journey.

As the Army works toward Project Convergence Capstone 6, sustainers will play a central role in shaping how NGC2 matures. With their input and experience, and with disciplined documentation to guide integration, NGC2 can evolve into the trusted decision-support system that gives commanders confidence and ensures the warfighter is never left waiting.

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BLAST FROM THE PAST

Battle Area Logistics in the Future

by Lynn L. Sims, Ph.D.

The Logistics Center's historian speculates on combat service support of the future.

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While you were filling out a supply request, loading authorized stockage list items for movement, or treating wounded soldiers on the battlefield, did you ever wonder, "How will my job be done in the 21st century?" Although no doctrinal developer could provide definitive answers to all our questions about logistics methods of the future, one thing is certain: Army doctrine will differ, and consequently so will the day-to-day activities of the Army logistician who supports the future battle.

Even though the tactics and logistics of the future battle will differ from those of the past, certain factors will not change. As always, the logistician's goal will be to furnish everything needed to produce maximum combat power. To effect this, the logistician must be able to transport massively equipped armies to any part of the globe and to supply and sustain them as long as they are there. Supporting the Army's combat readiness will continue to be rooted in effective planning and outstanding leadership. And, since many aspects of the future battle are like those of the past, we can continue to turn to history for lessons, both of what to do and of what not to do. But change and new methods are inevitable. Our improved weapon systems, new force organizations, and the resulting increased support requirements will also necessitate many changes for Army logisticians.

Future battles will be fought with weapons capable of killing before visual contact is made. Since nuclear, chemical, and biological weapons are likely to be used, units will have to be widely dispersed yet capable of quickly reassembling. These mobile troops will be expected to go into action from the line of march with little or no time between movement and combat. The dispersed and therefore isolated units will need reliable communications with adequate backup systems.

Future battles may extend over great distances and last an indeterminable time. Consequently, the traditional concept of a "battlefield" is perhaps too restrictive because it implies confinement in space and time and is associated with a conventional process of attaining victory by visible destruction. Such will probably not hold true in the future battle. A more likely scenario, known as the "air-land battle," will be characterized by mobile units operating in an integrated battle area — combining nuclear, chemical, and electronic with conventional means — unencumbered by excessive supplies, thus enabling their commanders to rapidly adapt to changing situations.

Integral to the future battle is a combination of static strong points and battle positions from which attacks will be launched. From these same positions the Army must meet the enemy's offensive threat. Gaining and maintaining the initiative through offensive action will be a key to success. Fighting often will change in direction and intensity, making offense and defense unrecognizable at battalion level. The battle will place heavy demands on leaders as well as individual soldiers. Leaders will need to seize every opportunity for decisive action. Often it will be difficult to know which side is winning.

At the squad or individual level, there will be little difference between the future battle and the battles of the past. Combat will require well-trained, well-equipped, highly motivated, and physically fit soldiers who are also mentally prepared for war. The individual soldier usually sees war as a localized, personal affair. The noise, loneliness, and fear bombarding his senses become his primary concern. The battle raging inside the soldier will be won due to his training, morale, steadfastness of purpose, knowledge of the situation, and ability to handle pressures. The battle going on outside will be won due to the creativeness and intelligence of leaders who recognize what to do and when to do it. Since combat in the future battle will be characterized by periods of intense action separated by lulls, soldiers must be able to shift emotionally from a safe situation to a dangerous one instantaneously and continue to perform effectively.

In the future battle, as always, the logistician's role will be to furnish everything the Army needs to produce maximum combat power. That will not change, but what will change is the superfluidity of supply and maintenance that has characterized many American military operations of the past. One time, when asked about supplying the Army, General Creighton Abrams replied, "The trouble with logisticians is they always give me what I want, not what I need."

When riflemen crossed the beaches in World War II, they carried 80 rounds of M1 ammunition, grenades, and food for 3 days. Surveys showed that 75 percent of this materiel was unnecessary and never used. When the 31st Infantry was overrun near the Chosin Reservoir during the Korean War, it lost 15 truckloads of clothing, none of which it should have kept in this combat situation. In Vietnam, oversupply was most evident during the initial stages of buildup, even though 40 percent of all requisitions were lost.

Whereas soldiers fighting in previous battles were provided with the luxury items considered as "necessities" by most Americans, such will not hold true for future battles. There must be one standard of living for all the Services, and this standard must be characterized by austerity and the efficient handling of resources. Commanders should not want, and will not get, any more than is necessary to win the battle.

Since the combat commander of future battle operations will be in a highly fluid situation, he will not be able to haul surplus supplies, for these would hinder his movement and ability to fight. Because of the change in the "battlefield," the commander will not want extra items, which would only take up valuable space and tie up vital transportation

assets. A commander's demand for support must be honest, not inflated to build up supplies for his unit. The logistician must have accurate information so there can be a close estimate of the quantity and type of support needed. Supply must match the combat unit's need. For example, if urban fighting is anticipated, logisticians must supply units less fuel and barrier materials than usual.

Once supply needs have been adjusted based on actual combat consumption rates, bulk items such as fuel, food, and ammunition will be pushed forward daily without special requests. It is anticipated that 80 percent of a unit's needs will be supplied in this manner. Because most of a unit's needs will slide through the system without undue daily management, logisticians will be able to react quickly to a unique request. Such requests will be managed more effectively since they can move through a system uncluttered by excess requests for bulk items. Automated systems that control the flow of supplies from a central location will be capable of finding assets worldwide.

By supplying bulk commodities on an increasingly predictable basis, much of the supply process will become automatic from the user's standpoint. The purpose of the scheduled resupply concept is not to see how close the user can come to depleting a commodity before receiving resupply but rather to keep him adequately supplied yet free from excess stocks that would impede his rapid movement. However, the "automatic" system never will be so rigid that changes cannot be made; instead, it will be the basic supply model to which logisticians make needed changes.

In the future battle, there can be little waste of supplies, action, or manpower at any level of command. Because we will be fighting away from continental United States supply sources, we must make the most of salvage, cannibalization, and host nation support. We must know about the enemy's supplies and equipment so we can use them when captured.

We must not leave equipment behind, however. In past wars, equipment we left behind often was used against us. Food, more than any other item, should not be allowed to fall into enemy hands as it is readily usable without modification. Since Soviet and other enemy soldiers probably will be fed poorly in comparison with U.S. troops, large quantities of captured food would be of immediate use to them. If the enemy cannot live off the land or captured food, he will use his supply lines to obtain food to the detriment of other items. No modern army has been able to live off the land for any significant lime. For example, although Gettysburg was the richest part of agricultural America in 1863, General Robert E. Lee could not sustain his army of 75,000 and had to offer battle or retreat since the land could not support them.

Captured supplies other than food sometimes can sustain an invading army for a time. Many successful campaigns were conceived, planned, and conducted which made initial use of local supplies. The German blitzkrieg of France during World War II, for example, which suffered the predicted 50 percent vehicle loss, used captured enemy and civilian vehicles as well as fuel to sustain the drive.

In their efforts to make the best use of available resources in the future battle, logisticians would do well to study the successful methods of the Medical Corps. The Medical Corps has made tremendous strides in maintaining our human resources through effective treatment of casualties. In triage, medical personnel tend to wounded, depending on the situation, either at the front, in a rear area, or by evacuation. The same should be true of equipment.

Inoperative equipment items can be divided into three groups: those that by virtue of small cost or extended use are not worth fixing and should be destroyed; those that should be repaired at a rear facility; and those that because of their size or location must be fixed where they stand. The logistician's job is to oversee effective equipment management.

The future logistician also must plan multiple uses for equipment and be resourceful in making the most of what is on hand. A generator used to run a single piece of equipment is a thing of the past. Just a few years ago there were 145 different makes and models of generators in the 1.5- to 100-kilowatt range! This created a nightmare for those supplying replacement parts as well as for those servicing the generators.

Shortages of equipment and supplies will occur in future battles. Occasionally, troops will go without materiel for short periods as enemy forces interdict supply lines. But logisticians who are able to think and react, as well as to plan and act, will be able to cope with unexpected problems. Part of the problem-solving exercise will involve a constant exchange of ideas between the users and combat service support personnel. When such an exchange is made, the tactician-logistician team will find a better way of doing most jobs. The addition of belly armor to armored personnel carriers in Vietnam and the rerouting of fuel lines, for example, are ideas that originated with users. Those ideas, when actualized, saved many lives.

In future wars, the large depot will be too vulnerable and cumbersome to be efficient. Instead of a network of large depots we need a responsive system able to speed up, slow down, or shift direction quickly. In the past, our well-stocked depots contributed to wastefulness and carelessness among commanders, who gained resupply with relative ease.

In the future, support units will be expected to carry greater loads, at greater speeds, over greater distances, and with greater frequency than ever before. The test of an effective logistics system will not be in amassing huge quantities of supplies but in matching the rapid fluidity of maneuvering

units throughout the battle area with the certainty of an accurate and reliable system of delivery of supplies to where they are needed.

Early in the next battle, we must expand our use of computers that are able to "talk" to supply facilities in the United States; in this way, we will be able to tie the many aspects of logistics together and make the system operate in a timely fashion. Computers are especially useful in "stovepiping" items directly to the user. In Vietnam, for example, requests for repair parts from HAWK artillery units bypassed all echelons between the general support unit to the inventory control point in the United States. The requesting unit would receive a priority item in 8 days, other items in about 17 days. The HAWK units thus were able to maintain a 90-percent operational readiness level.

The storage container was widely used in Vietnam and there proved its worth. Containers were unloaded from ships up to 10 times faster than breakbulk items and with less manpower. When the user opened the containers, which were packed in the United States, he found there had been less damage in transit and less pilferage, and he had fewer problems in sorting the containers' contents. Containerization continues to be improved and expanded.

Planners agree that on the next battleground transportation will have to use cross-country approaches since roads will be inadequate or will have been destroyed. Roads that have been targets for airstrikes are likely to be covered with rubble, which could cause excessive tire damage. Tire damage might mean diminished combat service support, as occurred during World War II when many trucks sat idle because replacement tires were not available to replace those destroyed by road clutter.

Established routes should be used during attacks in future battles. Even then, we cannot expect smooth, quick, or certain resupply. In fact, history indicates that armies cannot travel long distances for sustained periods. In the 1967 Israeli-Egyptian war, for example, which was fought under ideal conditions with air superiority against a poorly prepared and ill-trained opponent and which was able to make use of the element of surprise, the Israeli Army could manage only about 60 miles a day. It should be obvious that supplying highly mobile troops with essential combat items will require thorough planning and even then present great challenges for innovative logistics planners.

We must not lose sight of the fact that what is speculated here about battles of the future is our present best estimate. On the hypothetical description we have superimposed theory — theory that should work but, we must remember, that has not been war-tested. Doctrine, concepts, and systems emerging from this theory, or any similar theories, will be at best only starting points.

The key ingredients for successful logistics are the ability and training of the leaders. It is clear that logisticians will be called upon to deal with situations and make decisions previously left to tacticians. Logisticians, then, must demonstrate more problem-solving skills than in the past.

Employment of combat forces must be matched by an effective logistics system able to sustain maximum effort until final victory. There is a growing awareness through historical study and estimates of the future that success in the battle area will require the best possible integration of logistics and tactics in both planning and execution. Future battles will be fluid and thereby subject to the direct influence of dynamic minds.

Intelligent and well-trained Army logisticians will be able to use their resources wisely to overcome the unexpected. That is how logisticians will make the best contribution to success in combat.

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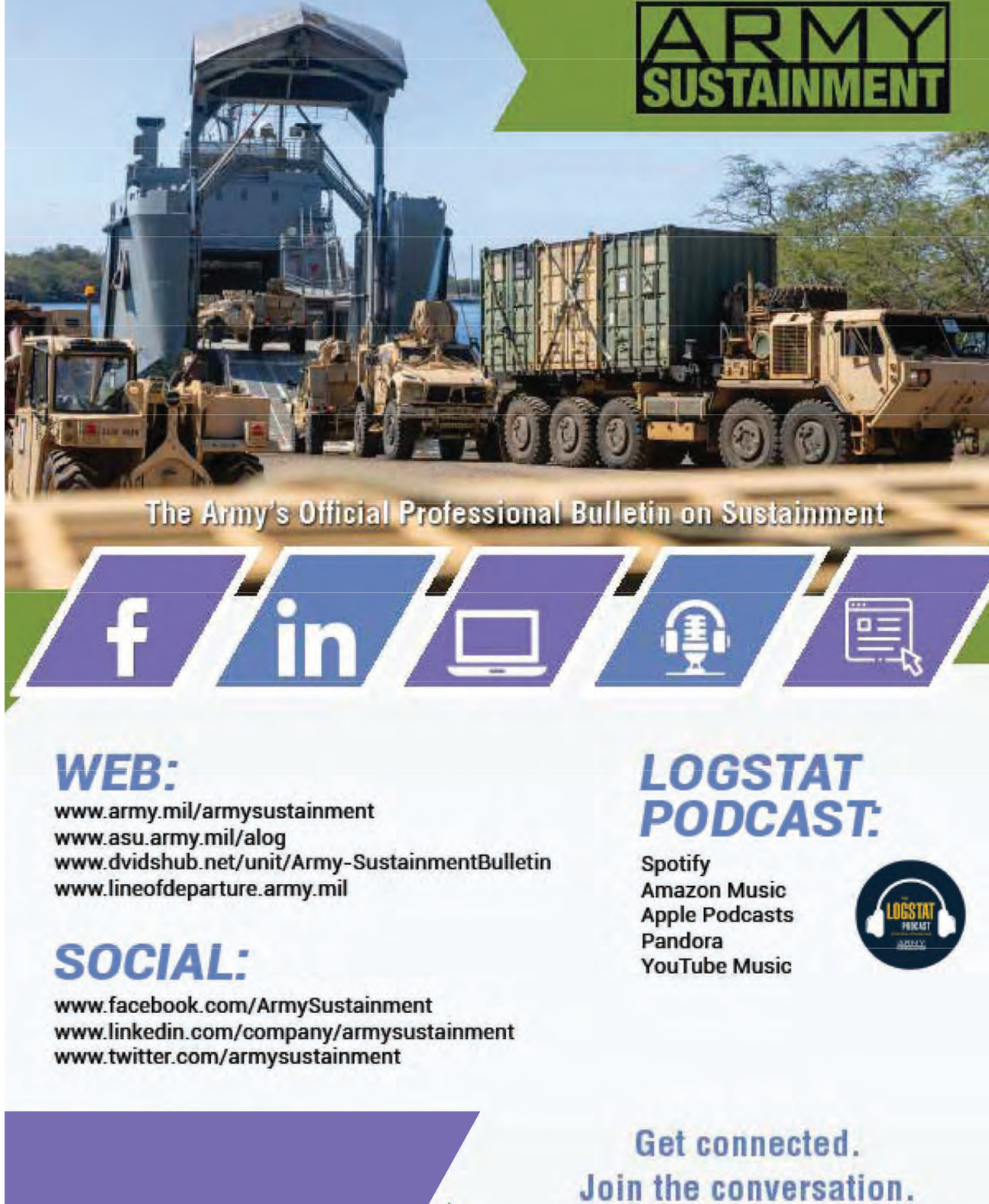

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