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HIP-POCKET GUIDE

HUNT OR BE HUNTED:

Lessons from the Ukraine Battlefield

Lessons Learned:

Ukraine Sustainment Operations

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ON THE COVER

Lessons Learned: Ukraine Sustainment Operations is the theme of the Spring 2024 issue of *Army Sustainment Professional Bulletin*. On the cover, stevedore drivers load Bradley fighting vehicles, part of the U.S. military aid package to Ukraine, onto the ARC Integrity, Jan. 25, 2023, at the Transportation Core Dock in North Charleston, South Carolina. (Photo by Oz Suguitan)

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

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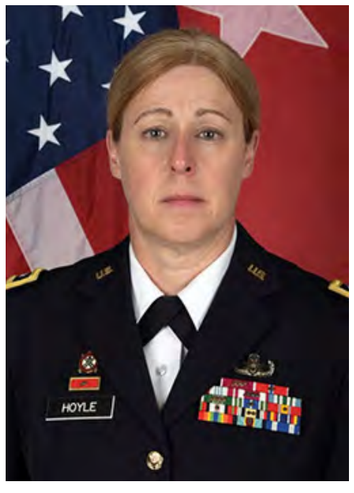
UNBURDENING the SOLDIER

Delivering Ready Combat Formations



■ *By Lt. Gen. Heidi J. Hoyle*

Conflicts around the world demonstrate the need to refine policies and strategies to prepare for the future fight in a contested environment. With a collective effort from the Army sustainment enterprise, part of the joint sustainment enterprise, the Army is rising to the challenges presented by its adversaries. Along with allies and partners around the world, the Army is already employing new techniques to gain an advantage on the battlefield. One such area is tele-maintenance, which is a practice that has long existed but has recently seen a resurgence in popularity since the Russian invasion of Ukraine in 2022. It is an effective method of ensuring the Ukrainian military can operate and maintain American equipment without sending American troops directly to the conflict. One of the units supporting the fight is the 405th Army Field Support Brigade's Remote Maintenance and Distribution Center-Ukraine, which is posted outside of Ukraine, in NATO territory, and connected with Ukrainian maintainers, providing insight and instruction on a wide array of American platforms, from Javelin missile launchers to Bradley Fighting Vehicles. In addition to providing necessary assistance to a partner nation, this also serves as effective testing of the Army's systems in a contested environment.

Another example of emerging technology on the battlefield is the effective utilization of drones. Like tele-maintenance, drones are not a new concept in warfare. The Ukrainian military has seen great success in destroying vast numbers of Russian vehicles and equipment. In the early stages, the drones were no different from those purchased at local electronics stores, albeit with grenades duct taped to the bodies. Despite the rudimentary origins of the conflict, the conversation around autonomous vehicle platforms has expanded to include use in reconnaissance and resupply. Autonomous resupply enables commanders at echelon to mitigate risk by conducting resupply operations from the joint strategic support area to the point of need without putting personnel in danger.

As the Army moves to integrate unmanned platforms into formations to fight alongside humans, it must update policies to reflect the influx of new equipment. Additionally, it is incumbent on the defense industrial base to incorporate service and maintenance requirements for these platforms up front to ensure they can be kept in the fight. While new systems present new opportunities for industry, parts for existing equipment are equally necessary for delivering combat-ready formations. Older platforms cannot and should not be ignored, as they will remain in formations as the Army transforms in contact.

As the Army prepares for large-scale combat operations, the last thing it wants is for its formations to be overburdened. As the Army continues to deliver combat-ready formations, those formations must not be burdened by unnecessary or unfeasible equipment, requirements, and timelines. We have all heard horror stories about commanders with 100-page hand receipts. One way the Army seeks to avoid those situations is the Rapid Removal of Excess (R2E) program. Before R2E, the Army divested thousands of pieces of equipment, and over 3,000 national stock numbers were subsequently retired. The R2E program allows units to turn in their excess property without bringing it to -10/-20 standards. This effort saves valuable time and helps reduce the maintenance workload for agile units. R2E has already shown to be effective at several installations across the Army, with significant pull by the team at Army Materiel Command. The Army will continue to leverage this great tool to reduce the burden in its formations.

It is an exciting time to be a sustainer in the Army. Sustainers are the linchpin for the joint force and need to be prepared to operate in any environment. The actions of U.S. adversaries around the world have exposed new capabilities. Army sustainers must train to standard to meet these new capabilities. It is also important that programs and policies adapt to meet new needs. I look forward to continuing to sustain our Army alongside you!

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

Sustainers are the linchpin for the joint force and need to be prepared to operate in any environment.

Adapting to the Expected LSCO Conflicts in the 21st Century

■ *By Maj. Thaddeus Wilson*

Throughout history, advances in civilian and military technology have continuously changed the character of warfare and necessitated constant adaptation of military training, doctrine, tactics, and thinking. The most recent example of the present character of war is the Russia-Ukraine war that began on February 24, 2022. Observation and analysis of Russian, Ukrainian, and allied operations during this war have provided critical insights into likely U.S. Army requirements in future combat operations. To meet these requirements, the Army must adapt its doctrine, organization, training, and mindset to build leaders and formations that can survive, fight, and win in high-intensity, large-scale combat operations in a multidomain environment. Among the numerous lessons learned from the Russia-Ukraine war, the five that directly and most profoundly impact sustainment on the battlefield are that sustainment assets are an intelligence indicator; the enemy will target sustainment nodes; the impacts of the widespread use of unmanned aircraft systems (UASs); the effect of individual Soldier discipline; and the importance of adaptive communication. Considering these insights, the Army has begun transforming training to build and maintain the capability to deal with dilemmas posed by the integration of new technologies into the future battlefield.

Field Manual (FM) 3-0, Operations, explains that Army forces conducting multidomain operations must "Account for being under constant observation and all forms of enemy contact." The Russia-Ukraine war has clearly shown that sustainment units are susceptible to a multitude of enemy sensors and intelligence disciplines, including human intelligence, cyber intelligence, financial intelligence, open-source intelligence, and signals intelligence. This new transparent battlefield requires a shift in the way the Army trains for and conducts sustainment operations.

Military sustainment by its nature focuses on friendly forces and maintaining the tempo, endurance, and freedom of action of the supported force. Historically, sustainment leaders have focused most of their planning and mission command efforts on how operations could most efficiently provide support with little consideration for the signature their operations might give to the enemy. Outside of planning for defense against localized direct fire, indirect fire, or enemy special operations forces attacks, most sustainment planning has not considered the impact the placement or employment of key sustainment assets might have on the enemy's ability to anticipate friendly actions. In both the initial Russian invasion of Ukraine and subsequent combat operations, the movement and placement of key sustainment stocks and capabilities have proved to be intelligence indicators. Army sustainment leaders must understand they are always in some form of contact with the enemy. How sustainment assets are arrayed and employed not only exposes them to enemy targeting but may provide the enemy with indications of what the friendly force will do next. These considerations must be incorporated into training, planning, and operations at all echelons of sustainment. On a transparent battlefield, sustainers at any level could significantly hinder operational success by inadvertently exposing the friendly plan to the enemy.

The Russia-Ukraine war has also shown that sustainment nodes and assets will be targeted with direct and indirect fires delivered by air, land, maritime, cyberspace, space, or special operations forces. To mitigate this, sustainment leaders and units must understand their signature across all domains and employ camouflage and deception techniques to reduce their risk of being targeted. Completely avoiding detection is not realistic with the widespread availability of sensors, but sustainment units can minimize the size of support areas, disperse stockpiles, employ decoys, be deliberate with emitting signals, and camouflage vehicles and equipment. Integrating signature management, frequent and rapid survivability moves, dispersed operations, and mobility into future institutional and sustainment training will prepare Army sustainers for the threats they will encounter on the future battlefield.

One sensing capability that has been employed in many recent conflicts, including the Russia-Ukraine war, is a wide variety of UASs. UASs of every size and description have been used by both the Russians and Ukrainians to collect intelligence, observe indirect fire, kinetically engage the enemy, and conduct multiple other tasks. The availability, relative low cost, and ease of employment make UASs a capability of choice for 21st-century military operations. Sustainment leaders and units must understand friendly and enemy UASs, counter-unmanned aircraft systems, and electronic warfare capabilities. UASs will be present in all areas of the future battlefield, and Army sustainers must have the capability to differentiate friendly from enemy UASs, master all facets of active and passive protection from enemy UAS capabilities, and employ UASs to provide responsive and precise support.

On January 3, 2023, Ukrainian forces conducted a rocket artillery strike that destroyed a building and killed 89 Russian soldiers in the Donetsk region of Ukraine. The Ukrainians found the target through signals intelligence gained from unauthorized cellphone use by the Russian soldiers. This is just one example of the unforgiving nature of the modern battlefield. In Ukraine, there have been multiple examples like this in which soldier indiscipline has led to targeting with indirect fires. For U.S. Soldiers, individual discipline and unit discipline are critical to the survivability and effectiveness of sustainment units. This discipline must be generated through tough, realistic training that replicates the conditions and the consequences of the indiscipline that Soldiers will face on the next battlefield. Soldiers must understand that their actions have strategic

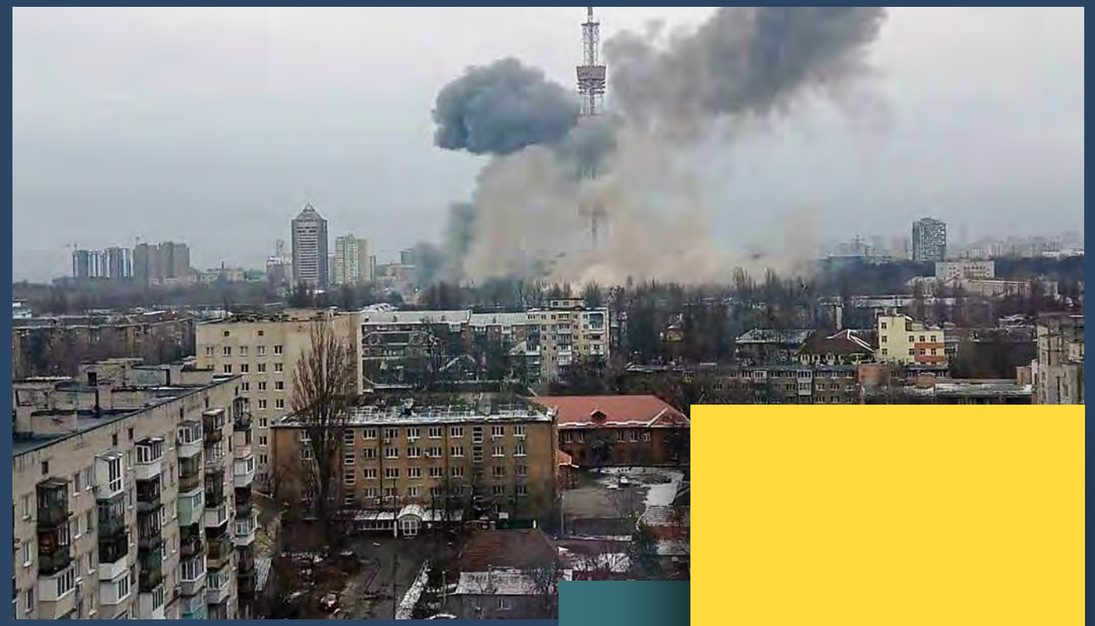
impacts and may jeopardize success up to the strategic level.

One key capability that enables sustainment units to conduct dispersed operations, employ precision sustainment, and mitigate the enemy's ability to find and target sustainment units is adaptive communication infrastructure. Lessons learned from the Russia-Ukraine war have shown that sustainment units need to be dispersed, mobile, responsive, and precise. Those things are only possible if units can communicate effectively and converge capabilities at the point of need. Sustainment units at echelon must have secure and resilient communications capability. They must carefully plan how and when units communicate to manage their electromagnetic signature. Communication discipline must be integrated into all training.

More than two years of observing the Russia-Ukraine war has provided countless insights into the future battlefield. Army sustainers and sustainment units must be able to mitigate their signature, conduct dispersed operations that deceive the enemy, mitigate the effects of UASs, display individual and collective discipline, and employ effective resilient communications. The Army and the joint force have already begun to operationalize these principles and integrate lessons learned from the Russia-Ukraine war into training and doctrine. The Joint Concept for Contested Logistics, the Predictive Logistics Capabilities Development Document, and the new draft of FM 4-0, Sustainment Operations, currently in development, all incorporate the changing character of war. Institutional sustainment training also integrates these lessons learned into courses. As the Russia-Ukraine war grinds through its third year, we will continue gathering lessons learned and adapt accordingly.

Maj. Thaddeus Wilson currently serves as the executive officer to the U.S. Army Chief of Transportation. He was also an operations officer (J3) in a joint and combined NATO Corps Headquarters in support of operations in Poland and the Baltic States. He has also served with the 75th Ranger Regiment and the 173rd Airborne Brigade Combat Team. He attended the Army Command and General Staff College and has a Master of Business Administration from the University of Kansas.

TACTICAL SUSTAINMENT



Unraveling Kyiv's Urban Battlefield

By Lt. Col. Phil Thomas

The battle for Kyiv reinforces the lesson that the sustainer must always account for worst-case scenarios, including prolonged operations, increased demand for supplies, dispersed formations, and little or no security. The battle, which occurred from February to April 2022, saw Russian forces advance from the north, transitioning from rural to urban environments. However, Russia's plan for the battle did not unfold as intended for several reasons. One of the most prominent was the expectation of encountering little Ukrainian resistance, which would facilitate a quick victory and uncontested resupply. The commonly accepted Russian objective was to surround Kyiv and create a blockade. For this discussion, let's assume the U.S., with a similar strategic need to seize a city, would approach it by focusing on key terrain while emphasizing messaging to mitigate collateral damage. Under these assumptions, the Army can derive the following sustainment lessons and considerations for U.S. forces that can be applied to future urban fights.

Seizing key terrain takes longer than expected, especially in an urban environment. A brigade combat team can carry three days' worth of supplies. According to Army Techniques Publication (ATP) 3-06, Urban Operations, one should anticipate a "20–30 percent expenditure increase in personnel, fuel, ammunition, barrier, or obstacle material" in an urban environment. Simple math suggests at least four days' worth of supply is required. Consequently, the brigade combat team either needs additional division sustainment resources assigned from the outset or must be resupplied within the first 24 to 48 hours after entering urban terrain.

The pace of battle is slow. With additional sustainment resources and more frequent resupplies, the tempo of the battle naturally decreases, which degrades the element of surprise and exposes formations to risks, such as from unmanned aerial systems or indirect fire. Striking a balance between tempo and protection is crucial for commanders on the ground, and sustainment leaders must be prepared to offer guidance and advice.

Battlefield geometry is messy, consequently affecting logistical reporting. Forces deplete at an alarming rate and divide into sectors and/or neighborhoods most likely delineated by supply routes. Units will most likely share supply points for the sake of simplicity. However, due to security challenges, it should be anticipated that the accuracy of logistical reporting is less accurate than usual. Hence, overcommunication and anticipation, achieved by synchronizing running estimates in all command posts regardless of warfighting function, become even more critical.

Stability proves to be a friend to sustainment but an adversary to protection. As the Army moves beyond the conventional support area, the enduring theme of stability from ATP 4-90, Brigade Support Battalion, remains pertinent: "units must know where the new BSA (brigade support area) and resupply points are and when to begin using them." Meanwhile, dispersion enhances survivability but "complicates C2 (command and control) and perimeter security." The Russian forces found themselves in-advertently dispersed, leading to a precarious situation. Commanders must devise innovative strategies to plan and safeguard stability, even if temporarily, across the battlefield to protect the planned distribution cycle. This concern has prompted many Army leaders to explore tactics and techniques, including keeping supplies uploaded and distributing items more quickly, while being conscious of the survivability of the logistics forces.

Sustainment units must prioritize their own protection or rely on others to do so. While sustainment units can protect themselves to a limited extent, are they designed or trained to defend adequately against anything beyond saboteurs (level I) or small tactical units (level II)? The resounding answer is no, leaving them increasingly exposed as logistical elements approach the front line, especially in an urban environment. The conflict in Ukraine involving Russia has prompted discussions among adjacent warfighting functions regarding the necessity for deception, pre-positioned ammunition, and additional strategies for moving commodities across the battlefield. All these factors bring field trains closer to the frontlines. Therefore, either sustainment leaders need to dedicate more time to training for their own self-defense, or maneuver commanders must allocate more forces to avoid further strain on an already resource-intensive operation.

The array of sustainment command posts within the division, including the brigade, requires reconsideration. Currently, Army divisions serve as the primary units of action, operating sustainment nodes in what is known as the close and rear areas per ATP 3-91, Division Operations, a configuration better suited for linear warfare but challenging in urban environments. The condensed nature of urban settings potentially exacerbates battlefield congestion and renders the supply chain more susceptible to indirect fires or unconventional threats when these nodes are established conventionally.

Moreover, the Army emphasizes commanders controlling their forces from smaller, dispersed command posts, ready to relocate quickly, introducing added complexity. When command nodes intertwine with dynamic battlefield geometry, roles and responsibilities among echelons may become unclear. Sustainment leaders must demonstrate immense discipline in synchronizing sustainment operations effectively without compromising flexibility and responsiveness.

This complexity might necessitate streamlining C2, potentially removing layers or redefining roles. Such measures aim to prevent mission creep, avoiding unnecessary redundancy or distribution inefficiencies that could needlessly risk constrained resources.

Current maintenance operations are structured to facilitate repairs as close to the front lines as feasible through maintenance collection points. However, in urban environments, this approach may not be viable. Consequently, vehicles end up being triaged in semi-secure locations for a significantly extended duration, surpassing what is presently considered ideal.

The degradation of combat capabilities may accelerate, necessitating more frequent and challenging decisions by maneuver commanders, particularly as they transition main effort responsibilities. Division-level and corps-level leaders could encounter task organization alterations that require hours, if not days, to realign and maintain effectiveness.

The demand for patient treatment at forward positions and/or the need for evacuation is significant and unconventional, necessitating strategic allocation of the division's limited assets to address these needs. Air evacuation within a city might not be feasible due to the threat or the terrain. Commanders must ready themselves to confront a challenging choice between managing personnel losses at the expense of momentum or capitalizing on momentum at the risk of neglecting personnel losses. This presents a tough decision, one that simulations may not comprehensively address—the emotional toll on the force in such a battle.

Divisions and corps sustainers undergo training to analyze the critical path, evaluating requirements, available resources for transportation, and the necessary measures to safeguard such movements. Senior leaders may make decisions like these once or twice a day. Operationally, this process entails identifying the main effort, formulating schemes for fires, and other essential inputs.

The outcomes involve adjustments in sustainment and protection priorities, alongside requests for support from either expeditionary sustainment or theater sustainment commands. Consequently, this process enables a surge of capabilities, like increased throughput and allocation of combat platforms from reserves.

The urban environment and the demands required for a successful battle for a city like Kyiv would not permit such an extended process. Therefore, corps-level leaders must anticipate needs beforehand. Anticipating and effectively distributing these requirements necessitates collaborative, rapid planning between corps and division staffs, especially in an environment where synchronizing operations and sustainment within the current planning cycle is already challenging.

One could argue maneuver commanders may need to plan for tactical pauses or transitions, even in environments where such pauses are not immediately apparent, solely to allow sustainment to maintain pace.

The Russia-Ukraine war has evolved into a battle of attrition, where the ultimate victor will be the one who integrates fires more effectively or mobilizes their military-industrial complex more efficiently. As with all wars, it consists of a series of tactical battles sustained by tactical planners. The overarching lesson gleaned from this is that sustainment leaders within the division and corps must undergo detailed training to adequately address the previously outlined lessons. An emphasis on immersing leaders in an urban training environment like Kyiv may be required to adequately provide the exposure required to facilitate the tough discussions and ultimately tough decisions between the sustainers and their maneuver colleagues to address the lessons learned from the Russia-Ukraine war.

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Feature Photo
Russia bombards telecommunication antennas in Kyiv, Ukraine, March 1, 2022. (Ministry of Internal Affairs of Ukraine/Creative Commons Attribution 4.0)

MUNITIONS FOR UKRAINE

Observations and Recommendations

By Chief Warrant Officer 4 Michael K. Lima

The ongoing international conflict between Russia and Ukraine, which began in 2014 with the annexation of Crimea, has brought about a new reality in warfare. The full-scale invasion of Ukraine by Russia in February 2022 put the conflict front and center in the minds of the general public. The news and social media have provided even more insight with details from the front lines. Updates from front-line leaders and official and unofficial sources on both sides offer insights not seen at this scale in previous conflicts. From the onset, social media has given the Russia-Ukraine war prominence never seen before. Case in point, Ukrainian President Volodymyr Zelenskyy was offered a chance by the U.S. to evacuate from the capital city of Kyiv, an offer he turned down in a spectacular statement: "The fight is here. I need ammunition, not a ride." Ammunition is a commodity that has continuously been at the forefront of Ukraine's sustainment operations.

Munitions Industrial Base

As of December 2023, the Department of State said the U.S. Government has provided approximately $44.2 billion in military assistance since Russia launched its invasion against Ukraine on Feb. 24, 2022, and has invested in air defense, fires, ground maneuvers, aircraft and unmanned aerial systems, maritime, and other capabilities equipment, all categories of support with heavy munitions assistance. Munitions support has strained the U.S. munitions industrial base and the European Union (EU). It takes time for the defense industry to ramp up, restart, expand, or a combination of all to produce critical items such as artillery shells or man-portable air-defense systems, both of which recently have been viewed as a priority for large-scale combat operations.

One such DOD prime contractor to ramp up production was Raytheon. The company called upon retired engineers to teach current employees how to build Stinger missiles. The surface-to-air weapon system has not been purchased in decades but is now integral to Ukrainian military defense. The private company worked to increase production and fill the initial orders. According to the company's president, it would take about 30 months for legacy munitions to come off the production line due to setting up the factory and training employees, functions the DOD has taken note of, as stocks have dwindled and munitions have been issued from a variety of sources.

Ukrainian artillerymen fire an M777 howitzer toward Russian positions on the frontline of eastern Ukraine on Nov. 23, 2022, amid the Russian invasion of Ukraine. (Photo by Anatolii Stepanov)

News reports indicate the Pentagon has sent an estimated 300,000 155mm howitzer shell rounds from War Reserve Stock Allies-Israel, maintained in Israel since the 1980s, to the Ukrainian military to counter Russia. The Israel-based stockpile, which Israel can access during emergencies, was sent out of the country to offset the reduced capability of domestic munitions production in the U.S. This is a short-term stopgap as the DOD plans to increase its monthly production rate for 155mm artillery shells to 100,000 by 2025. Another source of munitions for Ukraine has been ammunition seized by U.S. Central Command naval forces. The U.S. transferred approximately 1.1 million 7.62mm rounds of ammunition to the Ukrainian armed forces. The legal transfer was part of a more extensive investigation of an Iranian weapon smuggling network that involved Iranian illicit trafficking of advanced conventional weapons systems and components to support terrorist activities throughout the Middle East, a creative solution for seized munitions that supports the war effort. However, a more strategic solution is required to offset domestic munitions production.

Just as the commercial industry has made a strategic effort to modernize and increase the efficiency of systems, the Army's organic industrial base (OIB) has developed a 15-year OIB modernization implementation plan to modernize facilities, processes, and the workforce. The plan creates a priority and synchronizes resources on critical facilities and capabilities to increase capacity to sustain the Army's systems. The Army's OIB includes 23 arsenals, depots, and ammunition plants that manufacture, reset, and maintain Army equipment; provide critical munitions that may not be cost-effective to commercial industry; and supply warfighters across the joint force. Multiyear contract authorities provided by Congress, which can go up to five years, have potential savings from 5% up to 15% and provide prime contractors a predictable funding source, a forecast for given outyears, and an incentive for internal investment to expand. Such munitions supply has been a challenge in the U.S. and Europe.

This is why Europe has followed suit with munition reforms such as the Act in Support of Ammunition Production. The regulation facilitates the buildup of ammunition production capacity within the EU, allowing the European defense industry to increase support to member states' armed forces and the war effort in Ukraine. The European Union Act provides a three-track approach: deliver ground-to-ground and artillery ammunition to Ukraine, jointly procure 155mm ammunition, and support the buildup of EU manufacturing capacities. Other initiatives include the NATO Multinational Ammunition Warehousing Initiative, which allows the management of ammunition stockpiles amongst allies to be effectively and collectively controlled. The first opened in March 2022 in Estonia, and another in Belgium opened in 2023. The project is pertinent to the eastern part of the alliance that supports eight multinational battlegroups stationed in Bulgaria, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and Slovakia. The collectively stored materiel allows for a flexible warehousing solution for ammunition stockpiling instead of having materiel being segregated by nations or dependent on supply from their own country, permitting munitions to be protected, accounted for, and used collectively in the face of multiple threats.

Unmanned Threats

Threats are any combination of actors, entities, or forces with the capability and intent to harm U.S. forces and their interests. Many such tactics are now creative and low-cost direct actions by air, land, and sea. One of the most notable tactics from the Russia-Ukraine war is to have unmanned aerial vehicles, known as drones, look for targets of opportunity, such as an open hatch, and drop a rigged grenade or mortar. Munitions stored in the open make another valuable target as propagation provides for additional damage to other munitions and equipment. Both Russian and Ukrainian forces use cheap methods of delivery and available munitions to disrupt formations and munitions storage and bring a chaotic situation to the enemy. Another form of an unmanned system is unmanned ground vehicles with explosive charges, such as anti-tank mines that blow near targets. Another is unmanned surface vessels, which attack naval ships. The innovative use of modified systems to conduct direct attacks on Russian formations is an example that would be used against munitions supplies in a near-peer conflict. Tactics that have already appeared on each side find available targets. In future conflicts, the tactic would be used in deep and close operations and on sustainment organizations in rear operations, bringing about a new era of warfare and contested logistics not seen in previous conflicts. The Russia-Ukraine war has also seen an unprecedented amount of support for Ukraine as European nations fear they may be next and are more than willing to provide munitions and military supplies.

Standardization

While the U.S. has been leading the effort in security assistance to meet Ukraine's critical security and defense needs in its war with Russia, it is not the only country that has participated. The primary coordination is done through the Ukraine Defense Contact Group, a coalition that comprises the 30 member states of NATO and 24 additional countries that have provided major weapon systems, mass quantities, and a vast array of munitions. Meanwhile, ammunition manufactured to NATO standards, with available firing data, is designed to be interchanged between weapon systems. NATO terms to understand when discussing munitions standardization and the goal of interchangeability with allies and partners include:

- **Standardization.**
  Within NATO, the process of developing concepts, doctrines, procedures, and designs to achieve and maintain the most effective levels of compatibility, interoperability, interchangeability, and commonality in the fields of operations,

administration, and materiel.

- **Compatibility.**
  The capability of two or more items or components of equipment or material to exist or function in the same system or environment without mutual interference.
- **Interoperability.**
  The ability of systems, units, or forces to provide services to and accept services from other systems, units, or forces and to use the services so exchanged to enable them to operate effectively together.
- **Interchangeability.**
  Items possessing similar functional and physical characteristics that are equal in performance and capable of exchanging one for the other without alteration.

The conjecture is far from reality when faced with the actual problem of unfamiliar munitions. Just as most Soldiers conduct training with U.S. munitions on a routine basis, being handed a round with unfamiliar markings and packaging material in another language would make anyone think twice before firing, especially in combat staring at the enemy. Examples of differences include the notable Spanish-made M107 155mm high-explosive projectiles received by Ukraine with its bright yellow paint scheme and unexpected suppliers like Pakistan with Soviet-type 120mm artillery made by the Pakistan Ordnance Factories. Interoperability is acting together to achieve allied strategic, operational, and tactical objectives. As noted by Under Secretary of Defense for Acquisition and Sustainment William A. LaPlante, allies and partners are moving toward not just interoperable but to interchangeable munitions with production in numerous locations to meet the needs of a new security environment. A new operational environment has been unveiled in the Russia-Ukraine war. The challenge now is determining what the operational environment will look like when American forces conduct the fighting.

Both Russian and Ukrainian forces use cheap methods of delivery and available munitions to disrupt formations and munitions storage and bring a chaotic situation to the enemy.

Recommendations

While making great strides, a continental U.S.-based munitions modernization implementation plan ends at the port of embarkation. Theater-level munitions have had minimal change since the brigade combat team modular force transformation, only now catching up with a modular ammunition transfer point. The Army's business modernization with Enterprise Business Systems – Convergence provides a streamlined munitions business process. Still, more has to be done if the Army is to prevail in combat and learn from the Russia-Ukraine war. The main advancements required in munitions sustainment are the following:

- **Ammunition interchangeability in practice with allies and partners.**
  Allies and partner armies must demonstrate the feasibility of ammunition interchangeability. Deliberate exchange during exercises would allow tactical-level commanders and Soldiers to experience interchangeable ammunition in their weapon systems, practicing the procedures and exchanges while having hands-on experience with firing another nation's munitions. War should not be the time to try this but to confirm what has been practiced in training.
- **Counter-drone technologies on the modern battlefield, specifically for munitions storage at the tactical level.**
  Technology greatly improves modern air-defense systems and surface-to-air missile systems such as the Army Coyote drone interceptor. The challenges of facing smaller commercial off-the-shelf drones are that they fly at lower altitudes, are hard to detect and target, and make munitions in open storage a primary target.
- **Advanced identification technology (AIT) and sensing must be used at amass to keep pace with combat.**
  Using AIT to offload munitions vessels and firing-data sensing on systems for automatic reporting, technology can provide the data needed for decision-making.
- **Munitions data analytics must be harnessed down to the tactical level.**
  Pencil and paper and manual logistical status reports are trends that must be left in the past, used only as a back-up analog means if the Army is to prevail in the modern information age.
- **Munition visualization on the battlefield is imperative for commanders' decisive action.**
  Munition data sustainment and available visualization, both virtual and augmented (known as mixed reality), can provide commanders and their staffs the tools to assist in decisive action during armed conflict. Visualization representation of munitions operations allows theater-level staff and below to support decision-making between warfighters and the munitions supplies needed to reach military objectives.

Conclusion

Ukraine's remarkable victory to save its country from a Russian invasion may be rooted in its people's determination to remain a sovereign nation and in the overwhelming support from free nations worldwide. The pouring out of munitions has provided the means for committed people to defend themselves. When those means began to thin out, they became creative in front of the world audience through social media. This may be one of the most significant effects of the Russia-Ukraine war on the future of war: the ability to create, counter, and develop tactics that work on the battlefield, exploiting the enemy's weaknesses. The war has taught many lessons for a fragile munitions industrial base, including the ability to employ unmanned threats and the need to follow standardization to ensure interchangeability. Munitions will remain the primary lethal effect in the fight, and the need to sustain munitions for prolonged conflict will continue to be a national imperative.

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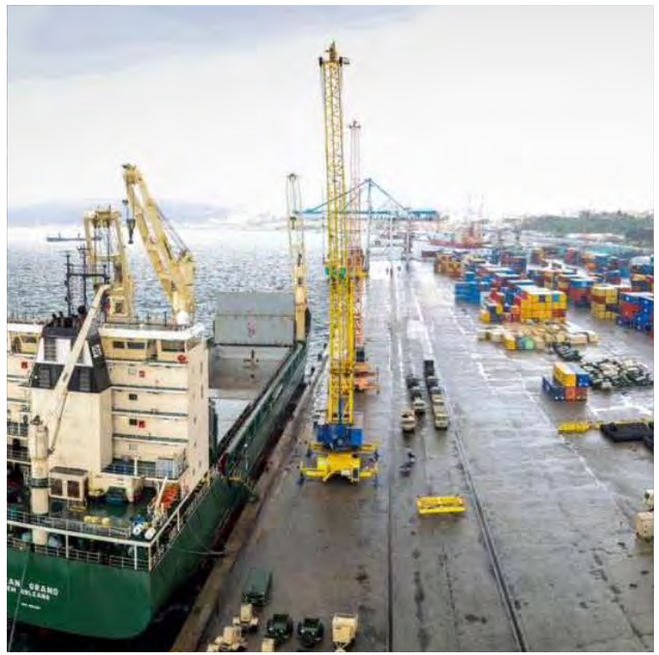
Feature Photo
A Ukrainian artilleryman tosses an empty 155mm shell tube as Ukrainian soldiers fire an M777 howitzer toward Russian positions on the frontline of eastern Ukraine on Nov. 23, 2022, amid the Russian invasion of Ukraine. (Photo by Anatolii Stepanov)



Intermodal Operations in Support of the Ukrainian Fight

By Maj. Gen. Gavin A. Lawrence

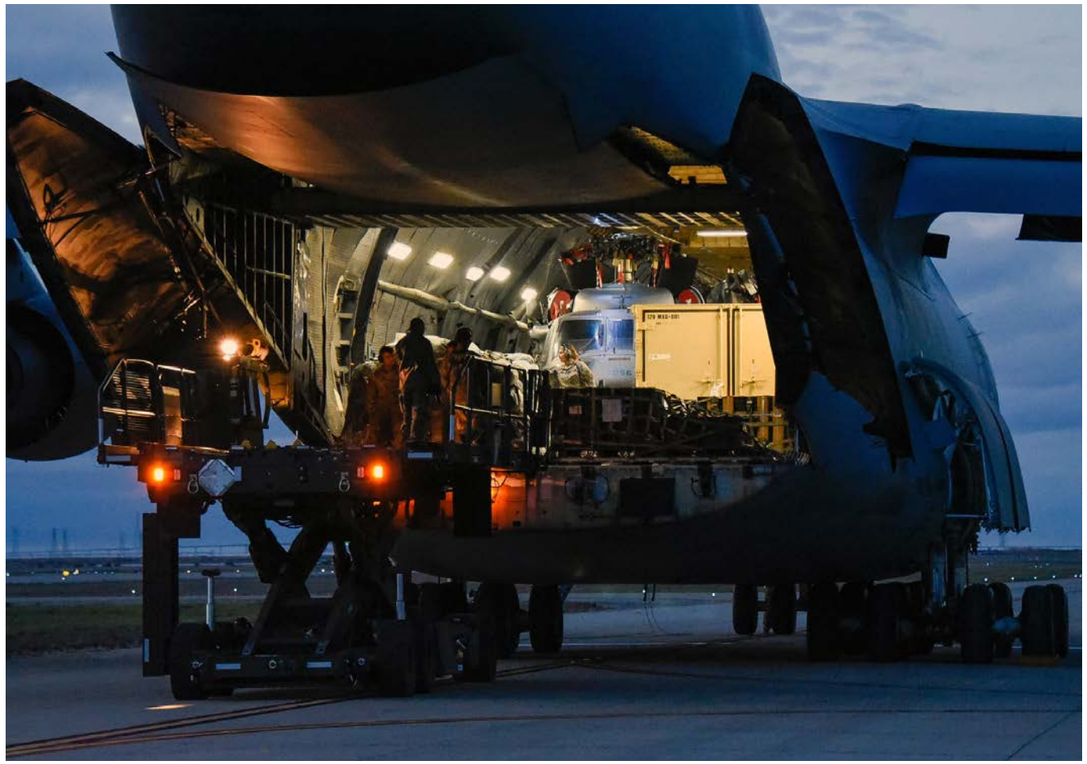
Force projection is the ability to deliver the military instrument of national power where and when it's needed in response to national security requirements. The capacity to project Army forces and associated combat power globally is an essential element of conventional deterrence and one of the strategic advantages the Army has as a fighting force. In the weeks leading up to and following Feb. 24, 2022, U.S. capability to project combat power was once again tested as Russia massed troops on the Ukrainian border and subsequently invaded. This time, the U.S. military was required to not only position forces forward to assure NATO allies but also coordinate the delivery of defense articles to Ukraine rapidly through Presidential Drawdown Authority (PDA). To accomplish this, the Army, in partnership with U.S. Transportation Command (USTRANSCOM) and its Army service component command (ASCC), the Military Surface Deployment and Distribution Command (SDDC), executed intermodal operations from continental U.S. (CONUS) to the joint area of operations in Europe. These intermodal operations contributed significantly to the projection of combat forces to Europe and to the provision of critical combat capability to Ukraine. They serve to not only set conditions for future force projection operations in Europe but also for the conduct of intermodal operations across the globe in support of future contingencies.

Per Army Doctrine Publication 4-0, Sustainment, intermodal operations are the using of modes of transportation to move troops, supplies, and equipment through a network of nodes to deliver combat power into an area of operations. According to Army Techniques Publication 4-13, Army Expeditionary Intermodal Operations, intermodal operations ultimately provide flexibility for the combatant commander to deploy, employ, and sustain land forces to extend operational reach, ensure freedom of action, and prolong endurance during combat operations.

These operations take into consideration theater infrastructure and the availability of multimodal capabilities. Multimodal is the movement of cargo and personnel using two or more transportation methods from point of origin to destination. Both air and surface (truck, rail, and maritime vessel) modes of transportation are integral to intermodal operations. Use of multimodal capabilities reduces backlog, enabling the speedy delivery of combat power to the point of need. This was certainly necessary at the outset of the Ukrainian crisis as the deployment enterprise was challenged with simultaneously projecting immediate response forces (IRFs) and large quantities of ammunition from CONUS into Europe to support Ukrainian requirements.

USTRANSCOM coordinated with Headquarters, Department of the Army, Army Forces Command, and U.S. Army Europe and Africa (USAREUR-AF)—U.S. European Command's ASCC—to facilitate the rapid movement of IRF troops via strategic airlift from CONUS air terminals to outside continental U.S. (OCONUS) aerial ports of disembarkation (APODs) in Poland, Germany, and Romania. Per Joint Publication 3-36, Joint Air Mobility and Sealift Operations, an aerial port is an airfield that has been designated for the sustained air movement of personnel and materiel and is an authorized port for entrance into or departure from the country where it's located. Aerial ports provide the most expeditious method for rapid force deployment and normally serve as a link to land transportation systems in theater.

SDDC leveraged its portfolio of commercial arms, ammunition, and explosives (AA&E) truck carriers to move requested munitions from Joint Munitions Command's (JMC's) CONUS depots and plants to air terminals for onward movement into theater. Due to the large quantities of ammunition that needed to be moved over a relatively short period of time, SDDC coordinated with the Department of Transportation's Federal Motor Carrier Safety Administration to garner permission to extend AA&E driving hours. This proved critical to ensuring there was sufficient AA&E truck carrier capacity to meet initial surge munition requirements. Once munitions were transported via AA&E truck carriers to designated aerial terminals, JMC, in coordination with SDDC, utilized special assignment airlift mission



An Air Force HH-60G Pave Hawk helicopter and equipment assigned with the 129th Rescue Wing are loaded onto a C5M Galaxy transport aircraft from the 439th Airlift Wing during a cargo deployment processing at Moffett Air National Guard Base, California, Dec. 28, 2023. (Air National Guard photo by Master Sgt. Ray Aquino)

(SAAM) requests to move stocks to OCONUS APODs designated by USAEUR-AF and the 21st Theater Sustainment Command (TSC) for onward movement. SAAMs are funded missions that utilize a combination of Air Force and commercial contracted strategic airlift assets to transport high-priority cargo. Utilization of SAAM flights provides the operational flexibility to pick up and deliver cargo to locations outside recurring channel flights. This proved critical as movement planners attempted to reduce the time it took to move critical munitions from JMC depots to APODs.

While strategic airlift remains essential to the rapid positioning of combat power, it is not an efficient means for the transport of armored platforms or for large quantities of ammunition. Strategic sealift took on a more prominent role as U.S. national command authority made the decision to increase the number of armored brigade combat teams on rotation to Europe along with increasing quantities of heavy platforms and munitions donated to Ukraine.

Strategic sealift is linked to inland transportation (highway, rail, or waterways) through ports, providing for a smooth, seamless flow of equipment and materiel. Roll-on/roll-off (RO/RO) vessels are the primary means of sealift for wheeled, track, and rotary wing equipment. Container ships are the ideal means of transport for sustainment and ammunition. There is a sizeable difference in the capacity of sealift versus airlift. A large, medium-speed RO/RO (LMSR) vessel, for example, can transport the equivalent of approximately 400 C-17s' worth of equipment. Two LMSR vessels can deploy an entire armored brigade combat team. This is the reason strategic sealift is the preferred method of transportation for large equipment requirements.

As the DOD's single port manager, SDDC utilized the CONUS 597th and 596th Transportation Brigades (TBs) to conduct marine terminal operations to facilitate reception, staging, and loading of unit equipment and PDA material at CONUS seaports of embarkation (SPOEs). As the SDDC CONUS units loaded and pitched strategic sealift carrying units and PDA materiel toward the European continent, the 598th TB, as USAEUR-AF's strategic TB, facilitated reception, staging, onward movement, and integration (RSOI) of equipment and ammunition received at European seaports of disembarkation (SPODs).

Coordination of RSOI operations was made through 21st TSC's theater movement center. The theater movement center and subordinate movement control teams coordinated movement of unit equipment and PDA materiel from SPODs to final destinations through a combination of host nation-contracted assets (rail, truck, and barge) and military common-user land transportation.

A by-product of the increased strategic sealift requirements caused by the situation in Ukraine has been the ability to expand port diversification efforts in Europe. OCONUS port diversification entails the deliberate selection of SPODs to meet combatant command's overarching theater security objectives. SDDC coordinates directly with the 21st TSC's theater movement cell and USAEUR-AF G-4 for SPOD selection. Extensive coordination is done with the host nation to coordinate provision of security, stevedoring, and related marine terminal services to ensure equipment can be received, accounted for, and moved onward. In support of Ukraine, USAEUR-AF planners have expanded utilization of ports from Germany to multiple locations in the Baltics, North Sea, and Mediterranean. Port diversification allows SDDC to garner increased intelligence on port capacity and capability within areas of operation. It also enables the TSC and its ASCC to validate intratheater movement corridors and host nation agreements. This ultimately results in accomplishment of the Three D's:

- Demonstrating commitment to allies through the ability to project combat power where and when needed in the theater of operations.
- Detering adversaries through forward presence.
- Dilemmas created for adversaries due to their inability to predict movements through use of multiple SPOD/SPOE and associated lines of communication.

The U.S. military is constantly on the move conducting dynamic force deployments around the globe in support of strategic interests. Intermodal operations remain key to enabling the projection of combat power and sustainment cargo in support of these deployments. Operations supporting Ukraine have provided invaluable reps and sets on the conduct of these mobility operations. The Army must continue expanding its global deployment networks, mobility capacity, and global command and control capability to execute intermodal operations in contested environments if it is to maintain the strategic advantage it currently enjoys in global force projection. USTRANSCOM and SDDC remain focused on mission execution, testing, and experimentation so the Army can maintain this advantage.

Maj. Gen. Gavin A. Lawrence currently serves as the commanding general of Military Surface Deployment and Distribution Command at Scott Air Force Base, Illinois. He previously served as the Deputy Chief of Staff, G-4, U.S. Army Forces Command at Fort Liberty, North Carolina. He is a graduate of the United States Military Academy where he was commissioned as a second lieutenant in the Army Quartermaster Corps. He has a Master of Arts in national security and strategic studies from U.S. Naval War College, Rhode Island, and a Master of Arts in strategic studies from U.S. Army War College, Pennsylvania, where he successfully completed the Advanced Strategic Arts Program. He has also completed the Massachusetts Institute of Technology Seminar XXI program and University of North Carolina's Institute for Defense & Business LOGTECH Executive program.

Feature Photo
The 21st Theater Sustainment Command (TSC) supports the first U.S. and Portuguese mission at the Port of Setubal, Portugal, on Dec. 7, 2023, a collaboration between the 21st TSC, 598th Transportation Brigade, the Portuguese military and port authority, and the U.S. Mission to Portugal. (Photo by Sgt. Andrew Jo)

THE MAINTENANCE AND MISSION

What Logistics Assistance Representatives Mean to You

By Sgt. Maj. Shane K. Short

The world is learning the importance of sustainment and maintenance as it watches Russia attempt to occupy and annex Ukraine. Beleaguered Russian formations struggle to maintain their equipment across long lines of communication with seemingly little to no maintenance or sustainment support. The U.S.'s race to employ and maintain a technological edge in the war on terrorism created an accelerated proliferation of technology in the operational force. The entire spectrum of warfighting equipment received attention, not just command, control, computers, communications, cyber intelligence, surveillance, and reconnaissance updates. In this push of modernization to control the desired centers of gravity, the Army also saw an influx of field support representatives (FSRs) and a reduction of logistics assistance representatives (LARs). Soldiers began to lose their maintenance and sustainment fidelity as the Army continued to field Non-Program of Record equipment under contract for maintenance and sustainment. Combat training center after-action reviews on sustainment show the U.S. military is in danger of looking like the Russians. The Army is now at a turning point, and the time of the LAR has returned.

FSR versus LAR

As far back as 2016, the Army looked to reduce FSR reliance and place ownership of maintenance and sustainment back into the hands of Soldiers, who must return to being able to maintain their equipment forward of the line and at the speed of maneuver. However, the pervasive nature of rapidly fielding equipment through program executive officers prior to Program of Record adoption led to a large FSR maintenance tail. While FSR personnel are great technicians and close a maintenance and sustainment gap, they are contractors and come with a different set of constraints and restraints based on their performance work statement, host nation agreements, and equipment supported. Sometimes, the funding for FSR support comes from unit funds.

LARs are different. Although they are still civilians, they are Department of the Army Civilians. Per Army Regulation (AR) 700-4, Logistics Assistance Program, LARs are part of the Logistics Assistance Program (LAP) and fall under the Army Material Command's umbrella of sustainment and maintenance tasks: "The LAP delivers materiel enterprise capabilities that enable Army readiness at the tactical point of need in order to provide commanders with freedom of action, extended operational reach, and prolonged endurance." This means LAR personnel can be with you at the speed of maneuver to solve the sustainment and maintenance issues that occur during combat operations. Your unit's LAR team is the subject matter expert pool for issues the unit cannot solve on its own. Every Program of Record underneath the four life cycle management commands (LCMCs) of Army Material Command has LARs assigned to it. If you have an issue with your track, Tank-automotive and Armaments Command (TACOM) has a LAR for that. If you have an issue with something on the aircraft, Aviation and Missile Command has a LAR for that.

Each LCMC complement of LARs is dependent on what Programs of Record are underneath that LCMC. So, the LAR team complement from TACOM may be larger than the LAR team complement from Communications-Electronic Command. Therefore, it is important to understand your LARs, what LCMC they represent, and what they do specifically for the assemblage. Many of the LARs have a broad scope of expertise but are best suited when used for their specialty. However, LARs are not simply a magic wand to wave at your sustainment and maintenance issues.

As AR 700-4 says, the LAR does not absolve the commander of logistic readiness but is an asset to aid the commander in recognizing trends and providing hands-on training to close logistics gaps related to Programs of Record. The hands-on training portion of that statement is crucial in receiving the best support from your LAR and the LAP in general. Hands-on training means whenever a LAR is providing assistance to your formation, the operator or maintainer for that equipment must also be there. The LAR's goal is to teach Soldiers how to do it on their own. To borrow a popular analogy, they teach the Soldiers to fish.

Lawrence Hill, a Joint Munitions Command Logistics Assistance Representative assigned to the 405th Army Field Support Brigade's Army Field Support Battalion, trains a motor transport operator from the 2nd Cavalry Regiment in Vilseck, Germany, Dec. 7, 2021. (Photo by Cameron Porter)

How to Use the LAR Team

To get the most out of the LAP and the LAR team assigned to your formation, there are a few things you must do. The first and most important thing you must do is setting the conditions and culture within the unit. Does your unit have a good maintenance plan and focus on maintenance? Often, units focus on the attractive pieces of their inventory and ignore the enabling tools that help maintain those attractive pieces. When was the last time Soldiers turned on the Joint Battle Command-Platform (JBC-P)? Do Soldiers know the JBC-P must be turned on regularly to keep it from being removed from the network? Standard operating procedures go a long way to address issues like this. Commanders and leaders at all levels need to understand these nuances to maintenance because Soldiers know that what is important to the commander gets checked.

The next thing leaders must do for good LAR relationships is talk to them regularly. Do not only call them prior to a combat training center rotation as your formation is preparing to railhead equipment. Invite them to your maintenance meetings and have them come to your motor pools. Commanders and staff leaders need to ensure there is LAR integration and welcome the LARs as enablers in your formation. After all, these are the same personnel that will deploy with you when the time comes. AR 700-4 explicitly says LARs must be deployable, mandatory mobile, and emergency essential.

Lastly, and one of the most important parts of getting the most out of the LAP and LAR team, make sure your operators and maintainers are present. As mentioned before, the LAR wants to train themselves out of a job. That's not to say they will stop helping you; they are enablers. This is one of the primary distinctions between the FSR and the LAR. The FSR is a doer. They maintain the equipment in the absence of Soldiers. The LAR teaches the Soldier how to do it, creating spheres of maintenance influence in the formation. So, if the LAR is off somewhere else, that Soldier is now capable of performing the maintenance task on their own.

How to Find Your LAR Team

While each LCMC has a LAR population, the LAP is geographically dispersed and managed directly by the Army field support brigades (AFSBs) of Army Sustainment Command. Each Army service component command has an AFSB, managing the LAP for Army Sustainment Command. AR 700-4 has a very detailed explanation of where each AFSB is and the area the AFSB commander is responsible for. The AFSB and its subordinate battalions help deconflict and allocate these assets to best enable the operations in their respective areas. Each Army division in the continental U.S., Alaska, Hawaii, and Korea have a lead-system technical representative (L-STR) assigned to it to help communicate maintenance trends and operations to the AFSB and LCMC. Japan and Europe have these personnel also but are assigned differently because there's no division headquarters. The AFSB, the L-STR, and the LCMC senior command representative determine priorities of work and coverage in terms of mission risk and need. For instance, many LARs from various AFSBs were called to support Defender Pacific in 2021 because critical aspects of that exercise needed to have success.

Each unit has, or should have, a process for requesting the LAR team for support. After all, the Army runs on documentation, and AR 700-4 has a section specifically for documenting LAR support. In many units, the request is through staff and technical channels from battalion, through brigade, to the L-STR at division. However, if there is good integration of LAR support in the unit, chances are the LAR already helped the commander identify the problem and is helping resolve it, and the documentation for support is a formality.

What This Means to You, the Leader

First and foremost, it means leaders must take all maintenance seriously. Prior to the war on terrorism, many units had two days set aside for maintenance. Monday was for rolling stock, and Tuesday was for electronics maintenance. That is not the only way to do it, but it is a way. Secondly, look past any scar tissue that may have grown from war on terrorism FSR support and embrace the LAR team as part of your formation. Your LAR team is just as important as the enablers in the brigade support battalion. Third, make sure your maintenance personnel are correctly inputting the data into the equipment status report. Each L-STR has visibility of this report. Faults placed against rolling stock as opposed to the equipment end item (such as recording a fault on the JBC-P against the tank instead of inputting it as a fault against the individual JBC-P system) are not visible. This gives the commander, unit maintenance officer, and L-STR a false sense of where certain maintenance levels are.

Take the lessons learned from watching the Russians fail at sustainment and maintenance and do not repeat them. The Army has many enabling capabilities that make it the greatest fighting force on the planet. However, if you do not use these enablers, which are already funded, it makes your formation susceptible to the very same issues the Russians are facing.

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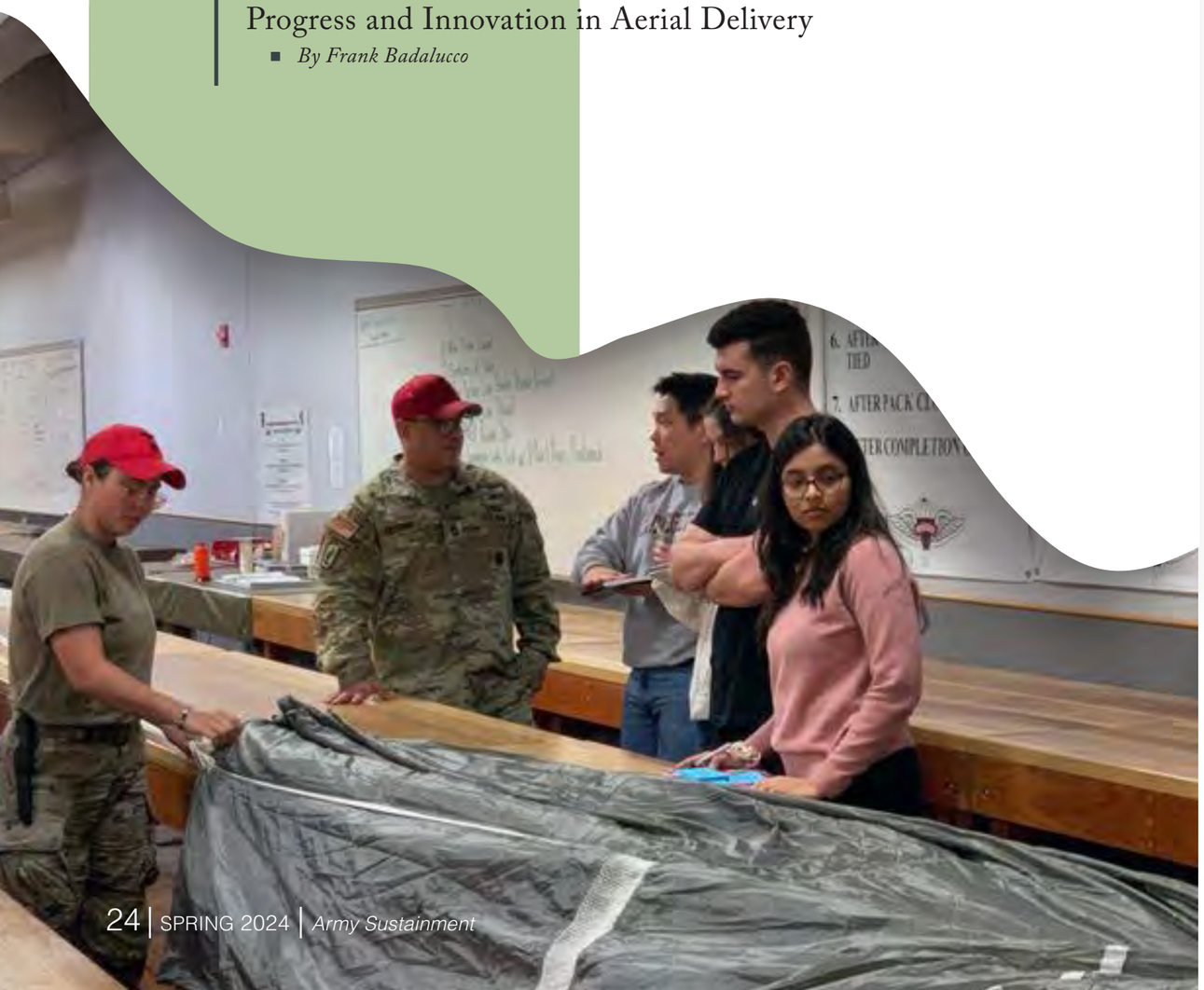
Embracing Modernization

Progress and Innovation in Aerial Delivery

■ *By Frank Badalucco*



Over the past 15 years, significant advancements in aerial delivery capabilities have allowed for enhanced interoperability and readiness/modernization efforts. Before 2005, equipment, tactics, techniques, and procedures (TTP) remained unchanged for over 50 years. The TTPs mentioned in reference texts were very useful in enabling the aerial delivery field to provide a strong foundation for the initial airdrop sustainment missions during Operation Iraqi Freedom and Operation Enduring Freedom. During the time of conflict, aerial delivery was forced to adapt and modernize. Currently, the Army is still modernizing and striving to be adaptable for large-scale operations, humanitarian support, and NATO interoperability support.

Aerial delivery is essential in shaping battlefields and giving commanders access to resources that would otherwise be denied when operating in a land-locked country like Ukraine. This led to a revision of Army Techniques Publication 4-48, Aerial Delivery, incorporating force design updates to unit structures. As individual combat loads and equipment became heavier and more sensitive, modernization became necessary for paratroopers jumping with more weight and at a slower rate of descent to avoid injuries and ensure the paratroopers' safety. Advancements on the battlefield, such as adversaries' increasing surface-to-air capabilities, have also impacted aerial delivery operations, pushing the Air Force to request higher drop altitudes and autonomous airdrop capabilities to avoid damage. With guidance from the Army Airborne Board and commanders at all levels, the aerial delivery community has adapted to new aerial delivery requirements and lessons learned for an ever-evolving battlefield.

The aerial delivery community must continue to support Soldiers with modern technology changes and work modernization efforts to increase commanders' operational reach and maneuverability. For any systems an airborne unit utilizes, the Army requires rigorous developmental and operational testing and certification for airdrop and sling load. Training and standards must also be developed and implemented for parachute riggers, jumpmasters, Air Force aircrews, and joint airdrop inspectors. The Army is advancing the capabilities for aerial delivery by implementing modernization initiatives such as utilizing mobile asset tracker-automated parachute management (MAT-APM) for tracking and maintenance, establishing the Aerial Delivery Readiness and Safety Team (ADRST) to evaluate and support all aerial delivery units, and integrating human and computer functions using robotic applications.

The MAT-APM application is a program designed by the aerial delivery community to establish a database to keep track of the history, maintenance actions, and catalog information of aerial delivery equipment (ADE). It provides a system for aerial delivery units to monitor personnel certifications, qualifications, and the operational status of ADE. The reason why the aerial delivery community took this action is that Global Combat Support System-Army was unable to perform these tasks, and a different process was needed.

By leveraging MAT-APM's many capabilities, data collection, analysis, and audits will increase throughput and reduce the need for human resources. For example, MAT-APM is a great resource and improvement on how the aerial delivery community collects data on malfunctions and mishaps of ADE. The reports contain multiple data points, capturing all relevant information on the user, maintainer, terrain, and weather conditions. The aerial delivery field is working to improve the process by introducing digital submission through MAT-APM instead of fax, email, or SharePoint. This will enhance record-keeping and instant information gathering for leaders. The current process is labor-intensive and requires years of experience to correctly review and process submissions, which takes time away from leaders and staff. Retrieving data for combat developers can be challenging, and the system is vulnerable to data loss and is restricted by local software policies.

To assist aerial delivery units with modernization and ensure safety and readiness, G-4 has created a new team called the ADRST. This team's mission is to assess and assist all aerial delivery units every three to four years. They assess adherence to policy and doctrine across all components of aerial delivery units.

Sgt. 1st Class Jesse Norris, a member of the Aerial Delivery Readiness and Safety Team, conducts a quality assurance and control check on a parachute as part of an assessment for the Airdrop Branch of the Joint Readiness Training Command, Fort Johnson, Louisiana, Jan. 10, 2024. (Photo by Sgt. 1st Class Nicholas Runyan)

To provide standardized and value-added assessments, the team has partnered with other units such as the National Guard Airborne and Aerial Delivery, Safety, Training, Readiness, Assistance Program; the 1st Special Forces Command senior airdrop advisor; and the Army Reserve airdrop office. The team's goals are to provide a status of the aerial delivery capability Army-wide and to offer assistance and get-well plans if needed. They share lessons learned across the aerial delivery community and report all findings to Army G-4. The team is developing an award program for annual aerial delivery unit readiness, safety, and unit of excellence and is credentialing its members through organizations such as Army Sustainment University's Data Analysis and Visualization course, Army Combat Readiness Center's Army Mishap Investigation Course, and the Army Inspector General School's basic course. The team also assumes the duties and responsibilities for the triannual malfunctions safety and analysis review board to identify units with malfunctions or mishaps and address them during assessment and assistance visits. Additionally, they are working on expanding MAT-APM's capabilities to allow units to submit malfunction reports and utilization summaries electronically.

Another modernization effort the aerial delivery community is undertaking is the integration of human and computer functions through robotic applications. This effort is to implement artificial intelligence (AI) applications to augment aerial delivery operations in personnel parachute packing, cargo rigging, and maintenance activities. Due to theater aerial delivery companies and corps aerial delivery companies being at risk of mission degradation for intratheater-level support activities, a need for a viable solution, which can be sustained both in garrison and combat, is immediate. The types of operations that face below-standard effectiveness are parachute packing facility operations, parachute management, rigging facility operations, heavy drop operations, and ADE repair facility operations, which constitute problems both in garrison and combat environments because personnel manning strengths cannot support full-scale aerial delivery requirements. In today's multidomain operations (MDO), aerial delivery must remain speedy in providing mission-critical cargo and key personnel anywhere in a dispersed era of operation. This strategic aim cannot be fulfilled if the manning portion is not maintained to wartime readiness rates above 90% or if the effectiveness of the personnel rigging is not trained appropriately with the right amount of experience.

As a result, the Aerial Delivery and Field Services Department at Fort Gregg-Adams, Virginia, is teaming up with the Army Combat Capabilities Development Command in Natick, Massachusetts, to design an AI robot that can interact with humans and perform rigging duties. This collaborative effort includes private organizations and colleges such as Carnegie Mellon University, Pennsylvania, to help create a technological application to meet aerial delivery's unique challenges and perform the associated high-risk operations. These cutting-edge efforts shape the future augmentation of the human force to help commanders improve combat readiness levels and outputs both in the garrison and on the future battlefield. The AI robotic system will also be able to connect to automated systems such as MAT-APM to upload real-time data and have total asset visibility throughout the aerial delivery enterprise. This monumental change to how aerial delivery is implemented will revolutionize aerial delivery operations to improve speed, volume, and asset visibility from the tactical to the industrial enterprise. The future seems so far away, but it is within reach due to push from the leaders of both the airborne and aerial delivery communities. An AI robot that can conduct aerial delivery rigging would help augment the human force and improve both quality and quantity to increase operations and safety measures of effectiveness and to give commanders the decisive edge needed to dominate the future MDO environment.

Aerial delivery is pivotal in shaping the battlefield and helping the Army achieve victory. Therefore, it is crucial to prioritize safety and readiness when modernizing aerial delivery capabilities. This can be achieved by analyzing data and auditing the aerial delivery community. The collected data is valuable for developers improving aerial delivery capabilities. It provides them with relevant and up-to-date data points, which can speed up the design and testing process in the developmental and operational phases. AI robots can be used in the future to address human resource constraints and modernization efforts. The development and implementation timeline for ADE is quite lengthy, and the development of training programs further compounds it. However, the MAT-APM, ADRST, and integration of human and computer functions through robotic applications provide commanders and senior leaders with crucial information and resources to make informed decisions at the right time.

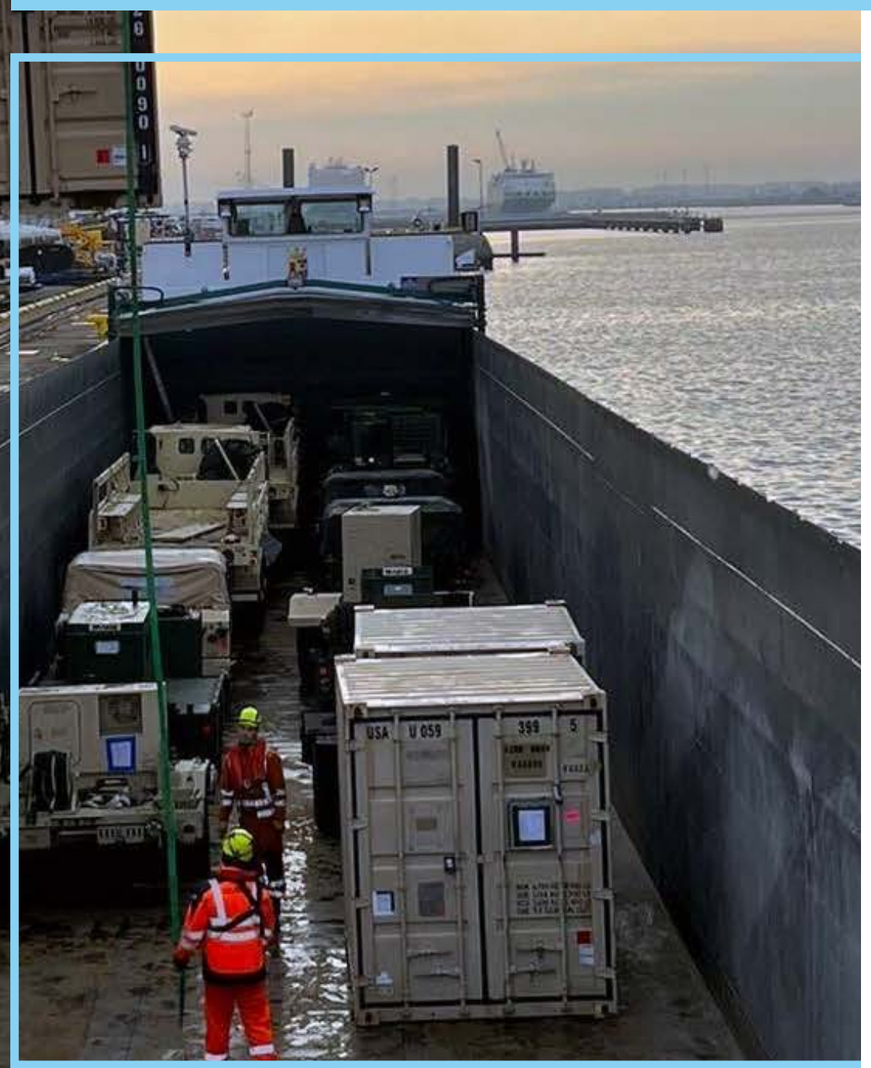
Frank Badalucco is presently the Deputy Director of the Aerial Delivery Readiness and Safety Team at the Aerial Delivery and Field Services Department (ADFSD), Fort Gregg-Adams, Virginia. Previously, he was a senior airdrop advisor and an aerial delivery technical writer for ADFSD. During his tenure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

Feature Photo
Sgt. 1st Class Freddie Feliciano, a member of the Aerial Delivery Readiness and Safety Team, explains the process of parachute packing to team members from Carnegie Mellon University's Master of Human-Computer Interaction program as part of a parachute packing demonstration conducted by Staff Sgt. Diana Campos, an instructor assigned to the Aerial Delivery and Field Services Department, Fort Gegg-Adams, Virginia, Feb. 9, 2024. (Photo by Sgt. 1st Class Jesse Norris)

Leaping Ahead in Projecting Combat Power

The View From the 267th Theater Movement Control Element

By Lt. Col. Scott Gum



On Feb. 24, 2022, the forces of the Russian Federation crossed the Ukraine border, initiating a special military operation that resulted in the first major ground combat operation in Europe in 70 years. In swift response, NATO nations, including the U.S., mobilized to support Ukraine with military materiel and supplies. Since the conflict's onset, the U.S. has assured its allies by projecting combat power across Europe, dedicating over $44.2 billion in military aid under the Presidential Drawdown Authority (PDA), granted in the Foreign Assistance Act of 1961. To coordinate these complex deployments and logistics movements across nations, the 21st Theater Sustainment Command (TSC) has operationalized theater sustainment to meet the challenge.

U.S. European Command (USEUCOM) faces the daunting task of accurately tracking the movement of Army division-sized forces in addition to the military sustainment materiel entering and traveling through European NATO countries. A critical aspect of this support falls under the 21st TSC's responsibility. Within the 21st TSC, the 267th Theater Movement Control Element (TMCE) developed, tested, and implemented an unprecedented method to further enable movement control: the Joint Enterprise Data Interoperability (JEDI) Movement Center – Europe (JMCE). Developed in collaboration with industry partner Nexus Life Cycle Management, the JMCE serves as a crucial interface between the 21st TSC, allied and partner nations, and NATO, which relies on the Logistics Functional Area Services (LOGFAS) suite of tools.

Exceeding limitations of stove-piped legacy systems, the JMCE accomplishes what has never before been possible. First and foremost, it rapidly enables integration between European allies/partners and DOD assigned/allocated forces during the planning and execution of operations, rotations, and exercises in support of military mobility across the European theater. In addition to achieving this extraordinary new standard of joint operations, it also leverages digital persistence, enabling consolidation and analysis of DOD and commercial information systems capabilities with LOGFAS, enhancing the functionality of LOGFAS across NATO nations. Since 2022, the 21st TSC rapidly deployed and tracked 14 brigade combat teams, five division headquarters, two corps headquarters, and countless enablers with near-flawless transparency in addition to partner aid missions, including 32 Surface Deployment and Distribution Command vessels of sustainment and combat power.

For the 21st TSC, the PDA mission is clear—transport and track resources that are critical for Ukrainian victory. Success in this mission relies on meticulous preparation of materiel for shipment, coordination with allies and partners, and appropriation of funding for the ongoing support by the American people backing this crucial endeavor.

The safe and secure movement of resources through a multinational environment is imperative, and this is where the 21st TSC, specifically the TMCE, comes into play. The importance of solidarity with sovereign nations and transit nations cannot be overstated.

The TMCE, operating under the umbrella of the 21st TSC, plays a pivotal role in accounting for a significant portion of the support when in the European theater. Established as part of the TMCE, the JMCE is vital in identifying frustrated cargo, reducing errors and delays from diplomatic clearances, and responding to requests for information from commanders and higher headquarters at the tactical level. This innovative element ensures the hand-off points, critical to the success of the mission, are efficiently managed and executed.

The military-commercial hybrid nature of the JMCE, developed out of necessity, facilitated the rapid adoption of next-generation transponders (NGTs), JEDI, and LOGFAS capabilities in a scope never before attempted. Beyond tracking, the JMCE has been at the forefront of advancing in-transit visibility (ITV) capabilities, particularly with LOGFAS. The implementation of this ITV capability, including the integration of commercial off-the-shelf (COTS) NGTs, was a groundbreaking step forward. The use of NGTs presented several challenges and lessons learned during the development and operational employment phases.

This mission, beyond its operational successes, has yielded a wealth of lessons learned for logistics operations in the multinational and NATO environment.

Implementing the new systems and methodology was not without its challenges. In late July 2023, spectrum management concerns arose, highlighting the complexity faced when employing COTS technologies such as NGTs with LOGFAS. By early August 2023, the JMCE, working in collaboration with industry experts, validated the commercial approval of NGTs throughout the European Union (EU), leading to the permanent authorization of NGTs. A dedicated team member was added in Germany to provide direct ITV support to the JMCE, resolving operational demands and advancing processes and policies to reduce the risk of additional concerns related to the new ITV capabilities.

The JMCE's commitment to continuous improvement is evident in its response to these spectrum management concerns. Recognizing the challenges posed by employing COTS technologies, the JMCE actively addressed these concerns and collaborated with relevant authorities, including the EU, to secure commercial approval for NGTs. Since the integration of NGTs in the theater, the JMCE has accurately tracked and reported on 869 missions between May and December of 2023. The industry team's dedication to resolving concerns and providing direct support reflects the adaptability and commitment of the JMCE to meet operational demands effectively.

The JMCE's work within the 21st TSC is not limited to tracking assets and ensuring timely deliveries. It extends to updating policies, executing new processes, and managing new technologies. Ongoing efforts include testing the use of mission data available in the Transportation Coordinator's Automated Information for Movement System (TC-AIMS), the Army's transportation coordination tool, with plans to bridge TC-AIMS to LOGFAS to streamline data entry requirements for movement control battalions and movement control teams.

This mission, rooted in on-the-ground, evolving processes, serves as a proving ground for advancing the Army's logistics and technological capabilities in Europe. The JMCE's integration of NGTs, JEDI, and LOGFAS capabilities into PDA missions not only advances ITV capability but also contributes to the development of policies, technology, and process advancements being assessed by the Army and NATO partners. At present, the 21st TSC is a catalyst for positive change, pushing forward advancements benefitting both Ukraine support and the entire Army ecosystem operating in Europe.

Due to the increased need for the U.S.'s support for Ukraine under the PDA, the use of NGTs and the implementation of greater ITV through the JEDI multinational (MN) logistics (LOG) common operational picture (COP) enhance the ability for successful USEUCOM theater deployment and sustainment of U.S. forces in a coordinated and collaborative joint and multinational environment. Furthermore, they strengthen the multinational force readiness capability and posture as the conflict continues.

This mission, beyond its operational successes, has yielded a wealth of lessons learned for logistics operations in the multinational and NATO environment. Acknowledging the importance of sharing these insights, the JMCE has actively contributed to NATO's Asset Tracking Working Group and plans to participate in NATO's Coalition Warrior Interoperability exercise and Asset Tracking Capability Integration Campaign exercise.

Beyond the direct support for Ukraine, the JMCE's use of LOGFAS enables rapid data sharing not only with NATO and NATO partners but also globally with non-NATO partners. This global application was demonstrated in North Africa during exercise African Lion 23, which showcased the versatility and interoperability of the JMCE's capabilities. The data collected can be shared with other DOD or partner dashboards or systems using the MN LOG COP application programming interfaces, providing commands across DOD the flexibility to use their preferred tools for viewing or analyzing the data. The natural next step for the DOD is to extend the proof of concept to other theaters of operation.

NATO and the U.S. military face extraordinary challenges in responding to the Russian Federation's incursion into Ukraine. Amidst these tumultuous times, the U.S. commitment to support Ukraine, under the PDA, necessitates a meticulous and synchronized logistics effort. The establishment of the JMCE within the 21st TSC emerges as a pivotal element, facilitating an agile approach to coordination, tracking, and transportation of critical resources. The benefits provided by cutting-edge technologies, including NGTs, JEDI, and LOGFAS, are seen every day across Europe. Notably, the JMCE's role extends beyond immediate support for Ukraine, showcasing its impact on global data sharing, technological advancements, and lessons learned for logistics operations. The new technologies, methods, and capabilities all add velocity, visibility, and flexibility to the Army's decision-making, increasing its advantage in future contested logistics environments. The continuous improvement ethos of the combined TMCE and JMCE, its adaptability to overcome challenges, and innovative contributions to NATO's working groups are groundbreaking with every movement, demonstrating its significance as a catalyst for positive change in advancing Army logistics and logistics convergence across Europe.

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Feature Photo
The Rhine River barge crew loads equipment for the 82nd Airborne Division deployment to Europe in Antwerp, Belgium, Nov. 23, 2023. (Photo by Capt. Jake Palmer)

The Multifunctional Logistician

By Command Sgt. Maj. Oscar Llamas

Most agree that much of what a senior sustainment NCO does is accomplished through the lens of a multifunctional logistician. What is a multifunctional logistician? It's an NCO with broad knowledge and experience who is qualified to fulfill several functions or roles within the sustainment warfighting function. This definition was determined and established early in 2023 by nominative command sergeants major and sergeants major across the Total Army.

The NCO corps currently has NCOs assigned to varied organizations performing multifunctional tasks. What did not exist until now was a codified process to bridge education and experience.

In May 2022, a directive was issued to incorporate Sustainment Common Core within the Senior Leaders Courses (SLCs) of logistics NCOs attending professional military education at the Logistics Noncommissioned Officer Academy (LNCOA) at Army Sustainment University (ASU), Fort Gregg-Adams, Virginia. The intent is to provide senior NCOs attending their respective SLCs with 58 hours dedicated to logistics common core. Sustainment Common Core is the foundation of the multifunctional logistician NCO. The required education exists and is currently delivered to senior logistics NCOs at the LNCOA.

Once the educational aspect was established, the experience was codified. The implementation of the Personnel Development Skill Identifier (PDSI) of the multifunctional logistician encourages leaders within the sustainment enterprise to seek to become multi-skilled. The PDSI also identifies trained and experienced senior logistics NCOs for multifunctional positions within organizations. Doing so provides a baseline understanding of mission planning within each sustainment warfighting function. With the implementation of the PDSI, positions are coded as multifunctional logistician positions, placing the right person in the right position at the right time.

The multifunctional logistician reflects the leader development model in that leader identification and certification is a deliberate, continuous, sequential, and progressive process grounded in Army Values and the Army Chief of Staff's four major priorities.

In December 2023, the Logistics Branch Proponency Office (LOGPRO) within ASU submitted a PDSI requesting the establishment of the multifunctional logistician NCO. Establishing the multifunctional logistician NCO PDSI allows for a formal program of self-guided professional development. The following criteria for a multifunctional logistician NCO were submitted for recommendation to the permanent PDSI:

- Graduate a senior NCO SLC (with Sustainment Common Core).
- Perform duties in a leadership role successfully for 12 to 24 months.
- Graduate the Support Operations Course (Phase I).
- Serve as support operations course commodity manager, S-3/operations noncommissioned officer in charge, or G-4/S-4 successfully for a minimum of 12 months (validated through NCO evaluation reports).
- Complete an associate degree with at least 60 accredited college hours.
- Acquire one credentialing certificate via ArmyIgnitED.
- Complete one functional course at ASU.

The request for the multifunctional logistician NCO is currently being actioned by Headquarters, Department of the Army, G-1. Once the PDSI has been approved, a board will be established, and LOGPRO will decide in detail the packet submission. The number of packets submitted for the PDSI will determine whether boards meet quarterly or monthly.

The Army Leader Development Model is woven into the fabric of the multifunctional logistician. The institutional domain is seen through the educational aspect of the Sustainment Common Core received by senior leaders attending their respective SLCs at the LNCOA. The operational domain is seen in the myriad of multifunctional positions in which senior NCOs currently serve. throughout multifunctional organizations. The self-development domain is grafted into a multifunctional logistician through various functional courses, civilian education, and a multitude of certifications and credentialing. The multifunctional logistician reflects the leader development model in that leader identification and certification is a deliberate, continuous, sequential, and progressive process grounded in Army Values and the Army Chief of Staff's four major priorities.

Identifying and certifying multifunctional logistical senior NCOs to meet the demands of the sustainment enterprise allow for continuous transformation through the delivery of combat-ready formations while strengthening the profession of arms. The Army is transformational in winning the challenges of an increasingly complex world.

There are currently logistics NCOs assigned to various organizations performing multifunctional tasks. A senior multifunctional logistician NCO possesses broad knowledge and experience and is qualified to fulfill several functions or roles within the sustainment warfighting function. The education portion of being a multifunctional logistician NCO is delivered through Sustainment Common Core presented to senior leaders who attend their respective SLCs at the LNCOA. However, there has been no process to certify multifunctional logistics NCOs, so efforts have been focused on codifying the process. The implementation of the multifunctional logistician NCO PDSI will allow the NCO corps to identify and certify logistical senior NCOs in performing multifunctional duties in multifunctional organizations, becoming multifunctional logisticians in the process.

Command Sgt. Maj. Oscar Llamas currently serves as the command sergeant major and commandant of the Logistics Noncommissioned Officer Academy at Army Sustainment University, Fort Gregg-Adams, Virginia. He graduated from all levels of the Noncommissioned Officer Professional Development System, culminating with the Sergeants Major Academy. He holds a master's degree in psychology. He is also a graduate of the Senior Enlisted Joint Professional Military Education course and the Supervisor Development Course.

Feature Photo
Soldiers assigned to C Company, 87th Division Sustainment Support Battalion, 3rd Division Sustainment Brigade, unload an M1 Abrams tank from the M1302 trailer, part of the enhanced heavy equipment transporter system, after hauling the tank back to the 2nd Armored Brigade Combat Team at Pabrade, Lithuania, Jan. 10, 2024. (Photo by Sgt. 1st Class Jason Hull)

THEATER SUSTAINMENT TRANSFORMATION

Lessons from the Russia-Ukraine War

By Maj. Gen. Ronald R. Ragin and Maj. Christopher G. Ingram

Emerging technologies, already visible on the battlefields of Ukraine, are rapidly changing the character of war in ways that require a transformation in how the Army sustains the fight. Autonomous systems, long-range precision fires, and hypersonic weapons are reaching deep and targeting command posts, logistics nodes, and lines of communication. As seen in Ukraine, once a logistics node is established, it is rapidly targeted and often destroyed in less than 24 hours. With drones that can detect, surveil, and target, the kill chain in Ukraine demonstrates that as fast as a supply depot or command post can be found, it can be destroyed. The future of armed reconnaissance is unmanned, lethal, and expendable, and it may be operated by artificial intelligence (AI) that follows a different set of moral norms than Soldiers do.

The proliferation and exponential growth of emerging technologies are changing the scale, geometry, and complexity of warfighting. The lessons learned in Ukraine are not unique to Europe. From Russian logistical missteps in the 2022 invasion of Ukraine to the attrition warfare that predominates the defensive fight today, these lessons should drive transformation of sustainment across the Army, joint, and multinational forces.

Applying Lessons Learned and the Russian Theory of Victory

One of the hazards in applying lessons learned in any conflict is that adversaries may draw different lessons from the same events. In Operation Desert Storm, the U.S. and its allies deployed to a new theater of conflict, built combat power, and defeated one of the world's largest land armies in under 100 hours of ground combat. The lesson the U.S. learned was that it could use its advantage in strategic mobility to respond to threats anywhere in the world. The lesson its adversaries learned was that if you let the U.S. establish a coalition and build up combat power in your neighborhood, you cannot win. From this observation, Russia and China invested heavily for three decades in anti-access/area denial capabilities.

As demonstrated in Ukraine and Georgia, Russia's theory of victory has been to turn tactical success into strategic advantage by exploiting political divisions of democratic nations and negotiating an end to the conflict that achieves their objectives. In contrast, the U.S.'s theory of victory includes an allied unity of effort, a theater set for contested logistics, multiple dilemmas imposed on the adversary, and creative options to win the close fight.

The logistics challenges the Russians faced in the early stages of the Ukraine invasion should not be ignored, but it cannot be assumed those challenges reflect the current or future Russian force. Russia is learning lessons and adapting under fire. While the initial phase depended on expeditionary logistics, the current phase features an active defense supported by robust internal lines of communication that are more consistent with Russian sustainment doctrine and organization.

At the theater level, Russia is expected to learn from its early missteps and develop expeditionary logistics capabilities to sustain offensive operations. Likewise, they are expected to continue investing in capabilities they believe will contest the U.S.'s ability to project power in response. While there are countless tactical lessons to be learned, this article's focus is on areas of theater sustainment transformation that will be critical to countering Russia, China, or any advanced adversary.

Contested power projection provides combatant commanders with sufficient power projection capability and capacity to enable strategic and operational reach and supports the freedom of action necessary to create multiple dilemmas for our adversaries. Executing contested power projection requires rapid power projection; conducting reception, staging, and onward movement (RSO) in contact; use of Army pre-positioned stocks (APS); and theater power projection capabilities.

Rapid power projection requires the ability to project and sustain forward-positioned forces rapidly, reliably, and consistently from multiple points of origin to deployed locations throughout the depth and breadth of the battlefield.

RSO in contact should be an assumption in planning for crisis and conflict. Current operations are regularly conducted under the observation of adversaries. Intelligence gathering on RSO locations, timelines, and capabilities sets the conditions for active targeting in future crises or conflicts. Throughout the process, critical vulnerabilities are exploited for targeting RSO across all domains.

APS enables forces to be inserted rapidly and prevents adversaries from exploiting a window of opportunity to gain a fait accompli. In unanticipated crises, APS may represent the bulk of immediately available combat power. The balance of APS should include the sustainment capabilities required for intratheater force projection and distribution.

Theater power projection platforms are critical to strategic mobility and the rapid movement and integration of combat forces. An adversary can attack anywhere, so it is critical to have theater power projection platforms to respond rapidly to any potential crises.

Adaptive sustainment is the solution to a contested logistics environment. Adapting to a contested logistics environment requires rapid and predictive decision-making, sustainment at echelon that is purposefully designed for distributed and responsive operations, and diverse options for the transportation of forces and materiel. Rigid planning processes,

echelons of sustainment with single points of failure, or single lines of communication create vulnerabilities the enemy can exploit to delay, disrupt, and defeat friendly forces.

The ability to hide in plain sight is critical to operating in a contested logistics environment. The proliferation of drones, with over 10,000 a day flying on each side, has made masking, camouflage, dispersion, and mobility a requirement for survival. Surprise, or rear area sanctuary, will be dramatically decreased in future conflicts. Expendable long-range drones above mean that if you can be seen, you can be killed, and you can almost always be seen.

Data-enabled decision-making and AI-enabled predictive sustainment are the nervous systems of an adaptive sustainment network. In a major war, the pace and scale of attrition will cripple antiquated decision-making processes. Achieving decision-advantage over the adversary requires the ability to collect and process volumes of data quickly and to provide relevant, reliable information to decision-makers faster than the adversary. AI will not replace Soldiers in combat, but Soldiers who know how to use AI will defeat those who do not.

Multimodal transportation provides options for sustainment when adversaries attack a preferred mode. Army watercraft are critical to sustaining operations in areas where ground lines of communication are unavailable or disrupted. Large ports, bridges, railheads, and tunnels are fixed targets for contested logistics. Russian forces were overly dependent on rail transportation and struggled when they had to transition from rail to road for expeditionary logistics in the offense. Russian reliance on rail for high-volume resupply of artillery ammunition also created a lucrative target for contested logistics before the Russians adapted.

Secure prolonged endurance determines the outcome of major wars. The side that produces, maintains, and regenerates combat power faster will likely prevail in Ukraine. As the pace of destruction has increased, the complexity of weapons systems has also increased. Success requires stockpiles of critical munitions and rapid regeneration.

Pre-positioned and distributed storage of bulk commodities is required to sustain forces in a contested environment at the scale seen in Ukraine. Both sides target fuel and ammunition storage facilities. Even semi-fixed locations are not mobile enough to support a dynamic fight and are targeted.

Resilient and autonomous distribution creates a targeting dilemma for an enemy focused on disrupting logistics. The simplest way to disable a tank is to deny it fuel, and a corps-sized force requires two million gallons per day. Relying in recent decades on contractors delivering fuel to forward operating bases, it cannot be assumed that contracted distribution will reach the tactical edge in an environment dominated by persistent surveillance and long-range fires.

Production at the point of need improves readiness and reduces the demand for long lines of communication. Advanced manufacturing closer to the point of need provides exponential advantages in speed and proximity. Advanced manufacturing capabilities exist in the commercial market. The ingenuity of Ukrainians has already demonstrated that additive manufacturing can produce parts that are good enough to meet operational requirements. However, current policies and proprietary restrictions create hurdles for the use of these technologies to sustain U.S. forces.

Regeneration of combat power requires distributed maintenance activities in theater with higher-level capabilities. The efficiency of the current sustainment model is not sufficient for large-scale combat operations. Russia has prioritized building maintenance, repair, and overhaul capability sites to get combat platforms rapidly back into the fight. Maintaining the advantage in prolonged endurance requires capabilities and authorities for combat regeneration, including advanced/additive manufacturing of parts in theater.

Collective sustainment enables collective defense. The U.S. has not fought a major war alone since 1898. When considering reinforcement and sustainment, the Army must find collective solutions and reduce friction. That includes collective investment in infrastructure, training, and efforts to streamline the cross-border mobility process. Whether in Europe, the Pacific, or elsewhere, building partner capacity and improving interoperability will make us stronger together.

Interoperability, integration, and interchangeability of sustainment capabilities improve unity of effort and prolonged endurance in a future conflict. The Army must train alongside its allies and partners as it pursues modernization. Our strength is multiplied when we combine effects to address common challenges, share costs, and widen the circle of cooperation. Interoperability enables forces, units, and/or systems to operate together, allowing them to communicate and share common doctrine and procedures, along with each other's infrastructure and bases. While interoperability can be trained, integration requires the ability to seamlessly sustain forces, regardless of nation, enabled by interchangeability.

Conclusion: Campaigning to Transform Theater Sustainment

As transformational change is sought to win in contested logistics environments against strategic rivals, theater sustainment requires deliberate operations, investments, and experimentation:

- Russia and China's anti-access/area-denial strategy requires contested power projection across all domains, from points of origin to the tactical edge. Our adversaries' theory of victory relies on delaying our military response to achieve their strategic objectives.
- The contested logistics environment requires an adaptive sustainment network, which leverages AI to adapt faster than the enemy attacks, a networked sustainment model, and multimodal and unmanned transportation capabilities to sustain the force.
- Victory depends on secure prolonged endurance. All wars become wars of attrition, eventually. The side that creates multiple dilemmas for its adversary, sustains the massing of operational effects at critical points over time, and regenerates combat power faster will win.
- Collective defense requires collective sustainment. Allies are the U.S.'s greatest strength. While we face active threats from adversaries opposed to the rules-based international order, we are stronger together.

Finally, some of the least discussed lessons being learned today are from the sustainment operations the Army does every day to transport, integrate, and repair equipment donated by the U.S. and its allies to Ukraine. The Army has an opportunity to leverage these contingency operations through a campaign mindset to transform how the Army sustains theater operations in conflict.

The innovations the Army fails to make today will be the adaptations it is forced to make under fire tomorrow, and the price will be paid in lives lost. Russia is adapting; China is innovating; Iran is learning; and the technological evolutions seen today will reshape the future of conflict. The scale and complexity of war are changing rapidly. Is the Army transforming sustainment doctrine, infrastructure, equipment, and training fast enough to win the next fight, wherever it occurs?

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Maj. Christopher G. Ingram is an Army strategist, currently serving in the Commander's Initiative Group of 21st Theater Sustainment Command in Germany. He previously served as deputy chief of plans and operations at the National Training Center Operations Group, California, and as the speechwriter to the commander of Combined Joint Task Force Operation Inherent Resolve. As an infantry officer, he served in South Korea, Iraq, and Afghanistan. He holds a master's degree in international affairs from American University, Washington, D.C., and serves on the board of the Military Writers Guild.

Feature Photo
A French soldier assigned to the 92e regiment d'infanterie engages an enemy drone during Saber Junction 23 at the Joint Multinational Readiness Center at the Hohenfels Training Area, Germany, Sept. 10, 2023. (Photo by Sgt. Christian Aquino)

Changing Military Mentality Vital to Modernization

By Adriane Elliot

As the Army comes out of prolonged conflicts in the Middle East and focuses its attention on Russia and the pacing threat of China, Army leadership is working overtime on modernization plans to ensure it cannot be outranged or outpaced by its adversaries.

Whether the threats come from cyberspace or traditional battlefields like Ukraine, the Army is pursuing its most significant modernization effort in generations. But as the Army modernizes, it must also help its allies and partners modernize to maintain the vital interoperability and operational effectiveness that will prove decisive on tomorrow's battlefields.

Part of that partner modernization assistance includes helping allies refine operational concepts, not just tactical practices.

The U.S. Army Security Assistance Command (USASAC)—headquartered at Redstone Arsenal, Alabama, with personnel spread across the globe—has incorporated this modernization support into its vast arsenal of security assistance aid.

But as the Army modernizes, it must also help its allies and partners modernize to maintain the vital interoperability and operational effectiveness that will prove decisive on tomorrow's battlefields.

USASAC's Security Assistance Training Management Organization (SATMO) supplied Ukraine with a Doctrine Education Advisory Group (DEAG), which was headquartered in Kyiv from 2016 until three weeks before Russia's invasion in February 2022. SATMO provides advanced and specialized training, professional military education, and tactical-level expertise to allies and partners worldwide.

The DEAG was activated to support the Armed Forces of Ukraine, which had been deeply entrenched in post-Soviet mindsets and processes, to become a force capable of NATO integration. It consisted of highly skilled U.S. Army officers, numbering between four and six Soldiers at a time, who advised at the operational level to revamp doctrine and professional military education.

"There was minimal teaching in the traditional sense of standing in front of a classroom," explained Lt. Col. Rob Nesbit, former detachment commander for the DEAG. "The reality is that there is far more advising of senior Ukrainian leaders which, in an abstract way, is teaching. Having said that, what we modeled to the Ukrainians is effective long- and mid-range planning and professionalism."

If that sounds simple, Nesbit said it's not. And he should know. Leading the DEAG until weeks before the invasion and continuing to consult at the start of the war, Nesbit has spent the majority of his life as an active-duty Army officer (37 years and counting) with multiple combat deployments. He is currently the deputy of G-33 Current Operations for the Army's XVIII Airborne Corps at Fort Liberty, North Carolina.

"Creating a climate for organizational change, altering the way a group has been thinking for generations, is a much bigger feat than teaching someone to follow orders or execute a task," he said.

It's a complete cultural shift, notoriously difficult even in the best of circumstances, and even more so considering the rigid, top-down style of leadership that was a remnant of Ukraine's Soviet roots. This is in sharp contrast to the U.S. military's mission command doctrine, which delegates decision-making to subordinates wherever possible, minimizing detailed control, and empowering lower-level initiative.

Despite the challenges, Nesbit began to witness a hopeful shift as senior Ukrainian officers, recognizing the value of standardized planning, began using long-range forecasting and preparation that are a hallmark of successful organizations.

The DEAG mission supported the Armed Forces of Ukraine: the National Guard, the National Defense University, and to a lesser extent the Air Assault and Airborne Forces and the Ukrainian Marine Corps. The mission was a crucial test of what the future holds for a strong, independent Ukraine and regional stability throughout Europe.

"Within the realm of great power competition, the DEAG was really a component of U.S. and NATO efforts to counter Russian influence, not just in Ukraine but throughout Europe," said Nesbit. "The importance of the mission rested in its ability to set conditions that enable the Ukrainian military to serve alongside Euro-Atlantic partners in the future."

Col. Dan Miller, former chief of the Office of Defense Cooperation at the U.S. Embassy in Kyiv, described the DEAG's work as leading edge, most notably its "development of new, NATO-interoperable doctrine and reforms to the professional military education system. This represents vital first steps to creating the sustainable and irreversible change needed for Ukraine to progress on its desired path to NATO membership."

No one knows how the story will end, but the beginning is clear. The world watched in awe as a much smaller, lesser-equipped Ukrainian military used extraordinary resolve and overwhelming allied support to defy the odds against Russia.

"We won't know the full impact of the DEAG and other international support," said SATMO's Ukraine Foreign Assistance Specialist Pat Macri, "but we're confident that it aided our partner and will continue, long after this war has ended, to provide tremendous benefit."

For more information on USASAC and how its security assistance missions support U.S. foreign policy, visit *www.army.mil/usasac*, or to learn more about SATMO, *visit www.army.mil/satmo*.

Adriane Elliot has served as a journalist, editor, and public affairs specialist for the Army for more than 26 years, both on and off active duty in the U.S., Europe, Asia, and the Middle East. Before beginning her military public affairs career, she served as a freelance reporter and columnist for the New Bern Sun Journal in New Bern, North Carolina. She served as the director of public affairs for the Army Area Support Group-Afghanistan during a yearlong deployment in support of Operation Freedom's Sentinel and the ongoing NATO-led Resolute Support Mission. She is the recipient of multiple military and national civilian journalism competition awards.

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