Telemetry

The evolution of distribution through innovative modernization

by Mr. James Esteem

In major military conflicts, logistics matters are often crucial in deciding the overall outcome of wars. An understanding of logistics was key to the battlefield successes enjoyed by great leaders and militaries such as Alexander the Great, Emperor Napoleon Bonaparte, and the United States during World War II. During Operation DESERT STORM, U.S. forces successfully overcame the challenge of providing supplies to a point in a geographically remote region with no preexisting agreements or infrastructure. In contrast, as recently illustrated by Russian forces in their conflict with Ukraine, an inability to provide continuous sustainment from strategic providers to forward elements will result in operational failure.

The core logistics functions are deployment and distribution, supply, maintenance, logistics services, operational contract support, engineering, and joint health services. The *Joint Publication 1-02* defines distribution as "the operational process of synchronizing all elements of the logistic system to deliver the 'right things' to the 'right place' at the 'right time' to support the geographic combatant commander." Today's global threats, accompanied by the need to plan and execute the movement of forces for deployment, redeployment, sustainment, and retrograde in support of global operations, make the distribution capability an essential logistics element.

Distribution management requires the ability to track, trace, influence, and execute the movement of materiel as it transits the Defense Transportation Systems at the strategic, operational, and tactical levels, including expeditionary, disaggregated, and distributed maritime operations. *Joint Publication 3-35* defines asset visibility as "the ability to determine the location, movement, status, and identity of units, personnel, equipment, and supplies. It facilitates the capability to act upon information to improve the overall performance of DOD logistics practices." Gone are the days of green logbooks, yellow legal pads, and Microsoft Excel spreadsheets to track the location and existence of materiel as it moves through the Defense Transportation System. We now have systems such as the Automated Manifest System Tactical, Integrated Development Environment/Global Transportation Network Convergence, and the National Radio Frequency-In

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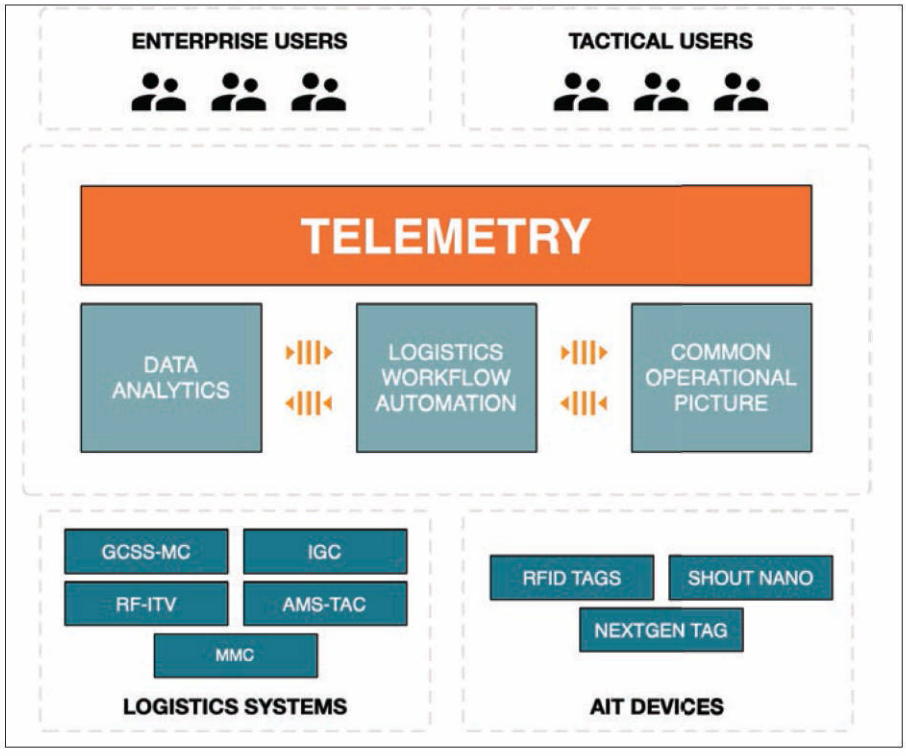
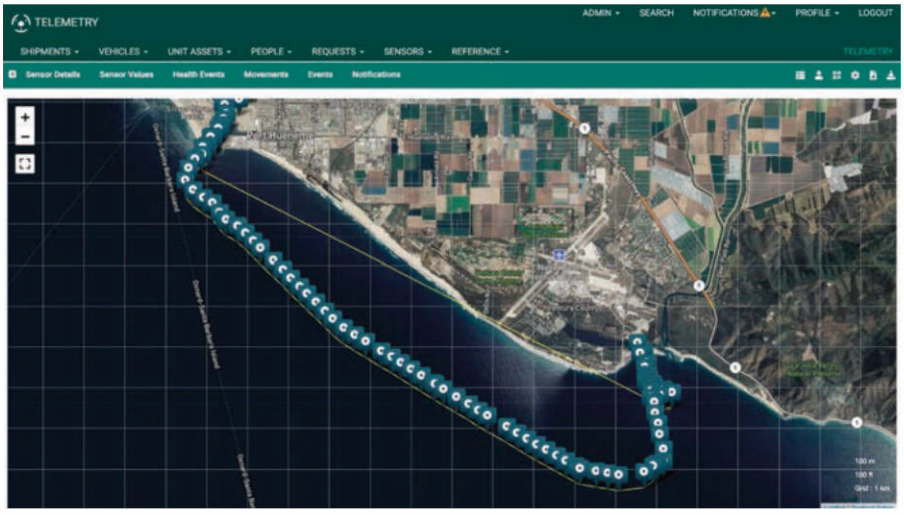


Telemetry leverages multiple authoritative data sources providing users with a holistic decision support tool that enriches data to provide a more robust decision-making capability. *(Image provided by author.)*

Transit Visibility Infrastructure that provides asset visibility and the last known location while in transit. While these tools and infrastructure deliver a degree of asset visibility, this environment is constantly evolving.

Military commanders require the ability to track and know the status of equipment, whether in transit, in storage, in process, or in theater. The commander also requires the use of decision-support tools (DST) that provide the ability to be proactive rather than retroactive. As a Service, we must evolve and adapt to those external variables by implementing new processes and technologies that prepare us for the peer-adversary threat. Through data aggregation and improved processes, enhanced asset visibility will produce more effective distribution operations and increased customer satisfaction. Telemetry, an existing government-off-the-shelf application developed in support of the Small Business Innovation Research program, is a tool currently in the developer portal to meet the commander's asset visibility requirement. The application has surpassed our existing distribution systems by providing end-to-end visibility of Marine Corps logistics activities. Augmenting data from current Authoritative Data Sources such as Global Combat Support System-Marine Corps and Integrated Development Environment/Global Transportation Network Convergence with environmental insights delivers a complete DST accessing near realtime information. Telemetry will support collaboration across commands by developing advanced predictive analytics to provide Marines with near realtime insight into the supply chain.

The capabilities Telemetry provides, but are not limited to, include in-transit visibility, total asset visibility, and end-to-end visibility of Marine Corps Logistics activities by automating the data collection process while improving data quality. Over the years, providing Marines with the information they need when they need it has been a challenge. Focusing on the issues that come along with working in austere environments, Telemetry's design allows it to operate in a "low or no" bandwidth environment and minimizes data transmission when used over a tactical network.

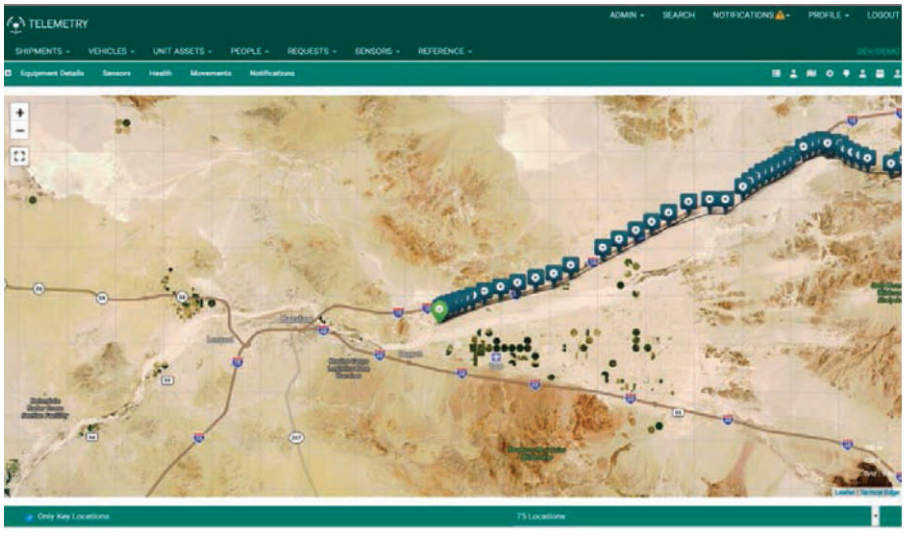


By deploying satellite and cellular-based trackers, Marines were able to track assets anticipate the arrival of the Maritime Prepositioning Force ship as it transitioned from one beach to another. *(Image provided by author.)*

The recent completion of Telemetry Small Business Innovation Research Phase II, also known as the "Prototype" phase, focused on Authority to Operate requirements and ongoing pilot programs. The Office of Naval Research initially introduced Telemetry to Marines in support of multiple government-sponsored events ranging from 2017–2020.

A few events were Marine Corps Warfighting Lab-sponsored exercises, including AGILE BLOODHOUND, INTEGRATED TRAINING EXERCISE 3, TRIDENT JUNCTURE, and PACIFIC BLITZ. After the conclusion of each event, Telemetry added enhancements with new capabilities and features to fit the warfighter's needs. INTEGRATED TRAINING EXERCISE 3 produced the requirement for convoy staging and planning. This capability was tested successfully during TRIDENT JUNCTURE, along with tracking 80 shipments, 44 vehicles, and 108 passengers.

PACIFIC BLITZ allowed for the usage of a distribution DST during a Maritime Prepositioning Force exercise. The Telemetry team engaged with the



Rail movement tracking proved to be of great value in a device-agnostic application, allowing flexibility in the automatic identification technology selection. *(Image provided by author.)*

Maritime Prepositioning Force offload team, reviewing process flow and location management for movement, processing, and equipment distribution while also deploying satellite and cellular-based trackers throughout multiple scenarios. The Marines were able to track rolling stock from the point of embarkation to the point of debarkation using container-mounted trackers. They were also able to track and anticipate the arrival of the Maritime Prepositioning Force ship as it transitioned from one beach to another. There were also two pilot programs sponsored by Headquarters Marine Corps Installation & Logistics, Distribution Policy Branch with participation from I MEF. The MAGTF Materiel Distribution Center Marines utilized Telemetry to track shipments of high-value assets moving by rail while providing a chain of custody for shipments marked for delivery to Camp Pendleton and Marine Corps Logistics Command. Rail movement tracking proved to be of great value in a device-agnostic application, allowing flexibility in the Automatic Identification Technology selection. Telemetry's device-agnostic architecture enables the mission to dictate the required tracking device rather than restricting the capability to a small set of predefined devices. The significance of this capability addresses a common concern from many organizations on the modernization journey: how to employ technology available today while planning for emerging technologies. While mesmerized by the lure of new technology, organizations racing full speed toward modernization can quickly lose sight of their validated requirements. Focusing on requirements and processes should be the primary factor in technology selection.

Technology can be enticing but staying focused during our pursuit of modernization will ensure a solution that meets the warfighter's needs. A simple example would be if your organization was required to move a one-megabyte file for an upcoming operation. Still, you purchased an expensive mobile hotspot with data speeds of one gigabyte per second rather than a less costly twenty-megabyte-per-second device. This decision was prodigal and far from the focus of the requirement. Acquisition outside of the Marine Corps is only sometimes required. Currently, the Marine Corps utilizes numerous authorized technologies for various employments and functionality.

Telemetry supports the technologies currently in use within the Marine Corps while accounting for emerging technologies. The current Small Business Innovation Research Phase III contract will migrate Telemetry to the Marine Corps Enterprise Network and the DOD cloud environment supporting the Marine Corps' software modernization effort. The application is prepared to receive data feeds from automation devices such as handheld terminals, radio frequency identification tags, sensors, and Internet of Things technologies scheduled for incorporation into Marine Corps logistics functions. The flexibility to integrate and receive data, whether from software or hardware, requires adequate vetting to ensure that it meets security requirements. Telemetry's developer knows the security and integrity of data within the supply chain are paramount, and the system protects and validates this information at all points of integration and distribution. The data transfer gains encryption by establishing a secure connection to the server. The application provides audit logging and access management, ensuring data protection from adversaries at rest or on the move.

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Logistically, the ability to collect, transport, analyze, make well-informed decisions, and act on data while maintaining cybersecurity allows distribution management to influence and execute the movement of equipment as it transits the Defense Transportation systems at the strategic, operational, and tactical levels. Strategic distribution encompasses everything involved, from the time of requisition to the supply source. Operational-level distribution and logistics pair strategic resources with tactical units and enable force closure, sustainment, reconstitution, and redeployment of forces. There is a significant requirement to monitor, influence, and execute cargo movement at the tactical level within the theater. Theater distribution enables the movement of supplies and personnel from the initial points of debarkation to the initial theater distribution nodes to the point of need. Distribution at the tactical level drives Telemetry's requirement to work in contested environments. Commanders and staff at all three levels not only need to view and follow equipment from factory to foxhole but also need notification of anticipated issues as early as possible to facilitate proactive interaction and management by exception. This information is accessible in Telemetry across the entire supply chain, enhancing decision-making abilities and providing enhanced support for deployed units in operational environments.

Logistics influences our Nation's economy. Military operations are both expansive and expensive, affecting the economic impact of military operations. Innovation occurs when one questions current practices. With budgets constantly tightening, we must ask ourselves how we can innovate, remain mission ready, and maintain global sustainability. Logistics costs are always on the rise and become affected by external factors. However, the Marine Corps can get ahead of these changes by innovating. Changes occur globally, affecting our ability to support our troops logistically. Concurrent with global change,

examination of current business models and processes allows refinement of current and future requirements. Many legacy systems used for distribution face suspension without planned replacements in the pipeline. As new systems undergo research and development, legacy systems face concerns regarding duplication and redundancy. Redundancy in a new system is a good thing despite the meaning. It provides a solid foundation to expand upon and is the key to evolving distribution through innovative thinking.

When an organization looks at the word "redundancy" from a financial perspective without a clear understanding of the business processes and the supporting technologies, the similarities describe innovation negatively. Imagine wanting a child and hoping that your child will have your best attributes and leave your less-desirable qualities behind. Many consider the retained features redundant, but they will develop additional attributes beneficial to their environment as the child grows. Our legacy distribution systems have significant capabilities that have worked for many years and will provide us with the foundation to improve our distribution process.

As the DOD propels modernization, the requirements and demands of legacy distribution systems will not provide the necessary capabilities to keep up with modern logistics operations. The initial push to move from "Silo" systems to cloud-housed "enterprise" systems enables interoperability amongst multiple units or organizations to support a common objective. Telemetry builds on the enterprise's capability to enhance force agility and information accuracy through data analytics and graphic displays of total asset Visibility on National Imagery and Mapping Agency products. The predictive analytics and increased information accuracy create a positive feedback loop to assist Marines within the distribution community in executing duties. Currently, Telemetry has holistic benefits for multiple stakeholders in the logistics community. The application uses a modern open-architecture methodology that allows the system to be software agnostic, pulling data from numerous authoritative sources. Telemetry also provides an array of data that has value based on the user's position or perspective. The immediate benefit is a dramatic reduction in the number of times a Marine must interact with multiple systems. Telemetry provides a common operating picture of several logistics activities.

How many automated information systems are required to make well-informed decisions? Multiple systems proven and streamlined over time play a vital role in logistics. These systems are not systems we should look to eliminate; alternatively, there is value in an interface. Telemetry leverages multiple authoritative data sources providing users with a holistic DST that enriches data to provide a more robust decision-making capability.

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With the influx of technology into the dispersed and distributed naval battlespace, the need to monitor assets through the distribution pipeline is more relevant than ever. The ability to use machine learning and predictive analytics provide commanders with the essential information they need when they need it. The time, human resources, and money saved by being proactive rather than reactive are invaluable to the Marine Corps' modernization effort. To many, modernization is a journey, not a destination. As we embark on the *Force Design 2030* journey and beyond, Marines should focus significantly on validated requirements and current business practices while not forgetting lessons learned from history.

Understanding where we came from will help us to evolve and adapt technologies and processes to prepare us for the new security environment. A continued understanding of logistics and supporting technology is key to battlefield successes of great leaders and militaries of the future. We must not use history as a blueprint or a roadmap but as the context of a situation or problem that helps accompany a nimble mind to make justified decisions.

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