UAS

Increase lethality through logistics

by Col Brian W. Mullery

The challenges of materiel management are a leading concern as we attempt to maximize the potential of combat forces across the globe. As such, the development and integration of unmanned aircraft systems (UAS) that deliver logistics, at home and abroad, enables the exponential modernization of distribution and sustainment while leveraging the full possibility of installations as a platform from where we equip, train, deploy, and recover the complete lethality of the MAGTF.

>Col Mullery is the Commanding Officer of Combat Logistics Regiment 27 with 38 years Marine Corps service as an enlisted Infantryman and a Logistics Officer.

The Marine Corps should develop this capability in simulation and refine it in training and day-to-day garrison activities with the aim of employing a mature system in a deployed combat environment. Private industry has taken the lead in research and development of drone technology to advance the next generation of delivery platforms to the consumer. Century old companies such as the United Parcel Service,[1] whose core competency is supply chain management, and its younger competitor, Federal Express,[2] the leader in realtime package tracking and electronic commerce, leverage drones to gain efficiencies, provide focused materiel management, and optimize support to their customers.

Currently, the Joint Logistics Enterprise (JLEnt) attempts to optimize global logistics providers, processes, and capabilities to allocate logistical resources according to the needs of the joint force commander or other supported organizations in an environment that includes an array of joint and coalition partners.[3] In concert with the JLEnt, we should focus our intellectual effort on developing a family of unmanned autonomous delivery systems that transport a variety of payloads. Once established, this capability can perform both rapid resupply and routine delivery. Integral to this effort must include the interoperability of Global Combat Support System Marine Corps (GCSS-MC) to tie in supply chain management and realtime tracking of requested items. Although GCSS-MC achieved full development in December 2015, modification to this program of record (POR) is ongoing and focused on "enhancing capabilities in the areas of warehousing, improved performance of GCSS-MC on shipboard and ashore tactical networks."[4] Of note, the Army uses GCSS–Army, but this POR does not interface with GCSS-MC. However, the POR used by the Navy is, Navy Enterprise Resource Planning,[5] which when fully developed will allow Navy and Marine Corps interoperability with the joint force. As these programs become fully interoperable, we will enable global logistics awareness and truly leverage the full potential of the JLEnt.

... UAS can be used to deliver any of the ten classes of supply.

The UAS can be used to deliver any of the ten classes of supply. However, I recommend initial efforts focus on Class IX repair parts, since every unit requires repair parts, and they range in size from very small, less than 5lbs, to large, between 100 and 1,000lbs. Once developed, expand materiel management and delivery to other classes of supply. The current method of repair part delivery has not appreciably changed for decades. Currently, a unit orders a repair part through GCSS-MC and that part is delivered to the MAGTF Materiel Distribution Company (MMDC), which is a consolidation point for shipments where both the supply management unit and commercial shipments are received and processed for delivery. Once received, customers either pick up an item or the MMDC distributes them during regular delivery runs. Typically, this requires two Marines in a large stake bed truck to inventory all the parts identified for delivery, after which they go door-to-door throughout base and give the requested parts to designated supply personnel at the receiving unit. This inefficient practice is a day-long affair but is necessary to make sure that the items delivered are given to authorized recipients by scanning their common access card. The transaction is complete once the using unit supply clerk inducts the D6T (item received transaction) in GCSS-MC after validating the correct item and quantity were delivered. Additionally, if an individual is not present to receive the delivery, the parts are not received, and attempted delivery will occur on their next scheduled trip, usually the next working day. This inefficient method repeats on every Marine Corps base and DOD installation throughout the globe.

While singular adjustments to this process would increase efficiency, introducing a bold change that includes autonomous delivery that tracks status change in GCSS-MC and notifies the requesting unit—down to the service

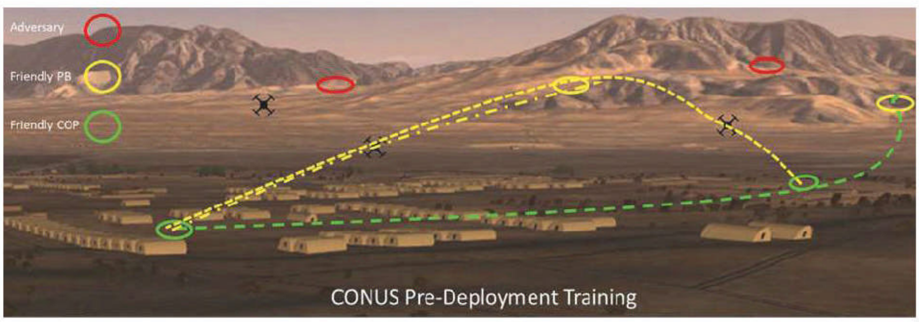
An example of potential UAS delivery tracks from the SMU to using units at French Creek, Hadnot Point, and the Industrial Area aboard Camp Lejeune. **(Photo: Image created by author.)**

technician—exponentially improves accountability, responsiveness, supply chain management, and sustainment across the force. A workable solution requires investment in both hardware and software. The result must be a blend of autonomous delivery systems, surface distribution, and unit pick up, all of which includes receiving stations with interrogators that record transaction confirmation in GCSS-MC. Doing so produces agile delivery solutions from the MMDC to the requesting unit while providing realtime updates to records by confirming receipt and sending an alert the service technician that the parts they require are available for application to the broken equipment. The types of autonomous delivery systems should vary to include light, medium, and heavy payloads. An analysis of satisfied Class IX demands identified ~80 percent weigh less than 5lbs and only ~14 percent are over 20lbs.[6] As the autonomous delivery systems come online, machine learning could use statistical techniques and computer algorithms to study the data collected and develop optimal delivery routes accounting for time of day, obstacles, airspace de-confliction, and weather.[7]

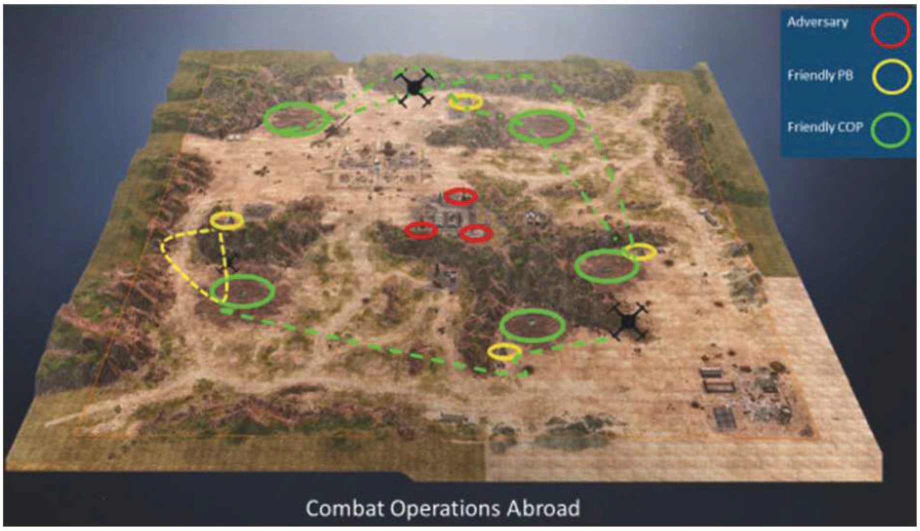
The benefits employing autonomous delivery systems includes diversifying our distribution system while reducing ground convoys required to deliver essential logistical support. Minimizing these patrols lessen the vulnerability of Marines and Sailors to the threat of improvised explosive devices and other enemy threats. Additionally, an unmanned system reduces vulnerability to aircrew and manned aircraft. This was demonstrated through the use of the joint precision airdrop system in Afghanistan, which permits high-altitude air delivery over difficult terrain to limit exposure to aircraft and crew while delivering essential supplies.[8] Finally, with a decrease of logistical support convoys or manned aircraft, the quick response force responsibilities of the battlespace owner also reduces. When matured, this capability prepares us for the security environment of the future as a strong, agile, and resilient force, espousing interoperability, enhancing lethality, and promoting survivability.

In the *38th Commandant's Planning Guidance*, Gen Berger provides his strategic direction for the Marine Corps during his tenure.[9] In his guidance, the Commandant reminds us that to achieve his strategic vision we will need to both invest and divest. By investing in autonomous delivery system, we could divest in legacy systems that we currently maintain because there are no other alternative delivery platforms. Additionally, the cost savings realized could be dedicated toward the Commandant's identified priorities for investment and future force development. The integrated development of autonomous delivery systems with nascent capabilities like the Mobile Air Defense Integrated System is essential to find friend and foe in a contested, distributed environment and will ensure the unmolested delivery of supplies to the end-user. Moreover, by spreadloading payloads, the value of a single payload that falls in the hands of the enemy is greatly diminished. Conversely, a coordinated attack on a convoy or manned air delivery system could result in friendly loss of life, a high pay-off of supplies and propaganda that promotes the adversary's agenda.

The counter argument to this proposal may be: why invest in a capability that does not deliver ordnance and have an immediate kinetic effect on the enemy or enhances our lethality? The amount of time, energy, and resources applied to this effort would be more efficiently focused on the adversary through investment in assault aircraft, weapons platforms, and equipment focused on the ground fight. Although there is value in this argument, I argue that a fully invested effort to field a family of UAS capable of delivering classes of supplies while communicating



An example of employing UAS in a training environment depicting both friendly and adversary locations. **(Photo: Image created by author.)**



An example of employing UAS in a deployed overseas environment depicting both friendly and adversary locations. *(Photo: Image created by author.)*

with GCSS-MC and ultimately the JLE modernizes our installations for optimal efficiency, enable global logistics awareness, allows us to diversify our distribution network, and will improve overall sustainment at home and abroad. Further, by reducing the demand for manned vehicles to provide logistical support, we can commit those assets toward the adversary, create friction inside their decision-making cycle, and exploit their vulnerabilities.

The path we negotiate to evolve from idea to operational is daunting, but if we never start, we will never get there. I offer we start by building a synthetic computer simulated environment that replicates main-side Camp Lejeune and Camp Pendleton. Map out the supply management unit and unit delivery points, distances, obstacles, and environmental conditions, concurrently develop required changes to GCSS-MC to enhance accountability, responsiveness, and supply chain management. Use the Naval Postgraduate School Naval Research Program and their graduate program research project as a way to refine this proposal in simulation.[10] The outcome of this research project will offer an estimated return on investment and serve as the model for cost, benefit, and risk analysis by modeling the delivery routes, times, and manpower savings that may justify forthcoming investments and directly support future force requirements. Once refined in simulation, build a closed environment practical application exercise to improve software and hardware interoperability. The next step would be to run real test tracks and develop a safe, reliable, and repeatable delivery and accountability system. Throughout this process, use machine learning to refine and optimize efficiency. Eventually, this capability could be deployed and employed in a tough training field environment that replicates the distances and challenges expected during future deployments. Refining this data in training would allow the deployed unit to use this capability on day one instead of as a reactive response to an adversary on the battlefield. This approach allows us to optimize our installations essential role in supporting the FMF with modern and responsive training and sustainment platforms that allow us to train, fight, and win in any clime and place.

Although we must develop innovative ideas in priority, we also need to balance innovation, collaborate with private industry, and leverage their successes to adapt, refine, and implement these systems in a combat environment that will maximize training, meet optimal equipment readiness, and ultimately deliver more lethal effects that out-cycle the enemy's ability to successfully respond and survive. Finally, integrating UAS and GCSS-MC will measurably improve efficiency and advance technology both at home and on the battlefield while reducing vulnerability to our most precious commodity: Marines and Sailors.

Notes

1. Information available at https://www.ups.com.

2. Information available at https://www.fedex.com.

3. Office of the Joint Chiefs of Staff, *Joint Publication 4-0, Joint Logistics*, (Washington, DC: February 2019).

4. Information for Global Combat Support System Marine Corps is available at https://www.candp.marines.mil.

5. Information for Navy ERP Enterprise Resource Planning Program is available at https://www.secnav.navy.mil.

6. Data provided by 2D Supply Battalion, MMDC on 4 Nov 2020.

7. Machine Learning: The process by which a computer is able to improve its own performance (as in analyzing image files) by continuously incorporating new data into an existing statistical model. *Merriam Webster*, s.v. "Machine Learning," available at http://www.merriam-webster.com.

8. Office of the Joint Chiefs of Staff, *Joint Publication 3-17, Air Mobility Operations*, (Washington, DC: February 2019); and David Salanitri and Airman Patrick McKenn, "Soldiers in Afghanistan Receive GPS-Guided Airdrop from Mobility Airmen," *Air Mobility Command*, (December 2011), available at https://www.amc.af.mil.

9. Gen David H. Berger, *38th Commandant's Planning Guidance*, (Washington, DC: July 2019).

10. Information for Naval Research Program is available at https://nps.edu.

US MC