

The Future of Marine Corps Logistics

We must take advantage of technological innovations

by LTC Barbara Haines, USA(Ret) & LtCol James A. Jones, USMC(Ret)

In *Ghost Fleet*, authors P.W. Singer and August Cole lay out a plausible, frightening, and pitch-perfect vision of what a future global war involving a near-peer competitor in a contested environment could look like.¹ The United States, China, and Russia confront each other on multiple domains, including space, land, sea, air, and cyber, using both manned and unmanned systems. If this is how the experts envision the future force fighting, how would we, as logisticians, support this force in such operations?

To extend the operational reach of the MAGTF in 2025 and beyond, logisticians across all elements must take advantage of the technological innovations we are developing today, including embedded maintenance and capacity sensors; unmanned air, ground, and surface logistics systems; industrial improvements to packaging; and enhanced battery technologies. To make this happen, we must truly partner with industry and streamline our acquisition processes.

The *Marine Corps Vision and Strategy 2025* states that “expeditionary” is an institutional and individual mindset, not simply the ability to deploy overseas.² To reach this, the Marine Corps of the future must focus on increased tempo, being increasingly lean, and maintaining combat effectiveness in austere and degraded conditions. Accomplishing this requires the Marine Corps to agilely respond to and anticipate changing situations on the ground. Our history of amphibious warfare and vertical envelopment has taught us that, by embracing new technologies and concepts, we will create new and effective means of warfare. This article describes that future, focusing specifi-

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A J-TRAV during a training exercise carries an attached IV-solution. The J-TRAV can provide immediate support to operational units. (Photo by Sgt Salvador R. Moreno.)

cally on the art and science of logistics in a future expeditionary environment.

Today’s Marines, operating at the tactical edge of the spear, carry between 97 and 135 pounds of equipment and supplies when heading out on patrol.³ Despite efforts to lighten the load, Marines must carry three to seven days’

worth of rations, water, batteries, and ammunition, let alone the necessary equipment for the duration of the mission, because terrain and weather often prevent reliable resupply.

Today’s tactical vehicles, in addition to their growing weight and size, consume an enormous amount of fuel,

requiring a large logistics tail. The M1 Abrams tank gets about .6 miles per gallon, which means that it needs approximately 300 gallons of fuel every 8 hours. Additionally, maintainers and supply officers must predict what parts the MAGTF will require while deployed and carry them as part of the organization's sustainment block, tying up approximately 2,000 items of supply that are worth millions of dollars and critical embarkation space.

In the future, we will effectively eliminate the requirement for Marines to carry more than the recommended 50-pound assault load by leveraging emerging technology. Spare batteries will become obsolete as Marines will use a suite of sustainable energy technology, such as solar or kinetic power generators. Marines will autonomously communicate their location, allowing logisticians to send support or sustainment without requiring that they wait for the convoy or return to a basecamp. A family of unmanned logistics ground, air, and surface systems will be trusted to deliver all classes of supply on-demand and on-time. Unlike current manned systems, unmanned systems will operate in all environmental and threat conditions. Equipment and supplies will speak to each other through a mesh of location sensors, allowing Marines to maintain 100-percent visibility of supplies from the garrison warehouse to the



Battery technology is just one of several technological advances that is being pursued during equipment testing/experimentation. (Photo by Sgt Kailyn Klein.)

predicted equipment failures while also alerting suppliers to direct and provide directions for resupplies of fuel, water, ammunition, and rations.

Though not optimized, today's defense supply chain remains one of the most effective in the world. We routinely move critical parts from warehouses in the United States to a forward location within 12 to 14 days. At the operational level, however, today's logistics still represent the "iron mountains" of World War

tional, and strategic levels, allowing commanders at each level to have an accurate picture of the situation at all times. These systems will also enable a reduced ashore footprint of sustainers necessary to support the Marines engaged in the fight. Artificial intelligence, behind the "screen," will manage and optimize this complex web of requests, deliveries, and routes.

In the future, our Marines will no longer wait for a supply chain to bring critical parts to them. Additive and other digital manufacturing equipment (i.e., 3D printing) operated by sustainers aboard vessels supporting the MAGTF will support the MAGTF by producing mission-critical parts and tools from durable plastic polymers and various metals within hours of receiving a requirement, often via a sensor alert before the equipment fails. Parts and tools that cannot be manufactured by the MAGTF using additive manufacturing will be automatically requested by artificial intelligence and express shipped via autonomous air-to-surface drones from the afloat or ashore forward support base within 24 hours. This capability will ensure that our Marines and Sailors have what they need at the right place, at the right time, and in the right quantity to accomplish their mission, whether that mission is to strike with

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afloat block of sustainment. By outfitting our Marines and their equipment with self-reporting beacons and sensors capable of providing us an accurate and constant picture of the fight, the Marine Corps will improve the lethality and readiness of the MAGTF.

Technology, including sensors on equipment, will alert maintainers to

II, Vietnam, and DESERT STORM. In the future, Marines will use location-enabled devices to request support without waiting to return to base. The data produced by the sensors on Marines and their equipment will feed a cloud-based routing system that will provide critical information to "apps" and devices held at the tactical, opera-

deadly force or provide humanitarian assistance.

In the future, artificial intelligence in service aboard ships will predict maintenance on logistics equipment, such as the unmanned/autonomous resupply vehicles and landing craft. Artificial intelligence will also digitally assemble prepackaged loads and special requests, which will then be physically assembled by Marines teamed with advanced robotics. These special requests may include either inclement weather gear based on predicted weather conditions or even emergency medical supplies based upon the health status sensors of an individual Marine. The artificial intelligence will recommend the correct optimal packaging solution based upon the type and capacity of the unmanned logistics system as well as the expected humidity and temperature. Some of these packaging solutions will be recycled on-site to become feedstock for 3D printed components or other packaging forms. This feedstock will also be recycled from the hundreds of polymer pallets and containers used to bring equipment into theater. The routine inter-theater resupply ships will be manned by artificial intelligence, thus allowing them to travel in extreme conditions without concern for human passengers.

In the future, we will minimize the need to transport fuel and potable drinking water into theaters of operation by using technology that can leverage the vast amount of seawater available at the littorals to produce potable water using reverse osmosis water purification/desalination technologies. The Marine Corps will leverage emerging technology to employ hybrid vehicles that use a combination of electricity and fossil fuels. Marines will use seawater and magnesium cells to create sustainable power plants that create electricity without the requirement for fossil fuels. That being said, our legacy systems will still require a reliable fuel source. In order to ensure sufficient fuel availability, the Marine Corps will outfit vehicle tankers with artificial intelligence. These tankers will use autonomous ship-to-shore connectors—the replacement for the Navy’s LCAC—for retail fuel delivery in order to move the fuel across the beaches and continue to the point of employment without human intervention so that Marines can focus on winning the battle and not worry about how they will receive logistics support.

As we saw in *Ghost Fleet*, we cannot focus on the kinetic war alone. As the Marine Corps incorporates innovative technology in order to enhance our warfighting capabilities, we also expose

ourselves to the risk of cyber-attacks. We must continue to invest in research and development in order to anticipate the potential actions of our enemies and design solutions before they occur.

By partnering with industry in order to incorporate the most recent technological innovations into Marine Corps doctrine and policy, the Marines will optimize tactical distribution, modernize the supply chain, and increase equipment readiness to ensure that we are ready to win our Nation’s wars. In the September 2016 publication of *Hybrid Logistics: A Blend of Old and New*, LtGen Michael G. Dana reminds us of what our 37th Commandant wrote in FRAGO 01/2016,

we must always be looking for, and exploiting, opportunities to both do what we do better, and do what we do differently. The latter requires adaptation which can only result from fresh thinking. It starts with visions like this one—and it begins and ends with active engagement and participation from you—our extremely talented MAGTF logisticians—and it extends to all MAGTF Marines.⁴

Notes

1. P.W. Singer and August Cole, *Ghost Fleet: A Novel of the Next World War*, (Boston, MA: Houghton Mifflin Harcourt, 2015).
2. Headquarters Marine Corps, *Marine Corps Vision and Strategy 2025*, (Washington, DC; 2008).
3. Naval Research Advisory Committee, “Lightening the Load,” (Washington, DC: September 2007).
4. LtGen Michael G. Dana, “Marine Corps Hybrid Logistics: A Blend of Old and New,” *Hybrid Logistics*, (Washington, DC: September 2016).



Advances in unmanned air and ground logistics support may replace some of the logistics support now provided through convoy operations. (Photo by LCpl Timothy Shoemaker.)