

The Age of Automation and Artificial Intelligence

The Marine Corps is unprepared
by Maj Karl Fisher

This article was written in response to my experience on a pilot retention OPT with LtCol Janine Garner (“USMC Pilot Retention,” *MCG*, Jan19). While the OPT was focused on the immediate concerns of pilot retention and talent management as described by LtCol Garner in her article, I kept thinking that there was a larger crisis staring us in the face. Namely, if we are struggling to produce and retain pilots now, how could we do it in a high-intensity conflict with significant combat losses? For my application to the School of Advanced Warfighting, I had to write a two-page white paper in response to the prompt “Is the Marine Corps prepared for a future conflict in a high-threat environment?” This is my answer.

The Marine Corps is not prepared for a future conflict in a high-threat environment since it has not fully grasped the implications of automation and artificial intelligence (AI). For the Marine Corps to prepare for armed conflict ten to fifteen years from now and exploit automated systems operating at machine speed, it must do more than fund and develop technology. The Marine Corps must embrace automation and AI by reprioritizing and recapitalizing manpower, changing the MAGTF and Supporting Establishment, and reducing the critical vulnerability of over investing in manpower that is too expensive to train and too costly to risk.

Automation should change the Marine Corps’ manpower model; there are upper limits on the Marine Corps’

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authorized end strength, automation can allow the Marine Corps to exceed the output of its allowable manpower and recapitalize its end strength toward higher priorities. Autonomous ground vehicles can reduce the Marine Corps’ manpower requirement for motor transport Marines, which in turn can be reallocated to other critical billets. While it may still take time for driverless vehicles to function in a tactical environment, the Marine Corps could begin to experiment with this technology in garrison environments now. Marines aboard Quantico are currently driving school buses to ferry workers from the train station to locations around base.



Use of automous ground vehicles can reduce manpower requirement and allow for Marines to serve in more critical billets. (Photo by Cpl Dalton Swanbeck.)

Replacing these drivers or planning to do so when the technology has matured, would be a low-risk way to free up manpower while gaining insights into future tactical unmanned ground vehicles. By using automated systems to conduct routine operations, the Marine Corps can shift its manpower to emerging fields or re-designate Marines to assignments where they will add the most value to tasks that machines cannot or should not perform.

The Marine Corps must remove institutional barriers that will hamper progress to fully leverage automated systems and AI. Currently, the MAGTF is based on three pillars of discrete knowledge, the ACE, LCE, and GCE, which have control over their respective warfighting functions or domains. Similarly, HQMC is divided into functional Deputy Commandants (e.g., aviation and logistics) and has an advocacy/proponency system for specific occupa-

into internecine turf wars that limit the advancement of technology.

Autonomy can also address the Marine Corps' "capital personnel" crisis—a problem with similar implications to the issues of capital ships in the Navy. While sophisticated platforms and weapons have made the Marine Corps more capable, it has placed a limit on how quickly Marines can be trained. Marines who require years of costly training to operate complex systems in a future war will become critical vulnerabilities, which are too valuable to risk and take too long to replace in the event that they are casualties. This capital personnel crisis can already be seen in the current fixed-wing training pipeline, which takes three years to create a winged aviator even under optimal circumstances. By comparison, in World War II the time to train a pilot was roughly 50 weeks. The Marine Corps is feeling the effects of this long

affects the individual; it does not directly enhance the learning of successive Marines who must also learn the same task for the first time. In a future warfighting environment, vast amounts of information will need to be collected, analyzed, and disseminated fleet wide. AI systems using machine learning can store the memory of events and these systems only have to "learn" a lesson once. This information can then be dispersed fleet-wide along with near instantaneous changes to tactics, techniques, and procedures. Replacement autonomous systems can quickly be fielded with the same or better "training" than the systems they have replaced. Unlike humans, autonomous systems do not need to repetitively practice tasks to remain proficient. This would drastically improve readiness by reducing maintenance and training requirements without sacrificing mission effectiveness—meaning more systems could be operationally ready for deployment at any given time, increasing the forward presence of the Marine Corps without a corresponding increase in cost.

In future wars, the United States may lack the advantages of mass, in both manpower and industrial capacity, it once had relative to adversaries. Its high-quality force, utilizing sophisticated weapons and platforms, is currently its greatest capability. However, this force could become its greatest liability if it cannot be rapidly reconstituted during a future war with high attrition. This will force the United States military, along with its competitors in the world, to explore autonomous systems and artificial intelligence. The country that understands and exploits this technology will be the victor in a future war. The Marine Corps can do more than merely anticipate the future character of war; by optimizing its manning and organizational structure, the Marine Corps can create a future where it can fight and win.



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tional specialties. Autonomous systems challenge these constructs since they can operate between these man-made lines in ways that make them difficult to categorize. In the future, an AI-enabled autonomous logistics delivery drone, equipped with sensors and onboard processing, could transmit targeting data directly to a weapons platform to engage a target. This autonomous system could execute the functions of an entire MAGTF without human interaction in the kill chain. There is not a simple category to fit multi-domain autonomous technology into in the Marine Corps' current construct. To remedy this problem, the Marine Corps must recognize the multi-domain role that future autonomous systems will operate in and create cross-functional organizations that can accommodate this changing dynamic. It must not allow parochial concerns of who "owns" a domain or warfighting function to turn

training cycle as it struggles to replace pilots who are leaving the Marine Corps faster than their replacements can be trained. If the Marine Corps cannot field adequate replacements in peacetime, it will be impossible to produce qualified combat replacements during a protracted fight against a future peer competitor while sustaining casualties. This makes human capital, and its slow production cycle, a critical vulnerability that must be addressed. The Marine Corps should use its pilot retention crisis as a galvanizing event to drive toward autonomous unmanned systems and obviate the need to replace its pilots in the future.

The industrial training system will also be altered by artificial intelligence enabled by machine learning. Computer processing speeds have already exceeded human ability to cognitively process information. Furthermore, the information that a Marine gains only