AI, Robotics, and Process Automation

Can emergent technologies change the way we look at Marine Corps logistics?

by MGySgt Jose J. Sanchez

Imagine you are currently forward deployed to support a military operation as part of a logistical unit. The Marines you are supporting need two critical components for an aircraft to ensure the plane remains operational. You receive the request and track it in the system as it has already been input due to predictive analytics and with the help of telemetry. Immediately, the system finds several of the parts in multiple locations within a ten-mile radius. The system then performs analytics reports to ensure the part will be taken from the section that indicates less usage per day of that particular part, thus not interfering with other operations. Once all of these actions are complete, a signal is sent to the part's location where a robot is deployed to retrieve the part and then hand it off to a Marine who packages it and prepares it for movement. Concurrent with all these steps, an autonomous drone takes off to retrieve the part and deliver it to its final destination.

The second part is identified by the system to be located in the Camp Lejeune Supply Management Unit. Immediately, a robot is deployed to retrieve the part and hand it over to a Marine. The Marine scans the item, and it provides choices for the various modes of transportation the item will require based on what it will endure on the way to its final destination. For example, the Marine knows this part will go from Camp Lejeune to Norfolk, VA, via truck and then be sent to a different destination by plane. Based on this information, the Marine performs only the necessary flexible packaging needed to account for

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the movement by truck and aircraft, thus avoiding unnecessary packaging while maximizing aircraft space and fuel consumption. The Marine is also able to print all required customs, hazardous materials documents, and marking requirements to avoid frustrated cargo while en route. Once the item has completed the first leg of the trip and upon review of the item's information, a Marine ascertains that the part will be now taking a short trip by water, where it will be picked up by a drone for transport to the final destination. The Marine understands that the packaging necessary to ensure the part is not damaged while being transported by water is different from the current packaging used to get it there by plane. Further, the Marine also understands that the drone transport will require subsequent packaging. The Marine
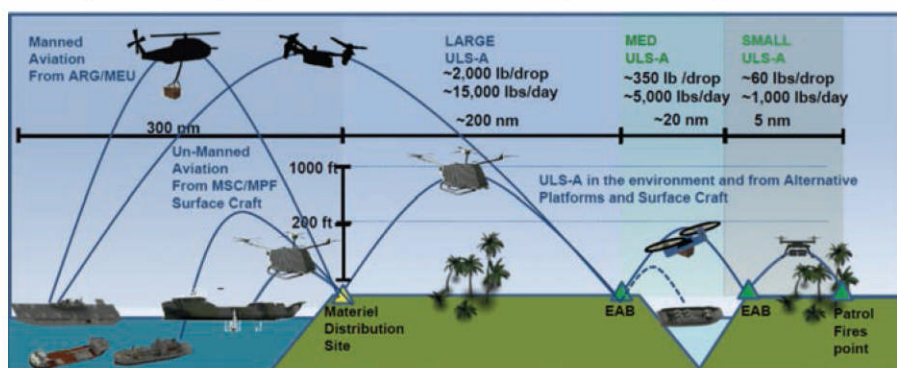
performs the implementation of the flexible packaging and sends the item by boat. Once it arrives at the short destination, another Marine removes the outer packaging, leaving only the packaging required for transport by the drone. The autonomous drone picks it up and delivers it to the destination. All this was initiated by a message sent by the part indicating a malfunction and Marines managing the systems to ensure the process ran smoothly.

"Our intelligence is what makes us human, and AI is an extension of that quality."
—Yann LeCun

Early Uses of AI

Artificial intelligence (AI) and robotics are not new concepts. In fact, these technologies have been part of our daily lives for the past two decades.

Autonomous drone employment in tactical logistics. (Photo provided by author.)

These technologies have been utilized as far back as the mid-1970s for military applications. Particularly for the logistics field, one of the first broadly used AI was during Operation DESERT STORM. The DOD, in collaboration with private industry, introduced the Dynamic Analysis and Replanning Tool (DART), an AI program designed to optimize the scheduling of supplies and personnel as well as manage logistics hurdles faced during the Gulf War. The U.S. Transportation Command implemented Dynamic Analysis and Replanning Tool, and after its launch, the Dynamic Analysis and Replanning Tool delivered positive results resulting in millions of dollars saved.

While machines/robots and AI have been part of our lives, we often do not acknowledge their widespread use because we imagine a robot to be something like in the movies, where they talk, think, and, in some cases, even take over the world. However, think of your kitchen. Most of us have dishwashers, microwaves, ovens, and refrigerators. These items are examples of early robots and facilitate and spare us from many laborious tasks while making them look easy and convenient. Another example is traffic lights, which measure and help manage the traffic conditions on our roads. Traffic lights can adjust depending on traffic, all while maintaining a level of safety for both pedestrians and drivers. So, if technologies such as these are part of our daily lives and have been for so many years, why are so many people—especially military members—still skeptical?

> *"Artificial intelligence is the future and the future is here."*
> *—Dave Waters*

What are Robotics, Robotics Process Automation, and AI?

Robotics is the study of robots, and robots are machines designed to do specific tasks or processes. These jobs can either be accomplished by the machine or with the help and interaction of a human.

Robotic Process Automation (RPA) is software robotics that uses automation to mimic back-office tasks of individuals, such as extracting data, filling in forms, and moving files. RPA can autonomously complete the execution of many jobs. Think of RPA as a software robot that lives in your computer doing the things you do not like doing.
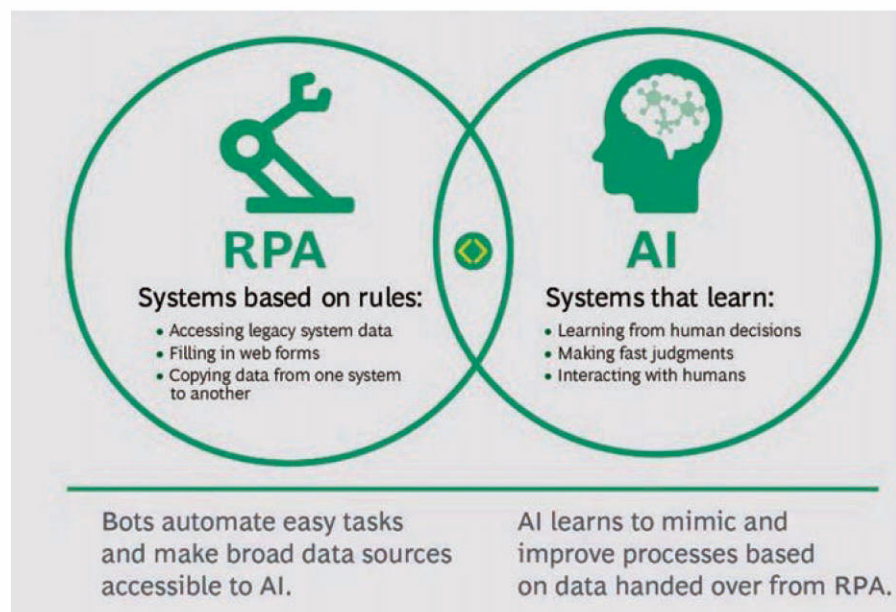
AI is a branch of computer science that can imitate human intelligence, but "human intelligence" is one of those footlocker words. The definition of intelligence can be debated, and the answer will most likely change. However, for this article, AI provides functions like reasoning, learning, problem-solving, and even quick decision making.

Can the Marine Corps Logistics MOSs Remain Competitive Against Our Future Enemies Without Maximizing Technology?

With all the hype surrounding AI, many industries claim to operate with AI technology by pointing to just about anything a computer can do. This includes traditional programs like a statistical database or even accounting. Unfortunately, many in our MOSs have the same misunderstanding of AI, robotics, and RPA, including the many benefits these technologies can bring to our current jobs. To that point, how can we implement something we do not quite understand? While we may not fully understand this technology and the full breadth of what it can do for and with us, we do already use robotics in the Marine Corps and the large warehouses. In the supply units, specifically the Supply Management Unit, they have a section called "carrousel." This section is an early implementation of robotics and helps the Marines operating it to find orders and bring supply items for distribution and processing. When the carrousel is fully operational, it brings plenty of advantages by eliminating human errors, improving accuracy while maintaining speed, and reducing time constraints. Other uses of robots are forklifts, pallet jacks, and car lifts. Why do we still have reservations when it comes to AI or robotics?

I argue the main reason Marines are skeptical is the deficient performance and reliability of poorly developed systems in the past, such as the Global Service Support System (GCSS) Marine Corps. I have been in the Marine Corps for over 21 years, and the problems identified when I was a young Marine in GCSS continue to be an issue today. GCSS has become one of those too-big-to-fail programs in which, unfortunately, some active-duty and many retired senior officers and enlisted

AI (machine learning) and robotic process augmentation. (Image provided by author.)

> **"GCSS's antiquated technology fails to maintain the pace with our near-peer competitors. It lacks the ingenuity required to meet future force objectives. Specifically, align Expeditionary Advanced Base Operations (EABO) with Marine Corps Logistics. In better words, the Corps does not have a logistics system equipped to support the future fight!"**
>
> **—MGySgt Jeff Gibson**

Marines continue to advocate on the program's behalf. This continued misplaced support of a failing system has caused many Marines to resist innovation without sound reasoning. Still, with all the technology available today, we in the logistics fields should not allow past experiences to dictate the approach we take moving forward.

> **"By far, the greatest danger of Artificial Intelligence is that people conclude too early that they understand it."**
>
> **—Eliezer Yudkowsky**

Can the Marine Corps Take Advantage of Current Technology and Change How We Do Logistics?

One of the challenges we face is the fallacy of believing process improvement and automation of a current process are the answer to our future challenges. To combat the future fight with near-peer adversaries, we need to re-engineer the way we do logistics completely. While words such as "hybrid" logistics can be encouraging and open the door for "new" ways to do business, they need to be banned from our minds as they now do more harm than good. Instead, we need to take advantage of technology fully and leverage our industrial base. We need to re-engineer our processes to match the capabilities of the technology vice having the

technology try to match our antiquated methods, which have not changed since World War II. Currently, two of our processes are *Just in Time, Logistics,* and *Hub and Spoke.* These methods were developed to provide cargo management while in theater (moving cargo in between several areas designed to increase transportation efficiencies and in transit visibility to reduce order ship time). They have proven to be effective in a passive semi-contested environment. However, it still has many issues, such as a fragile distribution process and an easily targeted logistics supply chain. Having a balance can be challenging; however, AI can help us navigate by cutting through our biases to look at things in a more pragmatic way and stay ahead of our near-peer adversaries. Our old processes, while still playing a vital role, should take a back seat and make room for our main effort: AI.

AI, robotics, and RPA can give us the flexibility to combine occupational fields and become more effective. For example, machines can now perform a big part of many logistic MOSs. I am not advocating for getting rid of MOSs; instead, I am advocating merging fields and filling the gaps with AI, robotics, and RPA. Let the machines do what the machines do best and let Marines

do what they do best. Let the aggregate of the two be more significant than each individual combined. As defined in business terms, let one plus one equal three or four!

> **"Building advanced AI is like launching a rocket. The first challenge is to maximize acceleration, but once it starts picking up speed, you also need to focus on steering."**
>
> **—Jaan Tallinn**

Is It Time to Start Thinking About the Differences Between How We Operate in Garrison And How We Will Operate While Deployed?

Many Marines would argue, what would happen when we deploy and do not have the convenience of technology? While the adage, *we train how we fight* is a genuine concept, many have misunderstood its roots. Technology is part of the new world, we should embrace it and master it. Perhaps allowing technology to help us navigate our daily tasks during times of peace could free our Marines to train for the inevitable fight in a contested environment where tech-

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nology is not available. Machines do not need rest, only maintenance. These machines can operate 24 hours a day, 7 days a week, which can reduce customer wait time tremendously and with minimum human interaction. We should get used to the idea of doing business one way when we are in garrison and train a different way for when we deploy. We must remember, the enemy has a vote, and

it is clear they are embracing AI at an aggressive rate. Our senior leaders need to be open-minded to the complexities of the informational world we live in. Simply discarding AI because they do not understand it is irresponsible. AI is here to stay, and it will continue to progress rapidly.

Artificial intelligence will reach human levels by around 2029. Follow that out further to, say, 2045, we will have multiplied the intelligence, the human biological machine intelligence of our civilization a billion-fold."

—Ray Kurzweil

Where Do We Go from Here?

As a Service, we need to shift the way we procure systems. Why do we have to purchase everything? Why not lease the technology and use the appropriate funds instead, and dispose of those systems as we please to leverage technology and its constant change? We need not be afraid to let AI be the catalyst of the logistical process. The Service needs to collect data from every widget possible in the form of streaming telemetry. Telemetry can be defined in a flexible and robust manner, in a way that is most convenient for the Service. For example, when requesting a part, we should know the date it was manufactured, when it was last used (if ever), have a functionality check to determine its viability, coordinates for easy location, etc. This information would facilitate the logistical process as well as allow for AI and RPA-enabled predictive analytics. Every widget should have an Internet Protocol Version 6 address, some form of wireless communication, intelligence to enable telemetric beacons, and access to a global network infrastructure to allow

"By exploiting the technical revolution in autonomy, advanced manufacturing, and artificial intelligence, the naval forces can create many new risk-worthy unmanned and minimally-manned platforms that can be employed in stand-in engagements to create tactical dilemmas that adversaries will confront when attacking our allies and forces forward."

—Gen David Berger, 38th Commandant of the Marine Corps

telemetry to be harvested, warehoused, and ultimately analytics performed on it. AI can also help us with the complexity of the linear process we currently have with the theater distribution and

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resupply of fuel and water or the forward air resupply point until we are not as dependent on fuel and have invested in electric or hydrogen. The implementation of this level of technology can allow service members to concentrate on agile logistics/distribution processes instead of focusing on mundane tasks

that can already be performed better by machines.

The example provided in the introduction is already happening in companies such as Amazon. While their mission is different, we can leverage their technology and take what works for the Service. AI can enhance military decision making in many areas, including strategic logistics. AI will certainly change the character of mobile logistics by offering those who embrace it a critical advantage. AI can provide a system in which data can move seamlessly between air, space, land, maritime, and cyber forces in realtime. In a logistical space in a contested environment, information is critical to the mission, we must consider the extent of interoperability of all systems, (Joint Logistics) to include our partners in the private industry, and any bandwidth constraints.

We have used AI and robotics to various degrees in the past and those endeavors have yielded excellent results as was the case in DESERT STORM. It is time to invest in our logistics fields by re-engineering the process from top to bottom with an eye toward leveraging the technology throughout to match and surpass our peers. The Marine Corps, as a Service, needs to take drastic steps to sunset systems that no longer work and some that may never work while making a substantive effort to maximize our human capital investments by educating our senior Marines, both officers and enlisted, to the many benefits AI can bring to the international supply-chain interdependencies we have created.

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