# The Benefits and Roadblocks of AI Adoption in the DoD

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When it comes to accessing and adopting new technologies, the U.S. Department of Defense (DoD) focuses on solutions that will increase warfighter survivability, improve lethality, and give military decision-makers a strategic advantage when identifying strategies that will result in mission success.

There are few technologies that have the potential to deliver all of those benefits as completely as Artificial Intelligence (AI).

As the military continues to generate mountains of data, they're increasingly looking to leverage that data to improve operations. AI has the potential to accomplish that – analyzing all of the data being generated in theater and delivering insights that can streamline processes and better prepare warfighters for the mission.

But is the DoD close to embracing AI in theater? What

benefits, specifically, are they looking to get from the technology? What use cases will it have? And what bottlenecks or challenges are keeping them from adopting AI more widely?

We recently sat down with Kirk Kern, the Chief Technology Officer (CTO) for the Americas at NetApp, to get answers to these and other questions.

**GovDataDownload (GDD):** What are some of the different ways in which the U.S. military is looking to leverage artificial intelligence and machine learning? What use cases are there for the technology within the DoD?

**Kirk Kern:** The DoD has come a long way from the establishment of JAIC in 2018. In that program, they attempted to use AI for predictive failure events to improve the maintenance of aircraft. They also used AI to analyze logistics and distribution use cases, all of which were not real-time processes. They also looked at leveraging AI for real-time interpretive analysis of natural earth events – disasters like fires and floods – to generate predictions of impacted locations so that response planning could be based on the events occurring on the ground. Over time, they gradually added new workloads to evaluate other capabilities.

**Kirk Kerns**
CTO for the Americas at NetApp

As a result of these implementations, they got a better feel of what the software environments were like, and the level of effort required to train and operate AI systems. Last year, we saw the establishment of the DoD's Chief Digital and Artificial Intelligence Office (CDAO), which added senior officials responsible for accelerating the DoD's adoption of data, analytics, and AI.

Their initial efforts, stemming from JAIC, were focused on algorithms, models, and outcomes. One of the practical learnings that was generated from that work was a recognition that they need to have an increased emphasis on data. And that includes the data needed to train the models, the real-time data that will be acquired or produced from other machine-based systems to be processed by the models, and then ultimately the data produced from running the models which are generating intelligence [data] as well.

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What they also discovered in AI operations was an emerging need to classify and tag data both when it is created, and as it progresses through the AI pipeline for security purposes. This ability to tag and classify data can also enable attributable analysis of model output to training sets when a result – especially an anomalous one – is generated, which is also known as "explainable AI."

They've since expanded focus into warfighting segments now. And that also increases complexity. But, certainly, the goal is to generate a decision advantage across all operations and missions in the battlefield environment. Expanded use of AI is being planned for the air, land, sea, space, and cyber domains and for nearly all aspects, such as predictive planning, operational support, and even mission execution.

But they have some technical challenges [to overcome] before they get through this incredibly complex environment and the process of evaluating and testing these models in a mission segment. I think we'll eventually see AI deployments involved in military OODA Loops, but time will tell on that.

**GDD:** What would the end result or impact of embracing AI/ML be on the battlefield? What impact would it have on the warfighter?

**Kirk Kern:** The impacts are going to be obvious and dramatic. AI will deliver better situational awareness, meaning senior decision-makers will have the right data at the right time. They'll have the right information and accurate intelligence that should lead to optimal decision-making.

While I think there will always be a human in the loop, AI will play a role in equipping the soldier with the right capabilities, as well as the right equipment. It will also play a role in sustaining the warfighter with all necessary supplies and "back of the envelope" things they need.

But it won't be useful unless we can generate better outcomes. And that clearly means delivering battlefield superiority with reduced losses.

**GDD:** What would AI/ML enable our military to do that it can't do today? What new capabilities would it enable that we don't currently possess?

**Kirk Kern:** Well, it clearly puts a soldier in a better position to win and engage from a safer standoff distance.

It starts with new types of battlefield sensors – ones that not only process and detect, but that can run autonomously on a self-guided mission and sense and react to the environment. What we have out there today is relatively stationary or guided by humans – remotely piloted vehicles, for instance. And, while most platforms today use either visible or invisible spectrum in sensor payloads, it's going to require some additional fusion of things, such as radio signals, audio, video, infrared, radar, and maybe even some atmospheric sensing – temperature, humidity, and those types of things – in order for these resources to be able to navigate and respond.

What I think ultimately happens – these sensors start to push the envelope of how much data can actually be processed in theater versus the cloud. But today, what the soldier will see is an AI-augmented battlefield awareness capability. And the goal would be to achieve an overwhelming advantage with its use.

**GDD:** Has the reemergence of near-peer, pacing threats created an urgency to embrace AI/ML? What technologies or capabilities do these near-peer adversaries have that make AI/ML essential?

**Kirk Kern:** I can't comment specifically on the DoD's sense of urgency and how they perceive their threats since I'm not a part of the organization. But what I can say is it's pretty clear that the two largest adversaries we face – Russia and the People's Republic of China – are aggressively trying to use AI to gain an advantage as well. And quite possibly with less oversight and risk analysis than we're employing right now.

There is a difference between "how fast you can move," and "how fast you can move safely." What I would really be worried about from near-peer adversaries and their integration of AI into real-time operational systems is the potential for wrong decisions. What happens when the wrong decision is made, and it causes an event or condition that would evoke a response from us? What if it creates a conflict or situation that we probably don't want to get engaged in?

That's what I see as the biggest challenge right now – adversaries proceeding aggressively and not safely.

**GDD:** Where is the DoD today in the adoption of AI/ML? What challenges or roadblocks are keeping them from embracing AI/ML solutions and technologies?

**Kirk Kern:** The DoD is making good progress on the science – they've got a handle on the software and what adaptations they need to make to their systems and their operational environments to employ it. However, the deployment is a challenge for them. And I see three roadblocks or reasons for that. Those three challenges are explainable AI, cyberse-

curity implications, and resource discrepancy.

Explainable AI is probably the biggest barrier right now. [The DoD] needs to be able to explain why a particular decision was made, especially when an erroneous outcome occurred. Unlike a traditional software program that we operate today that will generate an error when bad or unexpected data is ingested, AI will process that data and it'll produce an output or an action. We have to determine whether that output was within an acceptable level of accuracy or not.

Think about some of the AI tools that users are experimenting with right now – like ChatGPT. It's good, but perhaps it doesn't give the user the result they were expecting, right? If a user asks it a question and gets a response they weren't expecting or gets an answer that isn't completely accurate – was it perhaps close enough? Users need a better understanding of why AI tools generated that result – especially when we get back into talking about military missions.
Then there are the cybersecurity implications. The DoD needs to consider how it secures the data used for training AI tools and, ultimately, the training models themselves. They need to make sure that data and the model can't be compromised. Models can hopefully be secured so that they don't have exploitable features or hidden backdoors.

Then resource discrepancy is the third issue that they face, especially in deployment. In these battlefield conditions, the DOD has finite amounts of compute, storage, and networking capability. They also have to deal with networks being denied or degrades, resulting in spotty or intermittent networking. That is always a challenge for processing data and generating the results they're looking for.

There needs to be a balance between where the data is produced and/or consumed and its ability to be transported or processed in place. The DoD needs to understand if it can deploy the appropriate processing resources where the data is produced or consumed. If not, they need to develop a sufficiently robust network so that they can get that information to something like the cloud.

**GDD:** What has to change – or what is being done – to realize the benefits of AI/ML across the DoD?

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**Kirk Kern:** The DOD clearly needs more software development resources, both within their enclaves – all the different branches and services – as well as within their contractor community and system integrators. They need to also look at how they incorporate things like software from independent software providers and open source software, as well.

There's an entire ecosystem of advanced practices around software development, software analysis, and software deployment. They need to begin applying these in their software development operations.

They need more labs, more access to cloud resources, and faster solutions for tactical environments that bridge the gap between low power and high processing capability. They also need increased levels of software training, right? The discipline that the soldiers go through is obviously preparing them to protect and defend. But then they also increasingly need to be solid IT guys. It's literally another survival skill.

And then, lastly, we can't forget about the data scientists. There are not a lot of practitioners within the DoD in the data science field. But these models are really only as good as the data that you train them with. They're only as good as the format of data that you present to the model. The next war will be fought and won with data. The DoD needs to make strides with not just AI – but with its data, as well.