



Supporting Today's Warfighter With Machine Learning and the Cloud

MARKET TRENDS REPORT



Introduction

To protect our country and meet its mission, the U.S. Defense Department (DoD) relies on a host of strategic assets. But those assets aren’t limited to heavy weapons and manpower. Today, information technology and the data it collects are just as vital to DoD missions as any other tool.

“The first thing that warfighters are going to ask in the future is, ‘Do I have my data, and do I have access to my data?’” said former Deputy Defense Secretary Robert Work.

Operational data, counterintelligence, surveillance and even machine data can offer a significant advantage to DoD operations, allowing the agency to fully understand the mission landscape and tactics of its adversaries. But to truly leverage that information, DoD needs more than just data alone.

These capabilities rely on artificial intelligence (AI) and machine learning to automate the synthesis of mission-critical data and produce intelligible information. That’s why the DoD is increasingly turning to cloud computing. Cloud provides a secure, scalable and cost-efficient infrastructure that can power AI and extend the reach of data. It also provides applications and capabilities to create and train new AI and machine learning models.

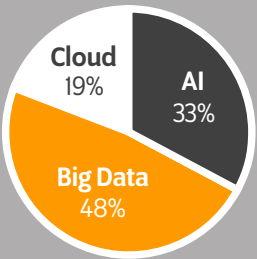
Our nation’s warfighters deserve the most innovative and secure solutions at the tactical edge – whether on land, in the air or at sea. With cloud and AI, the Defense Department can increase situational awareness and speed up decision-making to help secure our nation and its assets.

To learn more about how DoD is leveraging the cloud to take advantage of AI, GovLoop worked with Amazon Web Services (AWS) to produce this market trends report. In the following pages, you will learn how AI can impact critical missions in the Defense Department, and the role cloud plays to enable AI.

BY THE NUMBERS

\$7.4 billion spent by the Defense Department on AI, big data and cloud in fiscal year 2017.

SOURCE: GOVINI DOD ARTIFICIAL INTELLIGENCE, BIG DATA AND CLOUD TAXONOMY



Of that \$7.4 billion, AI accounted for 33 percent of the spending total, while big data accounted for 48 percent and cloud accounted for 19 percent.

SOURCE: GOVINI DOD ARTIFICIAL INTELLIGENCE, BIG DATA AND CLOUD TAXONOMY

32.4 percent

Increase in DoD investment in AI, big data and cloud From FY 2012- FY 2017.

SOURCE: GOVINI DOD ARTIFICIAL INTELLIGENCE, BIG DATA AND CLOUD TAXONOMY



Defense agencies that have used cloud for forward-facing websites experienced over **60 percent** in savings.

SOURCE: AMAZON WEB SERVICES

DoD requested an **\$18 billion** increase in science and technology spending in its 2019 budget proposal.

SOURCE: FEDERAL NEWS RADIO

“In an advanced society, the number of different ways to be vulnerable increases greatly. Artificial intelligence and cyber ... offer possibilities to our adversaries to do that. We must see to it that we cannot be surprised.”

– Michael D. Griffin, Undersecretary of Defense for Research and Engineering

SOURCE: DEFENSE DEPARTMENT

THE CHALLENGE

Lifting the Fog for DoD

To succeed in meeting its mission, Defense personnel must maintain constant situational awareness. Warfighters in the field, as well as command support staff, must constantly synthesize a vast and ever-growing volume of information collected from soldiers, surveillance, networks, adversaries and more to make real-time decisions.

The problem is that – even for an agency as large as the DoD – there simply isn’t enough time or manpower to manually sift through that expansive, rapidly flowing quantity of unstructured data. Instead, the department must seek technologies to automate and expedite the collection and synthesis of real-time information.

“For the Defense Department, using both artificial intelligence and machine learning can help automate the process of clearing the fog of war faster than our opposition,” said Mike Colson, Solutions Architect for Amazon Web Services (AWS).

Machine learning applies business logic to complex and often unstructured datasets, while AI executes decisions based on the outcomes of that logic. Together, AI and machine learning can give the DoD a significant competitive advantage, enabling field and command staff to make quick decisions.

Consider how terrain analysis could be transformed with the use of AI. Rather than dedicating multiple analysts to manually analyzing hours of footage to detect risks or targets, AI could automatically scan all images as they’re received in real time, detect anomalies in surveillance footage and alert Defense personnel to the most actionable data. Staff would no longer have to worry about data analysis. Instead, they could focus on quickly making a decision to move forward.

That’s just one example. Colson said AI could have the same impact on any number of Defense operations, including increasing the efficiency of refueling missions, providing safer travel routes for soldiers in the field, enabling predictive maintenance on equipment, improving HR operations and even strengthening Defense network traffic against cybersecurity risks.

But to leverage AI and machine learning, DoD must first consider the IT infrastructure and platforms it leverages. While AI provides significant advantages, it can be challenging to adopt without the right computing and development resources to enable it. Many government agencies, however, still struggle with legacy and outdated IT infrastructures.

THE SOLUTION

Enabling AI with Cloud

A trusted and robust cloud infrastructure is a critical component of the DoD’s journey to AI and machine learning.

Alone, cloud can dramatically improve the way DoD leverages information resources. Cloud minimizes labor and maintenance costs associated with traditional hardware-based legacy technologies. Additionally, it scales as new demands are placed on DoD networks, supplying additional compute resources and expanding the edge of the network.

As the DoD seeks ways to leverage AI, cloud becomes a true game-changer. Cloud provides the resources to maintain performance as vast amounts of data are collected, stored and analyzed. And with a robust cloud environment, developers can quickly create and train new AI and machine learning applications to synthesize new datasets and create new insights.

Most importantly, cloud can extend computing power to the tactical edge. Data from even the most remote locations and battlefields can constantly be collected, given the ability of cloud to extend networks. Then, that data can be automatically synthesized in the field or at an offsite command center via AI applications. Ultimately, cloud can enable the warfighter to access and act on a constant stream of actionable insights.

BEST PRACTICES

Making the Most of AI to Improve DoD



1 Map Your Data

Before applying AI and machine learning to organization information, it’s critical to map your network to gain an understanding of what data exists, how it’s currently being used and in what formats it exists. This survey will inform how your organization moves forward and which technologies are best suited to your data goals.



2 Evaluate Your Business Model

Once your data is mapped and consolidated, ensure that all other decision-making processes and technologies are integrated into a data-focused business model. That means that all related tools should be connected to the cloud environment and leveraging the insights generated by AI. Additionally, operational processes should be guided by data-driven insights.



3 Consider Culture

As actionable insights constantly flow into the enterprise via AI, personnel must be empowered to make quick, data-based decisions. This requires ensuring staff and warfighters can access data in real time, as well as giving them the ability to independently act on the insights produced by AI. Finally, encourage data-driven thinking by having leaders showcase their own data-driven insights and how they inform organizational decisions.



4 Train Users to Leverage Cloud and AI

Before placing the power of cloud and AI in the hands of personnel, it’s critical to implement training. Through interactive workshops and guided practices, highlight the power of AI to impact daily operations and explain how to leverage cloud-based tools in the field. Consider partnering with cloud-focused companies if internal training resources aren’t available.



5 Ensure Accessibility

It’s not enough to collect and leverage complex data. It must also be accessible to warfighters and other personnel in the field, in real time. This requires implementing a central cloud service that can be accessed by users from multiple environments, locations and devices. For instance, with a central cloud service, the Air Force Special Operations Command is able to centrally store data so people in different places can work with a common set of information, such as schedules, post-mission reports, inventories and plans.



CASE STUDY

How do you dissect more than 1,400 square kilometers of remote, low-resolution imagery that includes more than 60 classes of data and contains 1 million object instances? That’s the challenge that the Defense Innovation Unit Experimental (DIUx) and the National Geospatial-Intelligence Agency (NGA) are trying to solve. To do so, they’re turning to machine learning – what they call “computer vision.”

The two agencies are heading the [DIUx xView 2018 Detection Challenge](#) – a call for private-sector entrants to train algorithms to identify details like damaged buildings, utility trucks and fish boats in annotated satellite images. Once those details are identified by the algorithms, they could be automatically analyzed to inform disaster relief and humanitarian missions, saving analysts significant time.

Additionally, the head of DIUx’s machine learning division, Brendan McCord, said the automated processes developed in this project could be applied to other divisions of the Defense Department. For instance, the NGA could use the same algorithms for warfighting and intelligence missions.

According to the department, this is just one of many projects exploring the use of AI and machine learning to support missions. “xView follows in the footsteps of challenges such as Common Objects in Context (COCO) and seeks to build off SpaceNet and Functional Map of the World (FMoW) to apply computer vision to the growing amount of available imagery from space so that we can understand the visual world in new ways and address a range of important applications,” states DIUx.

Conclusion

As the Defense Department seeks to meet mission demands in a more complex and technological threat landscape, it will be imperative to equip warfighters with real-time insights into the battlefield and adversaries. By turning to the right cloud provider, the DoD can fully take advantage of technologies like artificial intelligence that will pave the way forward for the future of the military.

Together, cloud and AI enable defense personnel to make in-the-moment, data-driven decisions by giving them access to the latest and most necessary information – no matter where they’re fighting.



ABOUT AWS

With over 2,000 government agencies using AWS, we understand the requirements US government agencies have to balance economy and agility with security, compliance and reliability. In every instance, we have been among the first to solve government compliance challenges facing cloud computing and have consistently helped our customers navigate procurement and policy issues related to adoption of cloud computing. Cloud computing offers a pay-as-you-go model, delivering access to up-to-date technology resources that are managed by experts. Simply access AWS services over the internet, with no upfront costs (no capital investment), and pay only for the computing resources that you use, as your needs scale.

To learn more about AWS, please visit www.aws.amazon.com



ABOUT GOVLOOP

GovLoop’s mission is to “connect government to improve government.” We aim to inspire public-sector professionals by serving as the knowledge network for government. GovLoop connects more than 270,000 members, fostering cross-government collaboration, solving common problems and advancing government careers. GovLoop is headquartered in Washington, D.C., with a team of dedicated professionals who share a commitment to connect and improve government.

For more information about this report, please reach out to info@govloop.com.

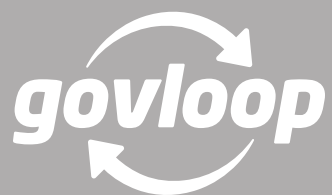
HOW AWS HELPS

AWS Cloud provides secure, scalable and cost-efficient solutions that help federal agencies meet mandates, drive efficiencies, increase innovation and secure mission-critical workloads across agencies like the DoD. It also enables the adoption of artificial intelligence and machine learning.

With AWS Cloud, agencies can use a wide array of available data analysis, AI and machine learning applications. Plus, they can leverage [Amazon SageMaker](#) – a fully managed platform that enables developers and data scientists to quickly and easily build, train and deploy new machine learning models at any scale. Then, they can apply new solutions and models across the entire enterprise, and use the cloud to place produced insights into the hands of the warfighter.

AWS Cloud allows agencies to enhance the way they achieve their mission goals – collecting data, finding insights and making powerful decisions with AI and machine learning.

Learn more here: www.aws.amazon.com/machine-learning/



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