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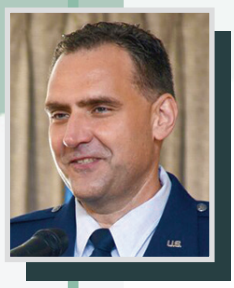
Actionable Intelligence for Maintenance Repair Operations

As the pandemic stretches supply chains to their limit, the government is employing machine learning to assist with complex maintenance operations

FEATURED EXPERTS:

Brian Laird
Assistant Commander, Supply Chain Technology & Systems Integration, NAVSUP



Col James Malec
Aviation Site Commander, Defense Logistics Agency

Louis Hogge
Engineering Flight Chief, USAF AFMC 416 SCMS

Bob Osborn
Chief Technology Officer, Global Governments, ServiceNow

The ongoing pandemic has exposed weaknesses within the high efficiency supply chains that American companies and government agencies normally operate. Those supply chains are efficient to the point of being severely disrupted whenever demand abruptly as it has during the pandemic. 2020 has shown that most agencies do not have the staff to quickly respond to changes in their supply chain within the current acquisition landscape. This has greatly impacted maintenance repair operations.

Machine learning and artificial intelligence can help. Throughout the year, those technologies have been employed to assist organizations in making informed choices regarding their ongoing maintenance tasks despite challenges in acquisitions and disruptions in the supply chain. The following are four key areas where technology has helped to improve operations.

STREAMLINING DATA ANALYSIS AND IMPROVING DECISION MAKING

Data analytics and data driven decisions have changed the landscape for supply chain management. This is due to improved technology that allows large data sets to be collated and streamlined into actionable intelligence for decision makers. This process allows decision makers to act quickly and effectively to better forecast demand.

"We built this integrated supply chain control tower, so we're able to take all the disparate sources of data and create a single source of truth to really make change," said Assistant Commander for Supply Chain Technology and Systems Innovation at the Naval Supply Systems Command (NAVSUP) Brian Laird. "So really, what we're able to do now is to basically determine all high priority parts and then work with some of our partners to see what's the best mix of organic and commercial maintenance activities."

The control tower has effectively allowed NAVSUP to automate some of their forecasting activities and enabled them to prioritize key projects more effectively. Additionally, NAVSUP gains an advantage by increasing efficiency in deploying resources for maintenance projects. Laird said that after the implementation of the tower, they saw an almost immediate performance increase across the board.

MAKING REAL TIME ADJUSTMENTS IN COMPLEX SUPPLY CHAINS

While some organizations can afford to wait on delayed or backordered parts when performing routine maintenance, agencies responsible for time sensitive or mission critical functions often can't pause or push back those activities without seriously disrupting operations. The Defense Logistics Agency (DLA) is an example of a government organization that, as one of the main suppliers for the Department of Defense, can't wait for parts. Machine learning has been deployed to support the DLA's massive catalogue of parts and items needed to support critical missions around the globe to make sure that everyone gets what they need, when they need it.

"Whether we need to initiate new purchase requests, adjust contract quantities based on changes to materials, change approved vendors, et cetera, we can communicate, manipulate, and manage those changes right away," said Col. James Malec, Aviation Site Commander for the DLA. This capability is critical, "because a lot of time lead times for these unique and complex material parts can literally be hundreds to sometimes even a thousand days out."

By operating with real time data and manipulating the supply chain, the DLA can minimize lead times over traditional sourcing methods. For example, if the agency knows that a critical part is lasting about six months, and it takes five months to acquire a new one, they can automatically order a replacement after the first month of service. That way there will always be new parts ready when old ones start to fail.

APPLYING MACHINE LEARNING TO DEVELOP BETTER LIFECYCLE ANALYSIS

Beyond understanding and adjusting the supply chain, machine learning can also be used to develop a lifecycle analysis for serialized parts. This allows agencies to measure the quality and lifespan of key parts and systems, including how each vendor's products perform. This is especially important within aviation due to the technical nature of specialized parts required, as well as the massive investment in each part or system.

"Our supply chain is a bit different from a commercial supply chain, so the effectiveness of my supply chain improves if we can actually reduce the flow of parts into our system," said Engineering Flight Chief Louis Hogge of the USAF AFMC 416 SCMS. "So, we're trying to measure the performance of the parts that we give to our customers to make sure that we're providing effective products."

By maintaining a record of lifecycle analysis for each supplier, agencies can assign maintenance tasks more effectively and maintain higher levels of customer satisfaction.

NORMALIZING DATA TO IMPROVE MACHINE LEARNING

Wherever supervised machine learning is employed, it's important to normalize input data so it can be more easily parsed and analyzed. For example, providing a supervised machine learning system with normalized data allows it to quickly develop context that improves the overall learning script. This is especially true in the realm of pattern recognition and issue detection, both of which are key components within logistics.

"Based on how well the technology sees patterns, it can recommend redeployment of capabilities, whether that be people, supplies, or maintenance repair parts," said Chief Technology Officer, Global Governments, for ServiceNow Bob Osborn. "The commander is able to understand what his meantime to repair is and get that weapons system back up and running. That is where this technology can really help us advance the ball."

By developing machine learning scripts, normalizing data, and then coupling that with well trained personnel, agencies can function at a higher level and become more efficient. This is especially needed when supply chains are stretched to their breaking points. But once established, machine learning and other similar technologies can work to mitigate almost any size or type of disruption.

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