

Leveraging Digital Transformation Initiatives and Artificial Intelligence to Optimize Readiness and Simulate Mission Performance across the Fleet

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Abstract : Siloed logistics and supply chain management systems throughout the Department of Defense (DOD) has led to disparate approaches to modeling and simulation (M&S), a lack of understanding of how one system impacts the whole, and issues with “optimal” solutions that are good for one organization but have dramatic negative impacts on another. Many different systems have evolved to try to understand and account for uncertainty and try to reduce the consequences of the unknown. As the DoD undertakes expansive digital transformation initiatives, there is an opportunity to fuse and leverage traditionally disparate data into a centrally hosted source of truth. With a streamlined process incorporating machine learning (ML) and artificial intelligence (AI), advanced M&S will enable informed decisions guiding program success via optimized operational readiness and improved mission success. One of the current challenges is to leverage the terabytes of data generated by monitored systems to provide actionable information for all levels of users. The implementation of a cloud-based application analyzing data transactions, learning and predicting future states from current and past states in real-time, and communicating those anticipated states is an appropriate solution for the purposes of reduced latency and improved confidence in decisions. Decisions made from an ML and AI application combined with advanced optimization algorithms will improve the mission success and performance of systems, which will improve the overall cost and effectiveness of any program. The Systecon team constructs and employs model-based simulations, cutting across traditional silos of data, aggregating maintenance, and supply data, incorporating sensor information, and applying optimization and simulation methods to an as-maintained digital twin with the ability to aggregate results across a system’s lifecycle and across logical and operational groupings of systems. This coupling of data throughout the enterprise enables tactical, operational, and strategic decision support, detachable and deployable logistics services, and configuration-based automated distribution of digital technical and product data to enhance supply and logistics operations. As a complete solution, this approach significantly reduces program risk by allowing flexible configuration of data, data relationships, business process workflows, and early test and evaluation, especially budget trade-off analyses. A true capability to tie resources (dollars) to weapon system readiness in alignment with the real-world scenarios a warfighter may experience has been an objective yet to be realized to date. By developing and solidifying an organic capability to directly relate dollars to readiness and to inform the digital twin, the decision-maker is now empowered through valuable insight and traceability. This type of educated decision-making provides an advantage over the adversaries who struggle with maintaining system readiness at an affordable cost. The M&S capability developed allows program managers to independently evaluate system design and support decisions by quantifying their impact on operational availability and operations and support cost resulting in the ability to simultaneously optimize readiness and cost. This will allow the stakeholders to make data-driven decisions when trading cost and readiness throughout the life of the program. Finally, sponsors are available to validate product deliverables with efficiency and much higher accuracy than in previous years.

Keywords : artificial intelligence, digital transformation, machine learning, predictive analytics

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