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Systems of Systems Architecture Approach for Lifecycle Digital Environments

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Abstract

Government mandates to control costs throughout the life cycle of a product necessitate a comprehensive architecture and methodology from design through operations and sustainment that is enabled by a planned digital environment. The Systems Design for Operational Effectiveness (SDOE) model developed by Stevens Institute has become the basis of the Office of the Secretary of Defense (OSD) guidance with a focus on increasing reliability and reducing logistics footprint. The complexity of the digital environment needed to support systems of systems approaches and model-based systems development increases when both on-board and off-board enabling systems are considered. Models for both should be included in any comprehensive digital tapestry. There are multiple digital threads for life cycle data for the enabling systems to represent the necessary causal relationships between primary and enabling systems that determine operational effectiveness. To address this challenge, a reusable architecture and methodology is the first step. This framework can support definition and advanced application of data analytics and big data approaches to the digital threads that define the interaction between primary and enabling system, the industrial enterprise, and the deployed environment, providing the variables which contribute to operational outcomes, and effectiveness. This includes analysis of feedback from actual operations compared with planned suitability analysis during the design phase.

Author Biography

Dr. Marilyn Gaska is currently the Corporate Logistics and Sustainment Chief Engineer and Fellow in the Corporate Engineering, Technology, and Operations organization at Lockheed Martin Corporation, Fairfax, Virginia. She is lead for the Flightline of the Future initiative and collaboration with the Air Force Complex of the Future initiative. Other responsibilities include overall logistics and sustainment vision, technology roadmaps, and architecture to include additive manufacturing for sustainment. As part of her 28 years at Lockheed Martin, Marilyn managed a Logistics and Sustainment organization with profit and loss responsibility for the Navy H-60 Tip to Tail Performance Based Logistics program and other product support programs. These involved extensive support from the supply chain management and operations organizations. She is currently the chair of American Makes Additive Manufacturing Maintenance and Sustainment Working Group. She is the author of over 25 papers and presentations. Marilyn's Ph.D. degree in Systems Science and Industrial Engineering was received from Binghamton University in 1999. She also earned a Masters Degree in Advanced Technology at Binghamton. Marilyn graduated from Cornell University in Ithaca, NY with Bachelor's and Master's of Science degrees.