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Relative Comparison of the Rate of Convergence of Collaborative Systems of Systems: A Quantified Multi-Case Study

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Abstract

This presentation describes an approach to quantify the relative rate of convergence of a system of systems architected using a collaborative approach. It will construct and describe the system of systems model used to produce a time-phased convergence index. The model will incorporate representations of factors that affect the rate of convergence, such as maturity of the interfaces and networks, inclination of the constituent system to collaborate, and the contributed functionality from constituent systems. Observations from analyzing multiple case studies will be instrumental for refining the construct of the model and the representation of the factors. The analysis will focus on documented, incremental functionality of system of systems such as the Smart Grid and the operational infrastructure created collaboratively by the Joint Improvised Explosive Device Defeat Capability Approval and Acquisition Management Process. Statistical analysis of the modeling results will illustrate the model's validity. The model will advance the state of the art of architecting system of systems by improving the ability to describe current and forecasted functionality. It is envisioned that the convergence metric will provide translation of technical progress to business capability that can be used to communicate status to stakeholders and customers and be used to make comparative decisions among competing systems of systems.

Author Biography

Bernard Collins is a PhD candidate at George Washington University. He is also currently a Program Manager for Information Technology initiatives in the U.S. Government and has previously managed two successful satellite programs. He also explored an approach for acquiring satellites through industry consensus standards (the Space Universal Modular Architecture). He received his Bachelors of Science in Electrical Engineering from the University of New Hampshire and his Masters of Science in Electrical Engineering from the Air Force Institute of Technology.

Dr. James D. Moreland, Jr. is an Adjunct Professor in the Department of Engineering Management and Systems Engineering at George Washington University, Washington, D.C. He also currently serves as the Deputy Director for Naval Warfare, Tactical Warfare Systems, within the Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics. Dr. Moreland earned a Ph.D. in Systems Engineering from The George Washington University; an M.S. in National Resource Strategy from the Industrial College of the Armed Forces; an M.S. in Systems Engineering from Virginia Tech; and a B.S. in Mechanical Engineering from the University of Maryland. Dr. Moreland serves as the President for the International Council on Systems Engineering Central Virginia Chapter.