System of Systems Engineering Collaborators Information Exchange (SoSECIE)

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Battle Control System of Systems (SoS) Engineering Analysis

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Abstract

The U.S. Air Force Battle Control System (BCS) is an excellent example of a system of systems (SoS) in which a set of subsystems, each developed and managed independently, provides support to the airspace defense mission. Successful defense against air threats depends on the ability of the entire set of constituent systems to effectively work together. Users' processes and interactions are closely integrated with the system component functionality.

This presentation documents a pathfinder effort to model the performance of user interactions as they conduct airspace defense mission management operations. The objective was to develop an SoS engineering analysis framework to measure the end-to-end system capability improvement or degradation when we make an architectural change (e.g., add a new sensor). The project was completed in collaboration with the BCS Program Office.

A single representative airspace defense mission thread was modeled using a scenario with notional system performance data. Measures of effectiveness were defined, and modeling methods were employed to show how potential system upgrades could provide operational mission benefits. System interactions, operational decisions and behaviors were captured in a Unified Modeling Language model using Rhapsody®. Vehicle flight paths engagements and sensor capabilities were represented in the Advanced Datalink Simulation. The presentation describes the model scenario including the motivations and results of the analysis.

Biography

Dr. Aleksandra Markina-Khusid is a Lead Systems Engineer in the MITRE Corporation Systems Engineering Technical Center, supporting several SoS modeling efforts for the Department of Defense and Department of Homeland Security. She holds Bachelor of Science degree in Physics, Master of Science and Doctor of Philosophy degrees in Electrical Engineering, and a Master of Science in Engineering & Management, all from the Massachusetts Institute of Technology.