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Title:

Modeling the Information Supply Chain Backbone of GEOINT Data Gathering and Analysis Systems

Author(s):

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Bio sketch:

Kai Anderson is a Member of the Technical Staff at Sandia National Laboratories, where he has worked on rapid software prototyping for various Sandia missions including; modeling and simulations, Space Situational Awareness (SSA), and sensor control.

Kevin Stamber is a Distinguished Member of the Technical Staff at Sandia National Laboratories, where he has worked in the modeling and analysis of infrastructure systems for over 20 years.

Project Description:

Hollywood is constantly remaking old classics. And people are almost always going to see them. Why? Because, to borrow a phrase (falsely) attributed to the bank robber Willie Sutton, “That’s where the money is.” When we’re modeling systems to better understand their performance, we wind up doing the same things: We build from common elements, even if the purpose of the model, or the domain space it covers, is completely different.

This talk will explore the development of modeling capabilities for a variety of purposes – understanding reliability, latency, resilience, and capacity of systems. The capabilities leverage a range of techniques, including Bayesian networks, linear programming, and stochastic simulation models. In this case the domain is the information supply chain backbone of GEOINT data gathering and analysis systems, but the work heavily leverages prior experience gained in the modeling and simulation of chemical supply chains. Common elements across those wildly divergent domain spaces necessary for the construction of networks that can be applied to the range of purposes. These common elements – entities representative of systems or subsystems that receive products and produce other products from them; products representative of these entities’ inputs and outputs; and the “stoichiometry,” or formulaic methods applied at the entity level for processing inputs to an entity to create outputs – work together with additional data for purpose-driven models to enable a range of modeling and analysis.

Put together, this set of capabilities enables a better understanding of the data needed to build models of information systems, of how those systems fit together in the here-and-now, and of how changes in system architecture might result in changes to system performance.

Project Summary:

The presenters discuss the benefits of leveraging common model elements from wildly divergent domains to construct a software framework for the modeling and analysis of the information supply

chain backbone of GEOINT data gathering and analysis systems. Applications in a range of purpose-driven modeling spaces, including reliability, latency, resilience, and capacity are discussed.

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