



System of Systems Engineering Collaborators Information Exchange (SoSECIE)

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On Modeling and Simulation Methods for Capturing Emergent Behaviors for Systems-of-Systems

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Abstract:

The terms emergence and emergent behavior are increasingly being discussed in the context of modeling and simulation for systems of systems. However it seems that there is not a definitive guide to methods for exploring, capturing and describing emergent behavior. The goal of this presentation will be to examine characteristics of the primary modeling and simulation methods and assess their applicability to capturing emergent behavior for systems of systems. The methods to be discussed are network simulation models, systems dynamics simulation, discrete event simulation, and agent-based simulation. The selection of these methods is based on taxonomy of common modeling and simulation methods systems. In addition to these methods' ability to capture emergent behavior, they will also be assessed in their applicability to capture other relevant aspects of modeling and simulation of systems of systems. These additional aspects include the method ability to a capture non-linear behavior and interactions between system elements.

Bio

Jack Zentner is a Research Engineer at the Electronic Systems Laboratory of the Georgia Tech Research Institute. His primary background is in the research and development of new probabilistic design methods for large scale, complex systems. In addition, he has considerable experience in the development and application of methods to aggregate diverse expert knowledge to enable decision making for both engineering and business problems. These expert knowledge driven decision support methods are typically used in the early stages of a project when little is known about the problem and decisions are often made based on qualitative data and trade-offs. He earned a B.S. in Mechanical Engineering from Colorado State University and a M.S., and Ph.D. in Aerospace Engineering from the Georgia Institute of Technology.