System of Systems Engineering
Collaborators Information Exchange (SoSECIE)

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Using MBSE to Evaluate and Protect the Electrical Grid as a System of Systems

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A System of Systems (SoS) is a large complex system, with varying degrees of operational independence, managerial independence, evolutionary development, geographical distribution and lifecycle independence. Critical Infrastructure such as the electrical grid contains all the aspects of a SoS. Due to the ever-increasing complexity of the grid, a single model encompassing all aspects of the grid would be impossible. Hence, we need to abstract the problem into a SoS set of aspects and examine the system both at the SoS level, as well as the detailed level. This will require the use of standardized systems modeling tools such as the Systems Modeling Language (SysML), and the Unified Architecture Framework (UAF) to define the overall goals, strategies, capabilities, interactions, standards, operational and system architecture, system patterns and so forth. Other systems engineering tools could then be used to do further analysis on both the operational systems and digital twins of the system. This presentation will examine the electrical grid as a SoS, define common characteristics, identify issues and vulnerabilities and MBSE strategies for addressing them.

Biography
Mr. Matthew Hause is a PTC Engineering Fellow and MBSE Technical Specialist, the co-chair of the UAF group a member of the OMG Architecture Board, and a member of the OMG SysML specification team. He has been developing multi-national complex systems for over 35 years. He started out working in the power systems industry and has been involved in military command and control systems, process control, manufacturing, factory automation, communications, SCADA, distributed control, office automation and many other areas of technical and real-time systems. His roles have varied from project manager to developer. His role at PTC includes mentoring, sales presentations, standards development, presentations at conferences, specification of the UPDM profile and developing and presenting training courses. He has written more than 100 technical papers on architectural modeling, project management, systems engineering, model-based engineering, human factors, safety critical systems development, virtual team management, product line engineering, systems of systems, systems and software development with UML, SysML, and Architectural Frameworks such as DoDAF and MODAF. He has been a regular presenter at INCOSE, the IEEE, BCS, the IET, the OMG, AIAA, DoD Enterprise Architecture, Embedded Systems Conference, and other conferences. He was a keynote speaker at the Model-Based Systems Engineering Symposium at the DSTO in Australia. Mr. Hause studied Electrical Engineering at the University of New Mexico and Computer Science at the University of Houston, Texas.