# System of Systems Engineering Collaborators Information Exchange (SoSECIE)

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#### Cybernetics, Complexity, and the Challenges to the Realization of the Internet-of-Things

***Presenter: Dr. Tod M. Schuck, Lockheed Martin Fellow***

#### Abstract

The realization of the Internet-of-Things (IoT) is a concept that is increasingly discussed as the result of networking a variety of “smart” electronic systems together to achieve high levels of automation and performance. Thus, the IoT is envisioned to enable everything from producing buttered toast in the morning to enabling fleets of autonomous vehicles to exist on roads and cooperating with human drivers. However, as more and more systems are linked together to form directed, acknowledged, collaborative, and virtual Systems-of-Systems (SoS), the exercise of control becomes problematic. Emergent properties, hostile agents, evolutionary and adaptive development, and other characteristics of systems will enable complex behaviors in SoS that are not part of the constituent systems. If information theory and cybernetics laws are not considered in the construction of SoS as part of the IoT, then the behaviors that will emerge can have destabilizing and potentially disastrous outcomes.

#### Biography

Tod M. Schuck received a B.S. in electrical engineering from Georgia Tech in 1989, an M.S. in electrical engineering from Florida Tech in 1994, and a Ph.D. in systems engineering from Stevens Institute of Technology in 2010 concentrating in knowledge representation in distributed, network-centric systems. He has worked extensively as a DoD/US Navy employee solving real-world problems for the Warfighter in the areas of data processing and fusion in cooperative and non-cooperative sensor systems.

Since 1999, Dr. Schuck has been with Lockheed Martin RMS, where he is currently a Fellow Emeritus/Principal Member of the Engineering Staff specializing in information and knowledge fusion (representation and distribution for surface, air, and missile defense combat systems) and in complex systems architecture and design. He is recognized as an expert in the field of Combat Identification (CID) and systems theory, receiving many awards for his research, writing, and mentoring.

Dr. Schuck is an adjunct professor at Johns Hopkins University, holding the title of Lecturer in the Whiting School of Engineering and Applied Science, Programs for Professionals; and at Rowan University where he developed and is teaching a course on Command and Control for the Henry M. Rowan College of Engineering – Electrical & Computer Engineering. He has published over 50 papers and conference proceedings and holds one US patent, two Lockheed Martin trade secrets, and has two recent patent applications submitted to the USPTO.