

## **System of Systems Engineering Collaborators Information Exchange (SoSECIE)**

**January 08, 2019  
11:00 a.m. to Noon Eastern Time**

### **Lead Systems Integration (LSI)**

***Presenter: Dr. Warren Vaneman***

#### **Abstract**

Modern complex mission capabilities are fundamentally achieved with multi-mission, highly interoperable system of systems (SoS). The engineering, acquisition, and management of these mission capabilities, across the SoS lifecycle, requires the complex integration of interdependent new and legacy systems from the lowest component level to the highest enterprise level. Recognizing the challenges of multi-billion-dollar SoS acquisitions, in the mid-1990s, the U.S. government embraced the practice of partnering with industry to effectively develop and integrate these SoS. The term “Lead System Integrator” became commonplace in large-scale SoS developments within the Department of Defense (DoD). However, after several high-profile SoS acquisition failures, it was evident that a full-scale rebalancing of risks and rewards was needed. In 2008 Congress directed the Secretary of Defense to ensure that the acquisition workforce is of the appropriate size and skills necessary to accomplish inherently governmental functions related to acquisition of major defense systems, and to minimize, and eventually eliminate the use of contractors to perform LSI functions.

Lead Systems Integration is an acquisition strategy that employs a series of methods, practices, and principles to increase the span of both management and engineering acquisition authority and control to acquire a SoS or highly complex systems. LSI is effectively a “marriage” of program management and multiple functional disciplines which must work together cooperatively to assert and execute trade space in the SoS given multiple constituent system acquisitions. The LSI function is to assert and execute SoS and stakeholder trade space to affordably optimize integrated mission capabilities across the SoS lifecycle. The roles of the LSI are similar to the roles of any systems engineer or system integrator within a program office. The primary difference is the span of LSI design and integration authority that persists throughout the SoS lifecycle.

To successfully plan, develop, and manage a SoS, a comprehensive development, acquisition, and implementation strategy is required. The LSI Enterprise Framework defines a means to engineer and manage the capabilities and interdependencies of a SoS, that can be executed by the government LSI, across multiple systems, programs, and stakeholder levels. The LSI Enterprise Framework captures the complex, interdependent, and mission capability areas through four levels to characterize the systems from the enterprise to the component level.

This presentation defines Lead Systems Integration, introduces the LSI Enterprise Framework, illustrates how it could be used as a framework for the engineering management of SoS, and begins to shape the problem to satisfy a set of mission capabilities.

## **Biography**

**Dr. Warren Vaneman** has over 30 years of leadership and systems engineering experience from various positions within the Intelligence Community and the Department of Defense, and is currently a Professor of Practice in the System Engineering Department at the Naval Postgraduate School. His research and teaching interests include Systems and System Engineering, Lead Systems Integration, and Model-Based Systems Engineering. He is a retired Navy Reserve Captain who served as a Surface Warfare Officer. Dr. Vaneman has a BS from the State University of New York Maritime College, a MS and Ph.D. in Industrial and Systems Engineering from Virginia Tech, and a Joint Professional Military Education Certificate from the Naval War College.

**Prof. Ron Carlson** served 26 years in naval aviation as a pilot, seven years of which were at NAVAIR where he led NAVAIR Systems Engineers through several years of systems engineering revitalization. He currently serves as a Professor of Practice in the System Engineering Department at the Naval Postgraduate School. He has a MPhil in systems engineering from Stevens Institute of Technology, MS in strategic studies and national policy from the Naval War College and MBA from Embry Riddle Aeronautical University, and his BS in nuclear engineering from the University of Michigan.