



OFFICE OF THE DEPUTY ASSISTANT SECRETARY OF DEFENSE SYSTEMS ENGINEERING

System of Systems Engineering Collaborators Information Exchange (SoSECIE)

August 23, 2011
11:00 a.m. to Noon EDT

SoS Management Strategy Impacts on SoS Engineering Effort

Dr. Jo Ann Lane
University of Southern California

Abstract

To quickly respond to changing business and mission needs, many organizations (both military and commercial) are integrating new and existing systems with commercial-off-the-shelf products into network-centric, knowledge-based, software-intensive systems of systems (SoS). Research has identified four types of SoS engineering (SoSE) management approaches: virtual, collaborative, acknowledged, and directed. In 2007, the United States Department of Defense, Office of the Secretary of Defense Acquisition, Technology, and Logistics Software Engineering and Systems Assurance organization sponsored case study investigations to better understand SoSE for the acknowledged SoS. The results of these case studies and other reports have indicated that SoSE activities are noticeably different from the more traditional systems engineering activities. Of particular interest to SoS sponsors is identifying the point at which a collaborative SoS (single systems' engineering teams collaborating together) should be transitioned to an acknowledged SoS (an engineering team established at the SoS level to manage and guide SoS evolution).

To help answer this question, an SoSE model based on the constructive systems engineering cost model (COSYSMO) was developed. This SoSE model is used to compare the effort required to engineer an SoS capability (or capability modification) using either the collaborative or acknowledged SoSE approach. The model allows one to modify the SoS size, the size and scope of a proposed new SoS capability or capability modification, and the concurrent constituent-system volatility. By varying these parameters and computing the associated SoSE and systems engineering effort for the collaborative and acknowledged approaches, one can find the point, if any, at which the size and complexity of the SoS or the SoS capability makes it more cost-effective to evolve the SoS using an acknowledged SoSE team. This presentation shows that there exist conditions under which investments in "acknowledged" SoSE have both positive and negative returns on investment, presents the first quantitative determination of these conditions, and points out directions for future research that would strengthen the results.

Biography

Dr. Jo Ann Lane is a research assistant professor at the University of Southern California Center for Systems and Software Engineering, conducting research in the area of systems engineering and system of systems engineering (SoSE). She was a co-author of the 2008 Department of Defense *Systems Engineering Guide for Systems of Systems*. Current areas of research include SoSE processes, SoSE cost modeling, SoSE test and evaluation, system development feasibility assessments, and innovation in systems engineering. Prior to her current work in academia, she was a key technical member of Science Applications International Corporation's Software and Systems Integration Group for over 20 years, responsible for the development and integration of software-intensive systems and systems of systems.