

# Fundamentals of System of Systems Engineering

A Review of Key Approaches and New Innovations to Achieve System of Systems Success

## Summary

- Three-day course (customizable)
- Provides a systemic overview of how to plan, manage, and execute system of systems (SoS) projects, where multiple systems must be developed, modified, and integrated to achieve the desired results
- Focuses on adjustments to the fundamental principles of Systems Engineering necessary when dealing with the unique aspects of SoS development efforts
- Follows the basic outline and conventions of the INCOSE Systems Engineering Handbook, ISO/IEC/IEEE 15288, and the Guide to the Systems Engineering Body of Knowledge (SEBoK)
- Practical information and tools are provided
- Includes several in-class exercises to solidify the concepts being presented
- Each student will receive a complete set of lecture notes and an annotated bibliography

## What You Will Learn

- The key characteristics of an SoS
- How to effectively plan and manage a nSoS development effort
- How an SoS environment affects your requirements and design
- How to effectively integrate SoS-based systems
- Effective verification and validation of SoS-based systems
- How to manage your SoS suppliers
- The latest SoS lessons learned

## Instructor – David D. Walden, ESEP

- An internationally recognized expert in the field of Systems Engineering
- Over 30 years of industry experience
- Taught over 100 courses to over 1600 students since 2006
- INCOSE Expert Systems Engineering Professional (ESEP)
- Senior Member of the IEEE
- Lead Editor of the INCOSE SE Handbook Fourth Edition
- Education
  - MS in MOT, University of Minnesota
  - MS in EE & CS, Washington University in St. Louis
  - BS in EE, Valparaiso University



## Course Outline & Topics

**1. SoS Concepts and Principles.** Key SoS and System of Systems Engineering (SoSE) Concepts. SoSE Compared and Contrasted with Traditional Systems Engineering. Key Challenges and Expected Benefits of SoSE. SoS Lessons Learned.

**2. SoS Influences on Requirements Development.** Tailored and New Approaches to Requirements. Stakeholder Requirements and Measures of Effectiveness. System Requirements and Measures of Performance Flow Down of Requirements to SoS Components.

**3. SoS Influences on Architecture and Design.** Architecting Principles. Architectural and Design Strategies for SoSE. Dealing with the Unique Interdependencies of Overlapping SoS and System Lifecycles. Net-Centric & Service-Oriented Architecture Approaches and Challenges. Dealing with Legacy Systems.

**4. SoS Life Cycle Considerations.** Reliability, Maintainability, Availability. Supportability/Logistics, Usability/Human Factors. Training. System Safety. Security/Survivability. Producibility/Manufacturability. Changeability. Commonality. Interoperability. Affordability. Disability/Sustainability.

**5. SoS Influences on Integration and Test.** Integration, Verification, and Validation Approaches in a SoS Environment. Strategies for Dealing with the Dynamic and Independent Nature of the SoS Components.

**6. SoS Influences on Technical Management.** Planning, Monitoring, and Control. Risk and Decision Management, Configuration and Information Management. SoSE Development Models. SoSE Measures and Leading Indicators. SoSE Skills. SoS Teaming and Collaboration. Course Wrap-up.

**Typical Course Duration - 3 Days**  
**Typical Schedule 8:30am-4:00pm**

**Earn up to 18 INCOSE PDUs!**

Please contact Sysnovation for availability, customization, and pricing.