

## **GSAW 2004 Tutorial I:**

System Requirements Development: An Architectural Approach

**Length:** Full day

### **Overview:**

This tutorial will discuss three ways to characterize a system: (a) models, (b) requirements, and (c) design. We will show how a system architecture serves to integrate these three aspects of the system. This leads to a more model-driven systems approach and allows you to “discover” the essential attributes of the problem space that must be addressed by the system solution. The architecture models are where these essential attributes are defined and evaluated. The architecture also provides the unifying framework for exploration of the problem space and for characterization of the solution space such that better decisions can be made. This tutorial will describe an approach for the flow down from the system purpose or mission need, down through operational requirements and concept of operations, and finally into system and lower-level specifications. How and when to model different aspects of the system will be discussed. We will also talk about the benefits and limitations of modeling and simulation. Another important topic to be covered is system threads and scenarios.

In addition to the basic flow down of requirements, we will show how the Zachman Framework and the C4ISR Architecture Framework can be used to structure the development of complex systems. A document tree template is described to assist a project in the generation of the technical documentation necessary for the organized development of systems.

**Instructors:** James Martin and Steve Heidorn, The Aerospace Corporation

### **Biographies:**

James Martin

James N. Martin is an internationally known writer and lecturer on systems engineering. He wrote one of the most widely read books on systems engineering, *Systems Engineering Guidebook*, published by CRC Press. His experience includes eighteen years in systems development of telecommunications products and services (most of this with Bell Labs) as program manager, systems engineering manager, system architect, requirements manager, and lead systems engineer. His experience with technology includes mobile wireless, underwater fiber optic, satellite broadband wireless, reconnaissance sensors and distribution networks, and airborne network hubs.

At the Aerospace Corporation, Mr. Martin is a system architect for communications networks and space systems. He also teaches at The Aerospace Institute and at seminars around the world. He led the development of ANSI/EIA 632, the US national standard that defines the processes for engineering a system. Mr. Martin graduated with an MS from Stanford and a BS from Texas A&M. He is an INCOSE Fellow.

Steven Heidorn

Steven Heidorn is a highly accomplished systems engineer with nineteen years' experience across a wide range of defense, intelligence and commercial systems. As a lead systems engineer, development engineering manager and chief engineer at IBM Federal Systems, he developed real-time, software-intensive, radar and sonar signal processing systems. At the MITRE Corporation, he developed concepts for software-reconfigurable sensor and communications processing systems and contributed to the architecture of the Joint Tactical Radio System. At the Aerospace Corporation, he provides system engineering and system architecting expertise across a wide range of information-intensive commercial, civil and intelligence systems and also teaches at The Aerospace Institute. Mr. Heidorn holds BS and MS degrees in electrical engineering from the University of Illinois at Urbana-Champaign

and has done additional postgraduate work in statistical communication theory at George Mason University.

**Description of Intended Students and Prerequisites:**

Systems Engineers and Systems Engineering Managers; Program, product and acquisition managers.