



System Architecting ... Using Heuristics and Patterns

A Full-Day Tutorial

Saturday February 24, 2006

System architecting is a creative art that develops the arrangement of components and relationships to build a system. Only partially understood, it is clear that system architecting involves heuristic rules and patterns that are recognizable by architects but difficult to codify. This tutorial shows the basic thought patterns behind system architecting, with some practice in identifying and using patterns effectively to develop an architecture. One day will not make you an expert in architecting, but it will provide you the starting point to develop your own effective techniques.



You should attend this tutorial if you are:

- A leader or a key member of a system development team
- Involved in the creative part of developing system solutions.
- Looking for practical methods to use today

The course is targeted for

- Systems engineers,
 - Technical team leaders,
 - Logistic support leaders, and
 - Others who participate in defining and developing complex systems.
-

Location: Teledyne Brown Cafeteria, 300 Sparkman Drive, Huntsville, AL

Schedule: 7:30 - 8:30 Registration & Continental breakfast
8:30 - 12:00 Architecting concepts, patterns, and DODAF
12:00 - 12:30 Lunch – **included in tutorial fee**
12:30 - 4:30 Architecting exercise, optimization, issues, and discussion

Cost: \$75 to \$195 (see registration form). **Fee includes a bound ~80 page reference manual**

Mail the Registration Form on the last page with your check payable to: *HRC INCOSE, P.O. Box 5015, Huntsville, AL 35814*. Reservations will not be confirmed until payment is received. You must register by February 9, or pay an additional \$50 late fee at the door (if seating is available).

**ATTENDANCE IS STRICTLY LIMITED.
RESERVATIONS ARE ON A FIRST-COME, FIRST-SERVE BASIS**

Topics Covered in the Course

Introduction – System architecting concepts. How architecting fits in to systems engineering. Terms and definitions. Roles of a technical leader in relation to architecture development.

Architecture – Understanding of the components of an architecture. Origin of the terms within systems development. Defining architectures in operational, technical, and standards terms.

Architectural Frameworks – Methods to convey architectures. DOD Architecture Framework (DODAF). Zachman Framework. Federal Enterprise Architecture Framework (FEAF). Hierarchies of architectures. Why frameworks exist, and what they hope to provide.

Design Patterns – What are patterns? How do we recognize them? Pattern definition language. Hierarchies of patterns. Extending patterns to new contexts. Using patterns in architecting.

Using the DODAF – Diagram types within DODAF. Operational Views, System Views, Technical Standards Views. Processes to use the DODAF effectively

Architectural Exercise – Practicing architecting methods against a sample system problem.

Dynamic Optimization – Architecting for systems of systems when the end goal is not visible. Dynamic methods to create architectures that self-organize to grow and change over time. Measurement and optimization of architectures.

Architectural Issues in Design – A survey of other issues related to architecting. Working with legacy systems and COTS. Interface control. Collaboration issues. Test and evaluation issues.

Summary - Review of the important points of the workshop. Interactive discussion of participant experiences that add to the material.

Mr. Eric Honour has been in international leadership of the engineering of systems for over a decade, part of a 36-year career of complex systems development and operation. His energetic and informative presentation style actively involves class participants. He was the founding Chair of the INCOSE (International Council on Systems Engineering) Technical Board in 1994, was elected to INCOSE President for 1997, and continued as Director of the Systems Engineering Center of Excellence (SECOE). He was selected in 2000 for Who's Who in Science and Technology and in 2004 as an INCOSE Founder. He is on the editorial board for *Systems Engineering*. He has been a systems engineer, engineering manager, and program manager at Harris Information Systems, E-Systems Melpar, and Singer Link, preceded by nine years as a US Naval Officer flying P-3 aircraft. He has led or contributed to the development of 17 major systems, including the Air Combat Maneuvering Instrumentation systems, the Battle Group Passive Horizon Extension System, the National Crime Information Center 2000, and the DDC1200 Digital Zone Control system for heating and air conditioning. Mr. Honour now heads Honourcode, Inc., a consulting firm offering effective methods in the development of system products. Mr. Honour has a BSSE (Systems Engineering) from the US Naval Academy and MSEE from the Naval Postgraduate School.



SPECIAL BONUS PRESENTATION FOR INCOSE MEMBERS

Mr. Honour will discuss the role of Complexity Theory in Systems of Systems at the INCOSE Huntsville Regional Chapter monthly meeting on Thursday February 22. Meeting details are on the Chapter website, <http://www.incose.org/huntsville>. A summary of his presentation is provided below:

Principles of Complexity Theory Provide a Basis for Systems of Systems

Today's environments are dominated by complex Systems of Systems (SoS). As a result, systems engineers now have the challenge to create systems of unprecedented scope and complexity. The SoS environment is characterized by its own challenges, such as an extended life cycle, legacy systems as components, and ongoing re-architecting throughout the lifecycle of the system and its component systems. Success under these conditions requires having a sound design, managing complexity, maintaining the integrity of that design, and supporting shifting operational priorities over significant time spans while avoiding the lurking potential of chaotic conditions.

This presentation describes how complexity theory, developed over more than 25 years, provides a theoretical basis for today's systems of systems by discussing:

- **Systems of Systems Concepts.** Examples of military and commercial SoS. What is a system of systems? What are its primary characteristics? Why does an SoS represent a paradigm shift?
- **Complexity Theory Applied to SoS.** Basic concepts of complexity. "The Edge of Chaos," and why this is a good thing. Some effects of complexity: Nonlinear dynamics and increasing return, Small worlds and strange attractors, Patterns, Emergent properties, Self-organization. Examples of how these effects happen in real SoS. How systems engineers work with these effects and use them to help evolve the SoS.

You can become a member of INCOSE (www.incose.org) for \$55 for the balance of the current fiscal year (until June 1, 2007). As a member, you will receive national and local publications, and have access to valuable resources and monthly meetings that provide both food for thought and a free dinner! Easy on-line application is available at https://www.incose.org/cc_orders/incosememapp.asp.

Sponsors providing in-kind support for the Systems Architecting tutorial include:



Honourcode, Inc.

3008 Ashbury Lane, Cantonment, FL 32533 - +1 (850) 479-1985

<http://www.hcode.com>



**TELEDYNE
BROWN ENGINEERING, INC.**

A Teledyne Technologies Company

<http://www.tbe.com/>

