



Management  
& Technology  
Consultants



*Chesapeake Chapter*

**INCOSE**

*International Council on Systems Engineering*

# INCOSE Special Architecture Workshop

**Gundars Osvalds**

Enterprise Architect

BearingPoint

March 19, 2008

[gundars.osvalds@bearingpoint.com](mailto:gundars.osvalds@bearingpoint.com)

# Purpose and Scope



## ■ Purpose

- Clarify and vet foundational concepts and terminology
- Create a small but fundamental body of knowledge to serve as reference for adapting existing standards
- *A SAW report will be produced that must have utility to ISO*
  - *Simplicity*
  - *Technical Rigor*
  - *Sound Criteria to Verify our Decisions*

## ■ Scope

- Technical not political
- Organizational
  - Aerospace/Defense/Academic communities  
INCOSE/ISO Liaisons TC184/SC5/WG1 and  
JTC1/SC7/WG42
- INCOSE at Large Consensus is a Separate Concern

# Expectations



- The Special Architecture Workshop (SAW) is an unique Group Undertaking a Hard Problem
  - If not us who?
  - If not now when?
- Contributions from attendees are more important than criticisms
- Each Working Group (3-5 participants) will be assigned one problem per session and present their response
  - 25 word problem solution summary
  - 1-2 supporting paragraphs
  - Authoritative references
- The INCOSE SAW report will
  - Give proper attribution to all contributors
  - Technical Rigor
  - Sound Criteria to Verify our Decisions

# Problem Statements



Chesapeake Chapter  
**INCOSE**  
International Council on Systems Engineering



Management  
& Technology  
Consultants

- What is Systems Architecture?
- What is Systems Architecting?
- How do systems architecture and systems architecting relate to systems engineering?
- What is the relationship between the nouns “architecture” and “design”, in terms of descriptive products (artefacts) and the transformations (processes) that produce them?
- What is the triangle of relations between: Architecture – Structure – Emergent Behavior?
- What are the products and services of Systems Architecting?
- How should we address life cycle management with respect to architectures or architecture management (and/or architecture rationale)?
- How do the work products of Systems Architect relate to those of Systems Engineer?
- Which directions should future development of the Systems Architecture and Enterprise Architecture Undertake?
- What should be the relationship between Model Based Systems Engineering (MBSE) and System Architecture?

## Sample Problem #3



Chesapeake Chapter  
**INCOSE**  
International Council on Systems Engineering



Management  
& Technology  
Consultants

### How do systems architecture and systems architecting relate to systems engineering?

- Systems architecture is a product of systems architecting.
- Systems architecting is an activity within systems engineering.
- A systems architecture is at a higher level of abstraction than a systems design.
- Systems engineering is an interdisciplinary approach and means to enable successful systems. (INCOSE)
- Requires good systems architecture
- The systems architecture sets and communicates the vision, plan, boundaries, and the stated purpose of the system.
- Systems architecting and systems engineering come together through the requirements and functional analysis.
- Architect that designs a building and works with a structural engineer, electrician, etc.
- Class models. The systems architect does the abstract classes; systems engineering does the concrete classes.

## Sample Problem #6



Chesapeake Chapter  
**INCOSE**  
International Council on Systems Engineering



Management  
& Technology  
Consultants

### What are the product and services of architecture?

- The first step in identifying and producing the products and services of architecture is to select the appropriate framework that the architecture is being prepared for.
- This framework will guide the selection of the products and services that will apply at ever more detailed levels of architecture.
- The services that are applicable for the framework chosen will include:
  - Identify objective (s) (that are appropriate for the domain and the hierarchal level that is being architected);
  - Develop strategy (to achieve the objectives);
  - Document performance (that is necessary to achieve the objective be architected);
  - Identify information (that is needed for the performance);
  - Identify the capabilities, functions, and features (to achieve the objectives);
  - Establish the organization (that will implement the architecture);
  - Identify the deployment location (s) (that the architecture being developed)



## What are the product and services of architecture?

- For each service (listed above) a corresponding set of products are developed. These products include:
  - View (of the service being performed);
  - Viewpoint (for the service being performed);
  - Model (abstraction of the service being performed);
  - Artifacts (as depicted in diagrams, charts, text, tables, etc.).



## What are the product and services of architecture?

- A way to envision using this set of services and corresponding products is through the use of a matrix with the appropriate "cells" selected (see example below).
- It must be emphasized that this set of services and products will change (usually to increasingly more complete details) as the succeeding levels of the architecture are developed.

Products	Services				
	Identify Objectives	Develop Strategy	Document Performance	• • •	Identify Deployment Locations
View	√	√	√		√
Viewpoint	√		√		√
Model	√		√		√
Artifacts					
Diagram			√		√
Chart	√		√		
Text	√	√	√		√
Table		√			



## Future:

- The SAW chair will release meeting result report to International Standards Organization (ISO)
- The INCOSE Architecture Working Group plans to continue work started at SAW
- SAW may meet again at the INCOSE 2008 Symposium
- INCOSE supports ISO via the
  - ISO TC184/SC5/WG1
    - ISO 15704-2000 Update
      - » *"Industrial Automation Systems – Requirements for Enterprise-reference Architectures and Methodologies"*
      - » Provide inputs to update document - such as the Cube concepts
  - JTC1/SC7/WG42
    - IEEE 1471/ ISO/IEC 142010
      - » "Recommended Practice for Architectural Description of Software-intensive Systems"
      - » Renamed by ISO "Systems and Software Engineering – Architectural Description"
      - » The ISO fast Track process just adopted IEEE document without changes
      - » ISO has 185 comments that they plan to incorporate into an update to clean up IEEE version

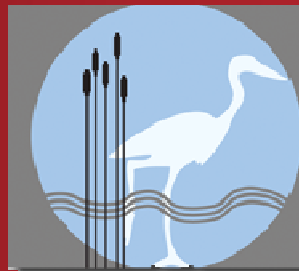
# SAW Conclusion



- The ISO requested that INCOSE provide them with architecture definitions
  - ISO uses industry inputs to document standards
  - ISO requested INCOSE to document their view on architecture definitions
- The attendees were by invitation and were some of the most knowledgeable in the area of systems engineering and architecture
- The tone of the meeting was cooperative
  - No one was disruptive
  - There a lot of discussion in the problem groups an consensus was accomplished
- The results will further our view of architecture
  - The architecture definitions are needed since architecture definitions are not mature nor agreed on
  - Looking for ISO to be a leader in bringing architecture concepts to a single definition



Management  
& Technology  
Consultants



*Chesapeake Chapter*  
**INCOSE**

*International Council on Systems Engineering*



## Contact

Gundars Osvalds  
[gundars.osvalds@bearingpoint.com](mailto:gundars.osvalds@bearingpoint.com)

