From Dual VEE to Dual Use

Introducing the SoS-VEE™ Model

Improving the Acquisition, Interoperability and Performance of Large System-of-Systems [SoS] Programs

National Defense Industrial Association [NDIA]

18th Annual Systems Engineering Conference – Track 5 System of Systems [Session 17887]

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ACKNOWLEDGMENTS

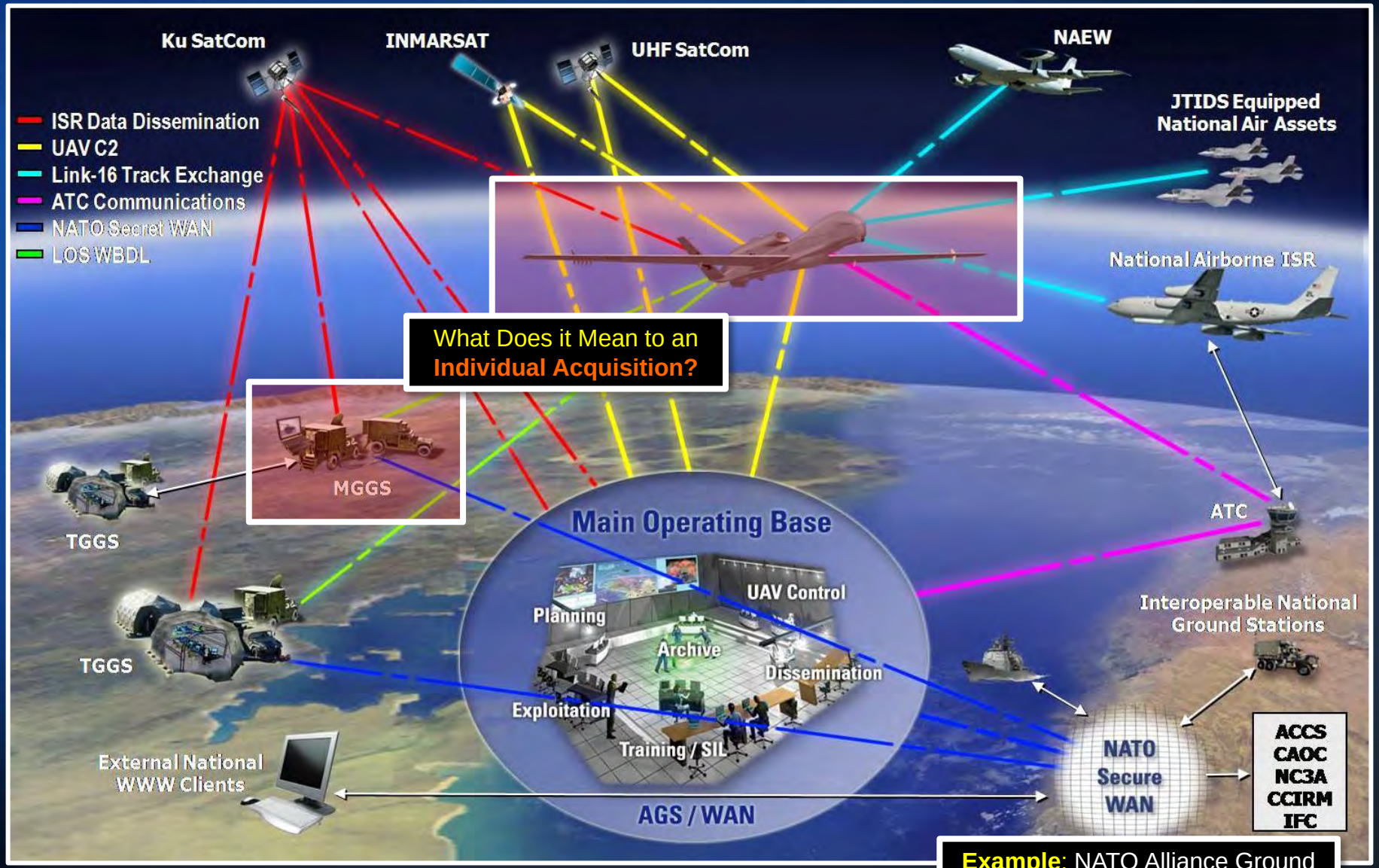
- Eric C. Honour, PhD, CSEP: “DANSE – Final Report on SoS Methodology and Tools”, INCOSE SoS WG Series, June 26, 2015, Eric Honour
- Garry Roedler: “Iteration and Recursion”, Systems Engineering Handbook , Fourth Edition, Figure 3.5, Garry Roedler
- John O. Clark, CSEP, MSEE: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark
- Dr Kevin Forsberg: Dual V-Model, The Center for Systems Management (CSM) Inc., Kevin Forsberg and Harald Mooz
- INCOSE: Systems Engineering Handbook, Third & Fourth Edition

PROGRESS

- **Problem Statement**
  - Challenges of System of Systems Engineering
- Objectives
  - Simple Model Useful for System of Systems Engineering
- Offered Solution: SoS-VEE Model
  - Main Building Block
  - Building the Model
  - Review against Objectives
- Proof of Concept
  - Application to System of Systems Engineering
  - Application to Project Management
  - Application to Conceptual MBSE (Outlook)
- Summary

PROBLEM STATEMENT

STOVEPIPED ACQUISITIONS IN COMPLEX SYSTEM OF SYSTEM ENVIRONMENTS



Example: NATO Alliance Ground Surveillance (AGS) System

Source: http://nagsma.nato.int/images1/AGS2_large.jpg

PROBLEM STATEMENT

CHALLENGES OF STOVEPIPED ACQUISITIONS (CONT'D)

Bundeswehr: New machine gun MG5 makes problems

Sep 12, 2015 Panteres

The new machine gun the army causes problems: According to information obtained by SPIEGEL, the MG5 does not fit the guns of tanks and all-terrain vehicles. The conversion will cost millions.

Source: http://panteres.com/2015/09/12/bundeswehr-new-machine-gun-mg5-makes-problems

Bundeswehr: Neues Maschinengewehr MG5 passt nicht auf Panzer

Getty Images

Bundeswehrsoldat im Manöver: Neues Problemgewehr

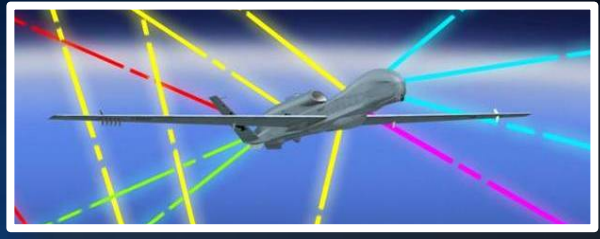
Auch das neue Maschinengewehr der Bundeswehr bereitet Probleme: Laut Informationen des SPIEGEL passt das MG5 nicht auf die Lafetten von Panzern und Geländefahrzeugen. Die Umrüstung kostet Millionen.

New MG5 Does Not Fit MG3 Gun-Mount (Interface with Existing Tanks & ATVs)

Source: http://www.spiegel.de/politik/deutschland/bundeswehr-neues-maschinengewehr-mg5-macht-probleme-a-1052458.html

PROBLEM STATEMENT

CHALLENGES OF STOVEPIPED ACQUISITIONS (CONT'D)



Germany axes Euro Hawk drone program

May. 14, 2013 - 01:00PM | By AGENCE FRANCE-PRESSE | Comments

A A A

FILED UNDER

World News
Europe

BERLIN — Germany has canceled a planned "Euro Hawk" drone program over fears that European authorities will not certify them, a defense ministry source said Tuesday after reported European safe concerns.

Germany had "no hope" of seeing the unmanned aircraft, part of a program that would have cost more than €1 billion (US $1.3 billion), approved for use, said the source, speaking on condition of anonymity.

The European Aviation Safety Agency has said it would certify the drones only to fly over unpopulated areas because of a lack of an anti-collision system to protect airliners, according to German press reports.

"The equipment is not ready for approval without immense expenditure," the source added.

Germany has already spent €508 million on a Euro Hawk prototype and was due to fork out a further €500 million on four more models.

German Euro Hawk Drone **Cancelled**

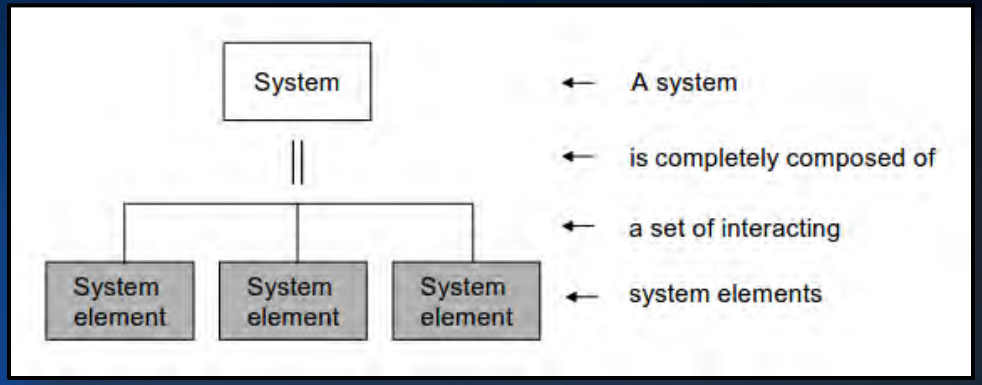
Lack of Anti-Collision System (**Interface** with Civilian Air Traffic Control)

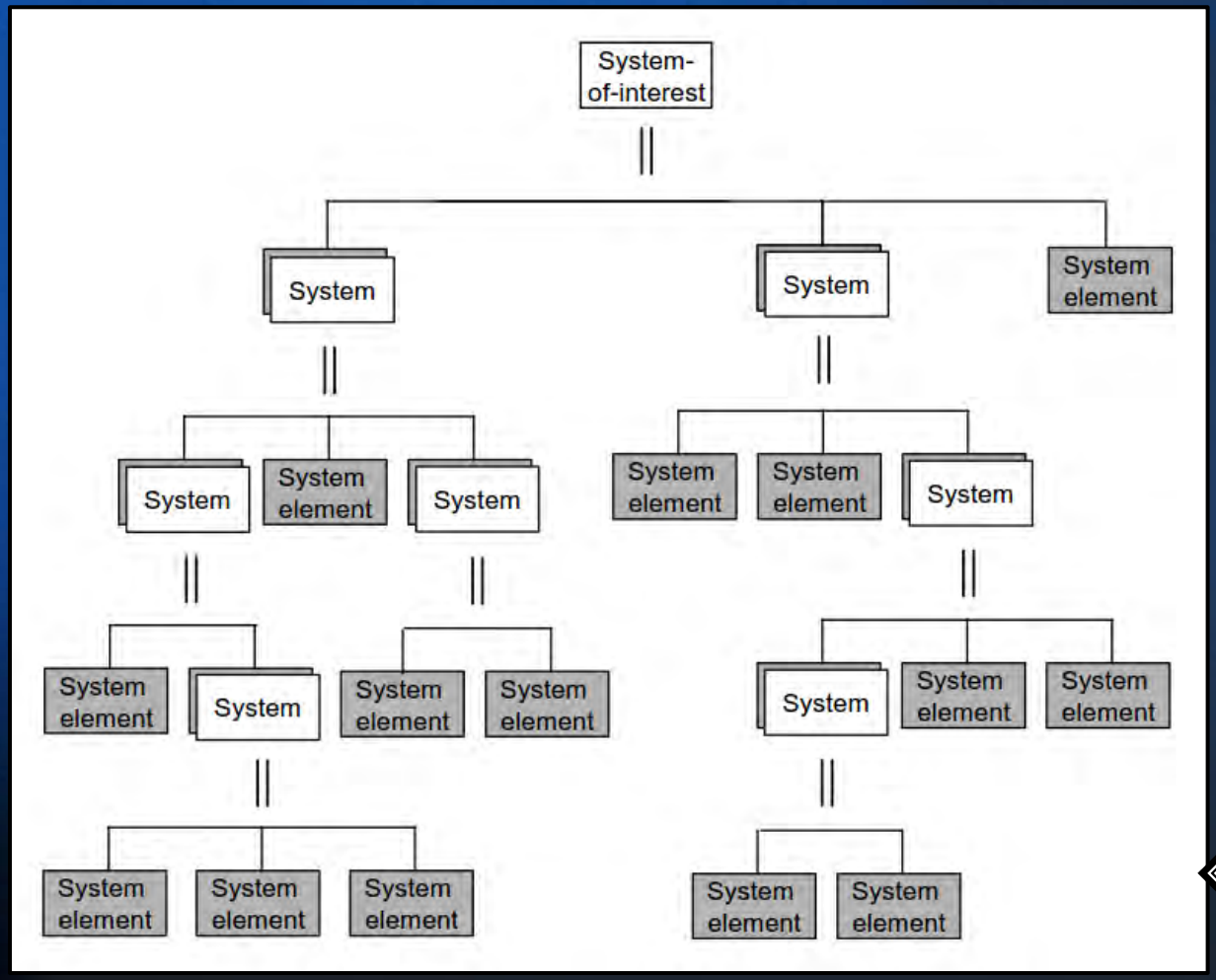
Equivalent (in %) of ca. $10 Billion Compared to US DoD Budget

Source: http://archive.defensenews.com/article/20130514/DEFREG01/305140015

SYSTEM OF SYSTEMS
THE BASICS

Hierarchy within a System
(Source: ISO/IEC 15288)





"Systems-of-Systems" (SoS) are systems-of-interest whose system elements are themselves systems, typically these entail large-scale inter-disciplinary problems involving multiple, heterogeneous, distributed systems. These interoperating collections of component systems usually produce results unachievable by the individual systems alone.
(Source: SE Handbook 3.2.2, Section 2.5 Systems-of-Systems).

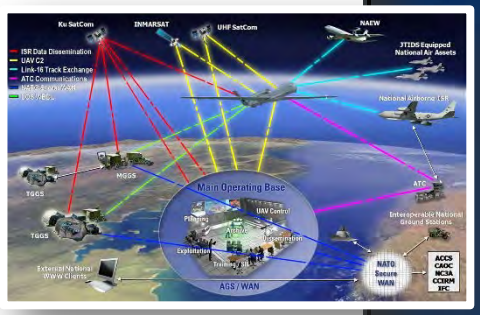
PROBLEM STATEMENT

NATO AGS SYSTEM PRESENTED AS A SYSTEM OF SYSTEMS

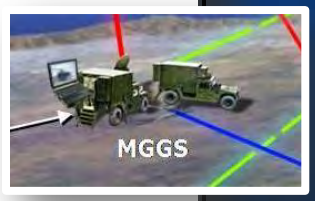
... Air Traffic Managem. ...

System of Systems (SoS)

... Civil Air Traffic Ctrl. ... NATO AGS System ...



... UAV ... Ground Vehicle Sys. ...



... Ground Vehicle ... Machine Gun ...

Constituent Systems & System Elements

CHALLENGES OF SYSTEM OF SYSTEMS ENGINEERING (SoSE)

SoS CHALLENGES AS DEFINED BY JOHN CLARK

What is Different About SoSE? – My Perspective

J Clark

- The management (e.g., acquisition) processes are inadequate, not the technical (SE Standards) processes:
  - There is no god (no overall Program Manager) of a SoS (Dr Larry Pulman)
  - Acquisitions are stovepipes (single systems, not SoS)
  - Systems are directed to "integrate" with other systems, often after fielding
  - Suppliers don't cooperate with each other (they believe it's not in their best interest)
  - Acquirers don't cooperate with each other for the same reason
  - SoS costs more up-front to develop (but saves much more later)
  - Interoperability is hampered by lack of SoSE

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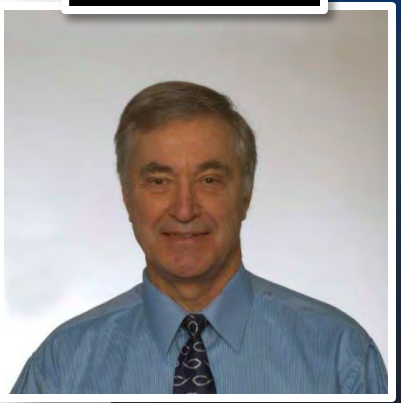
John Clark



Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

CHALLENGES OF SYSTEM OF SYSTEMS ENGINEERING (SoSE)

SoS CHALLENGES AS DEFINED BY INCOSE

SoS Challenges*	Description*
System elements are operated independently	➢ Each system element within SoS likely to operate independently
System elements have different life cycles	➢ SoS involves more than one system element ➢ Some system elements are possibly in development life cycle, while others are being deployed and operated, or in extreme cases even scheduled for disposal
Initial SoS requirements are likely to be ambiguous	➢ Requirements for system element are maturing during development, even more so for SoS under development
Complexity is a major issue	➢ Complexity of system interaction grows in non-linear fashion if system elements are added ➢ Conflicting or missing interface standards can make it hard to define data exchange across system element interfaces
Management can overshadow engineering	➢ Each system element may have own project/product office ➢ Coordination between requirements, budget constraints, schedules, interfaces, upgrades, etc. further complicates SoS development
Fuzzy boundaries cause confusion	➢ Definition and scope of SoS, management of boundaries are typically not controlled by one entity ➢ Results in non-definition of external interfaces
SoS engineering is never finished	➢ Even after successful SoS deployment, management of various system element life cycles need to be managed due replacements, improvements, etc.

* Source: Excerpted from Systems Engineering Handbook 3.2.2, Section 2.5 Systems of Systems

UNDESIRABLE OUTCOMES

RESULTS OF STOVEPIPING OR SILO ENGINEERING

Source: http://i81.photobucket.com/albums/j236/dimitri_the_pirate/RedneckCarAirConditioner.jpg

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- **Objectives**
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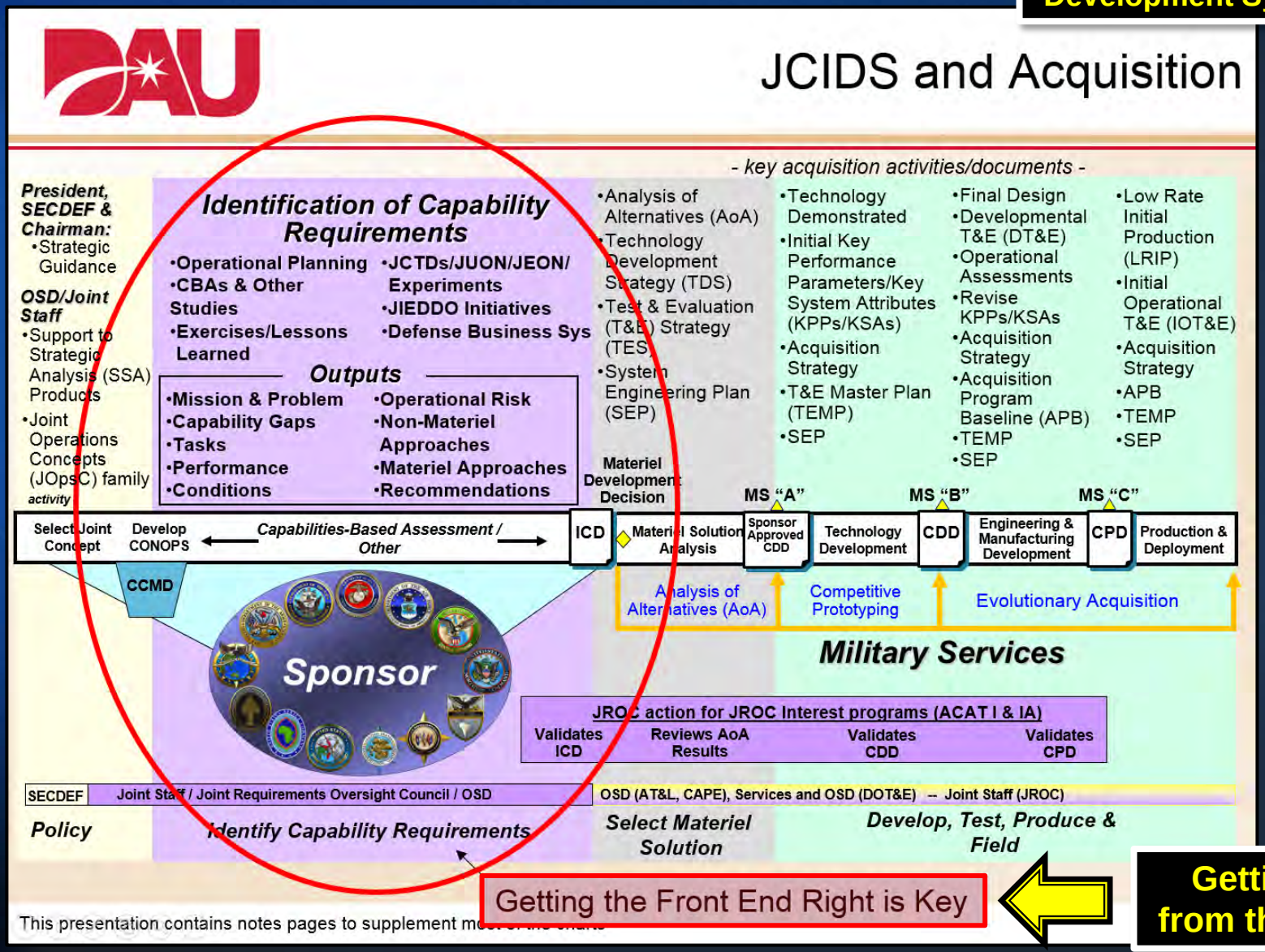
OBJECTIVES

GETTING IT RIGHT FROM THE BEGINNING

Joint Capabilities Integration Development System (JCIDS)

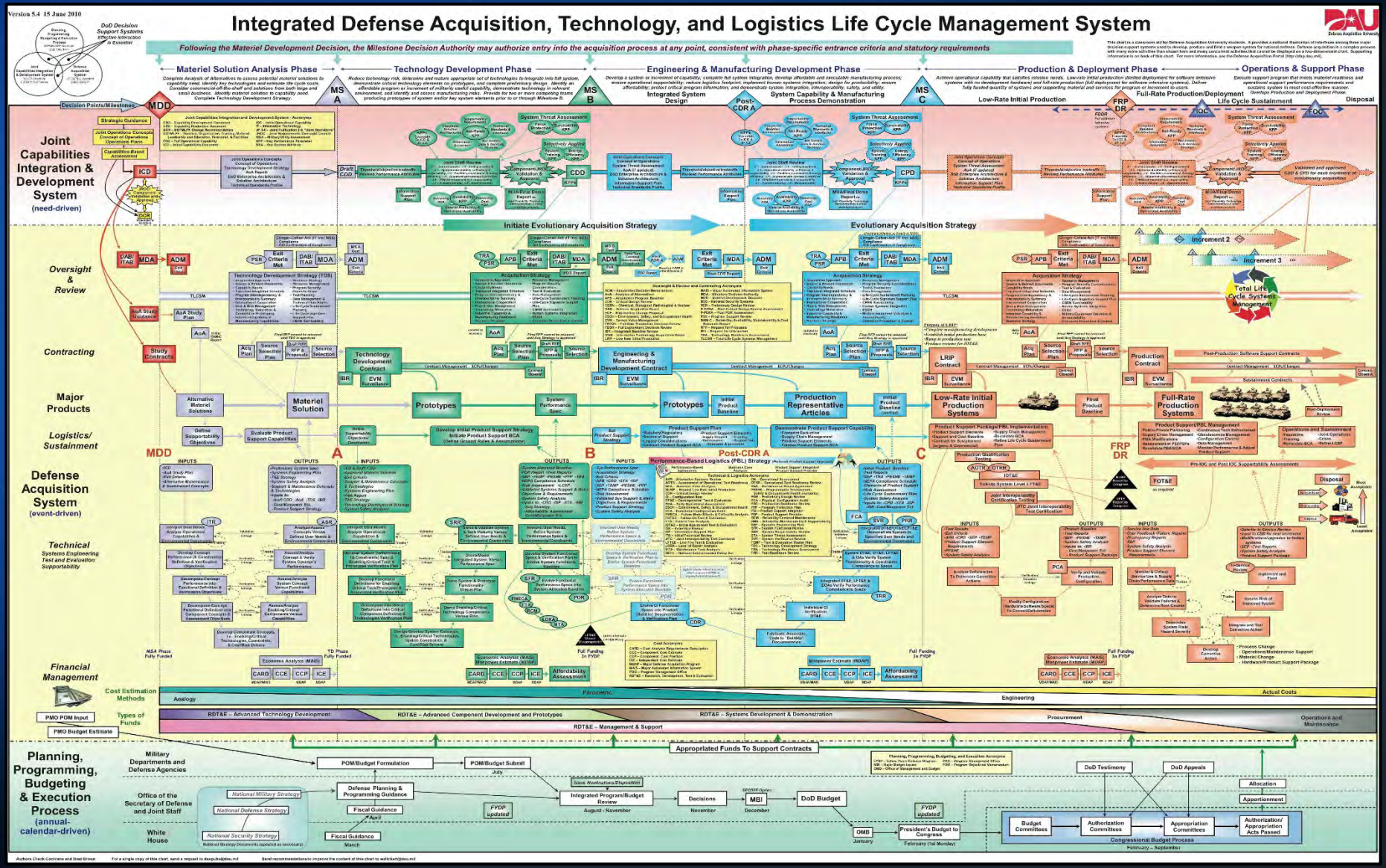


Getting it Right from the Beginning

Source: http://www.dau.mil/homepage%20documents/JCIDS_Primer_ver_%204_02162012.pptx

OBJECTIVES

COMPATIBLE WITH EXISTING DEFENSE ACQUISITION PROCESSES



Source: http://cimsec.org/wp-content/uploads/2015/08/atl_wall_chart.jpg

OBJECTIVES

ADDRESSING THE SoS CHALLENGES

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SoS engineering is never finished	➢ Even after successful SoS deployment, management of various system element life cycles need to be managed due replacements, improvements, etc.

Focus on Controlling the **Interfaces** between Systems Elements and External Systems

Be Aware of and Mitigate the **Risks** of the Seven Challenges

Part of the systems engineer's job in an SoS environment is to be aware of and mitigate the risk of each of these seven challenges. Focus is placed on controlling the interfaces between system elements and external systems. It is especially important to ensure that the interfaces are still operational when an older component system is replaced with a newer version. Verification and validation (V&V) processes play a critical role in such transitions.

Verification and Validation Processes Play a Critical Role

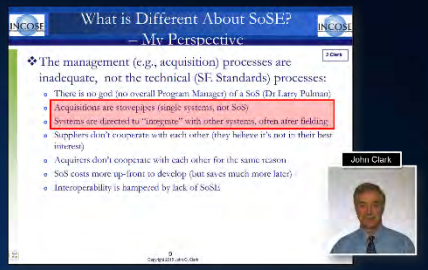
Ensure **Interfaces** are still Operational when replacing Element Systems

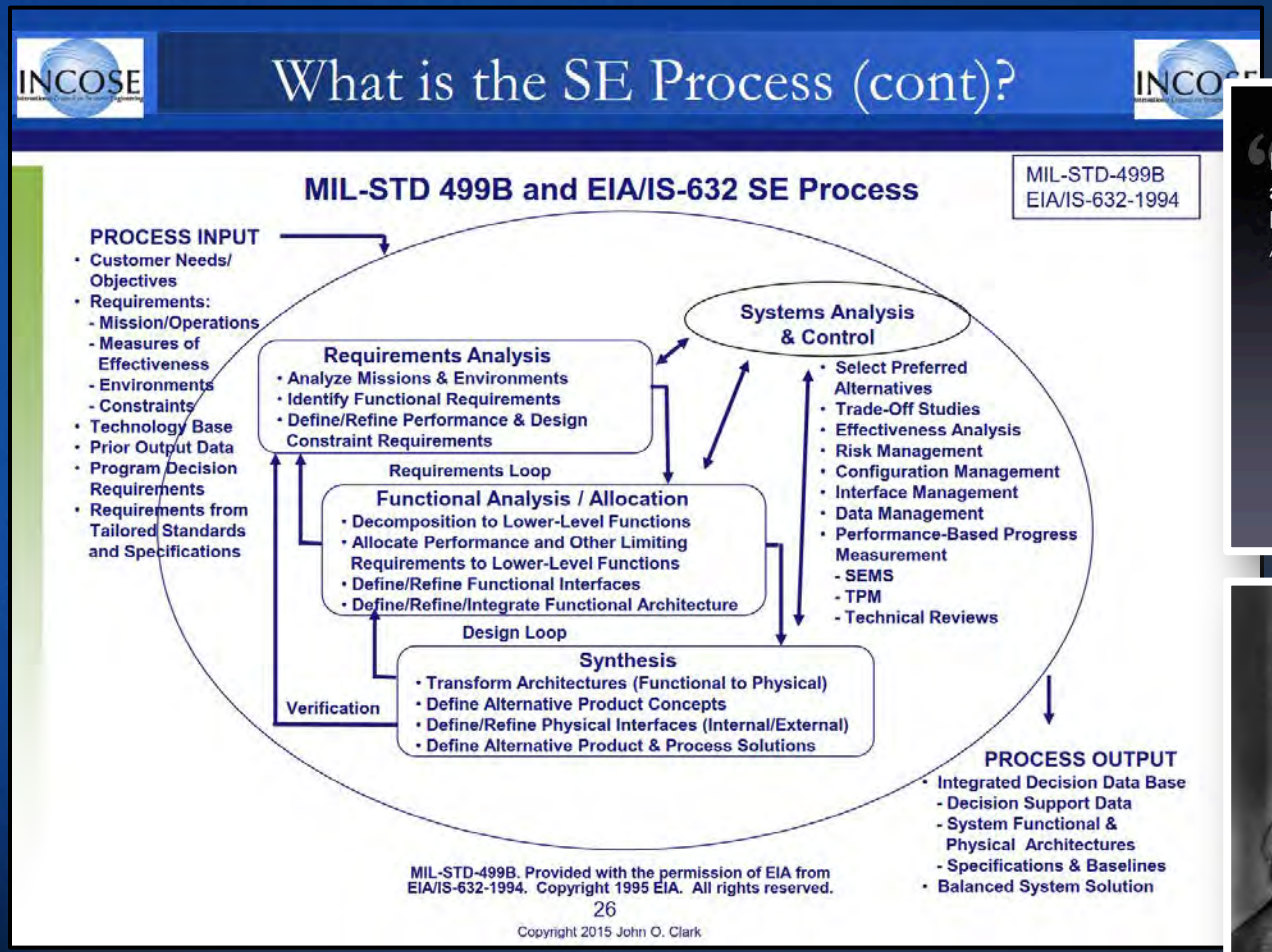
Requirements Management

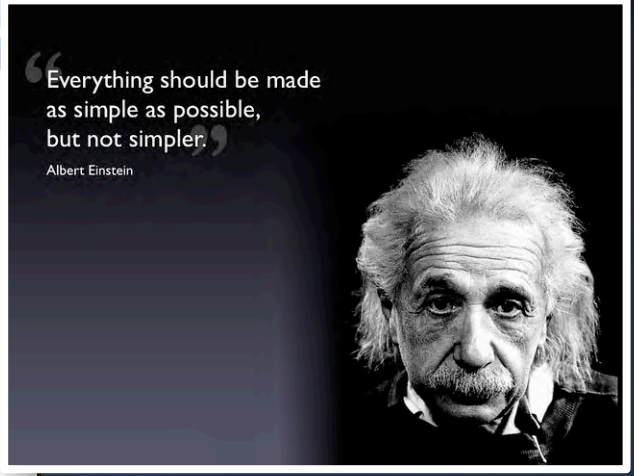
* Source: Systems Engineering Handbook 3.2.2, Section 2.5 Systems of Systems

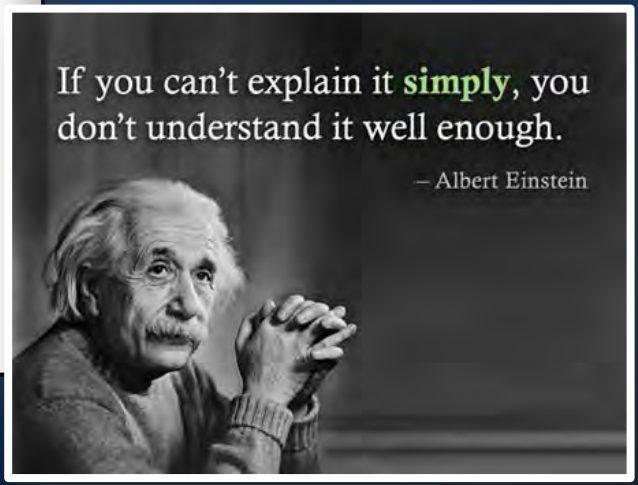
OBJECTIVES

CREATE SIMPLE MODEL USEFUL FOR SoS ENGINEERING









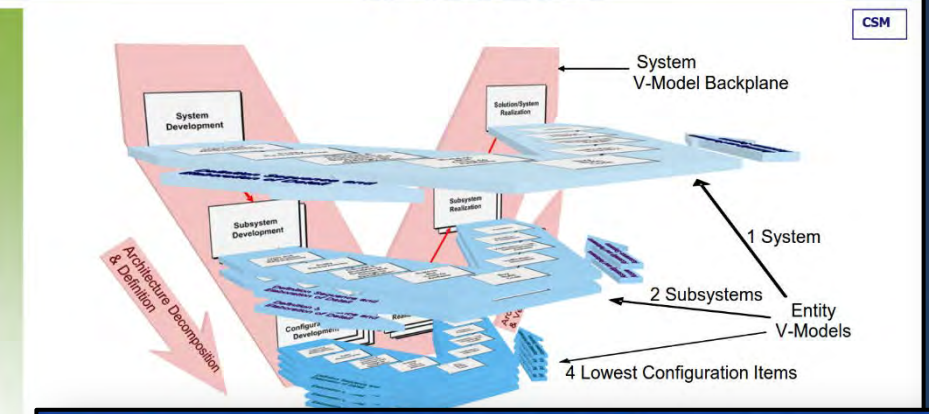
Based on Existing Systems Engineering Process

Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

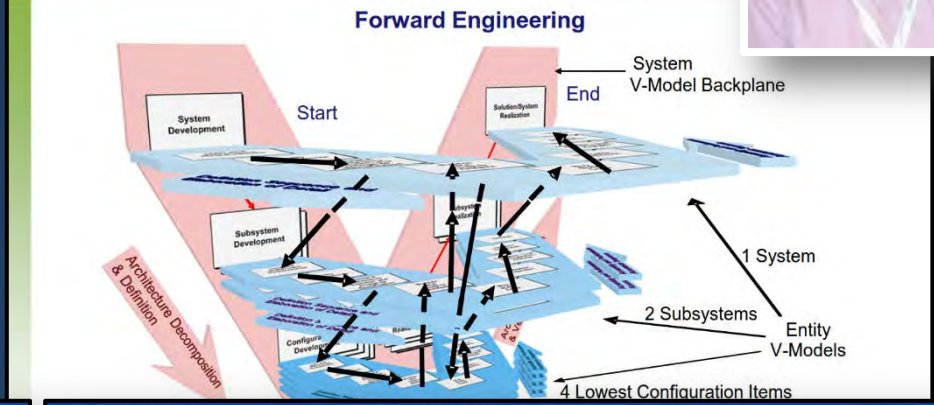
DUAL-V MODEL (FOR COMPARISON)

Kevin Forsberg

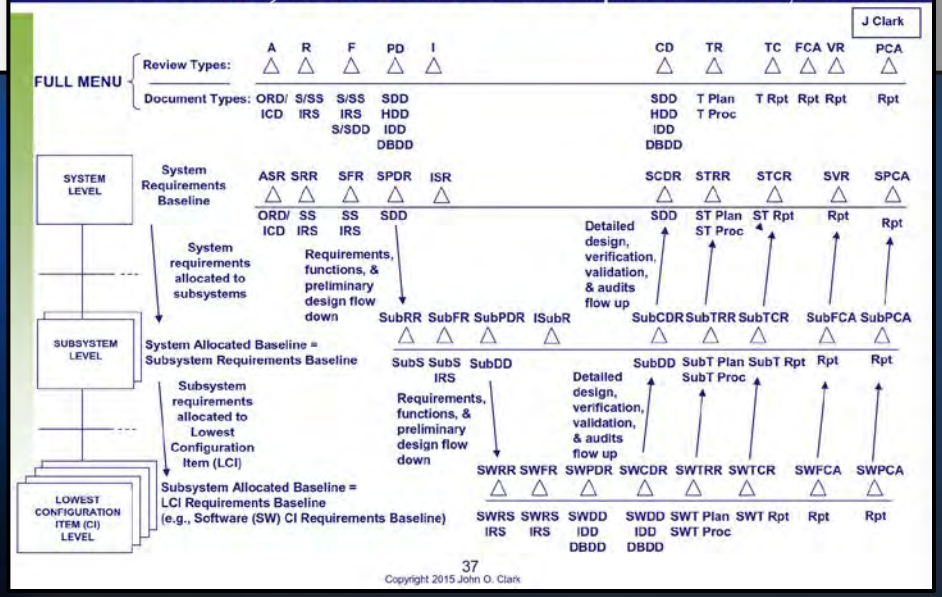
Dual V-Model Example for a System



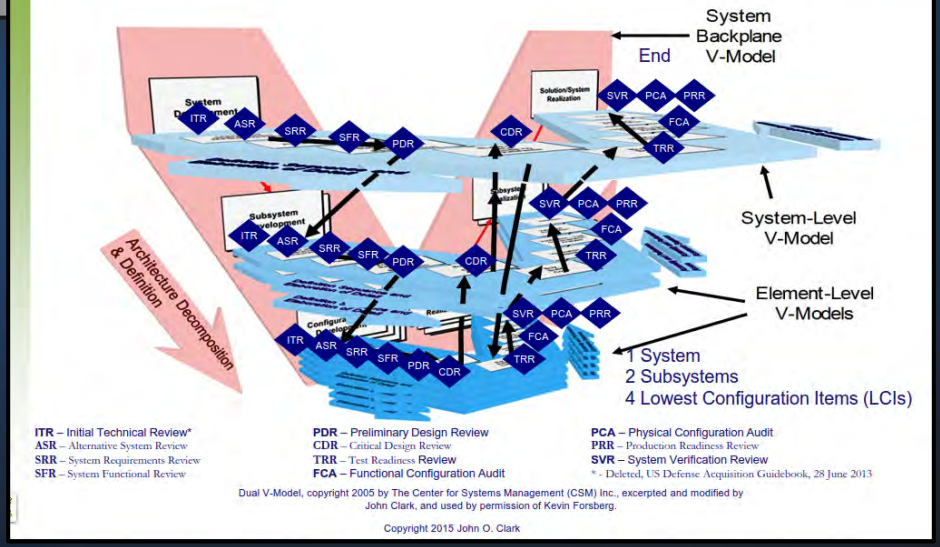
Dual V-Model Example for a System (cont)



Technical Baselines, Documents, Reviews, and Audits Example for a System



Dual V-Model Example Technical Reviews & Audits for a System



Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

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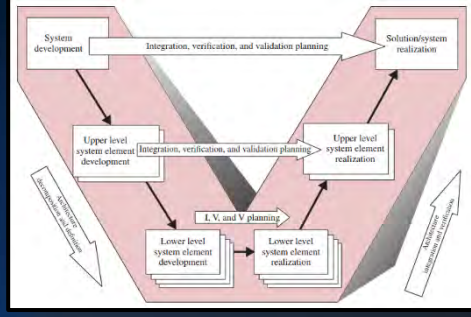
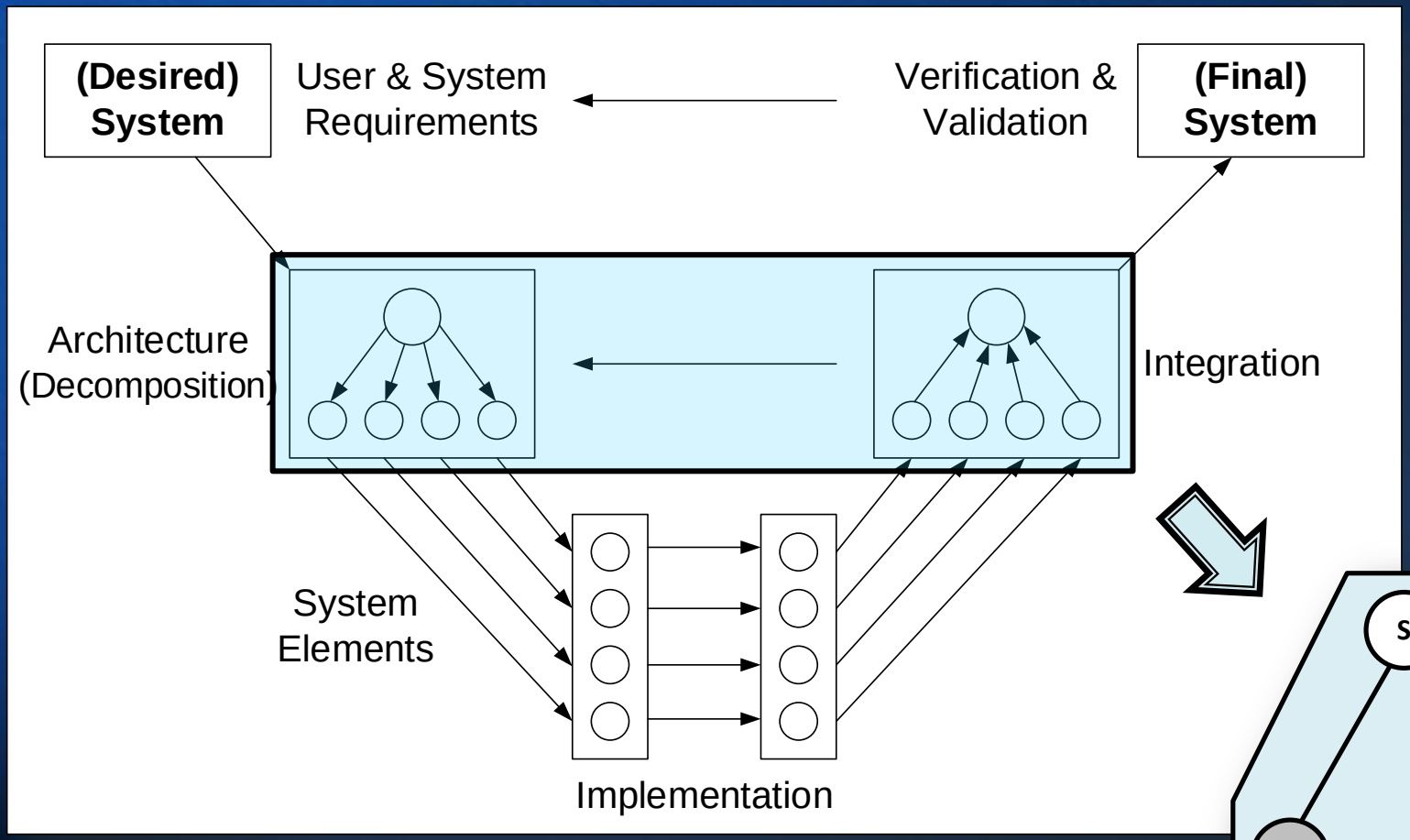
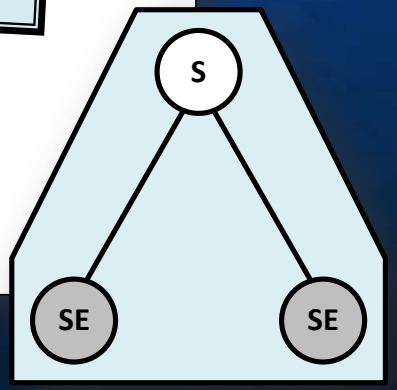
SoS-VEE Model

CREATING THE MAIN BUILDING BLOCK

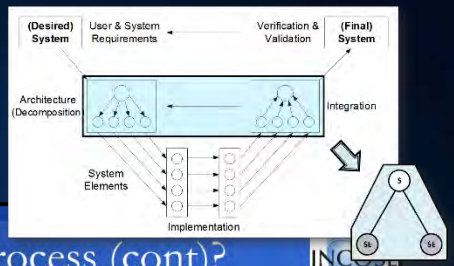






SoS-VEE Model

CREATING THE MAIN BUILDING BLOCK (CONT'D)

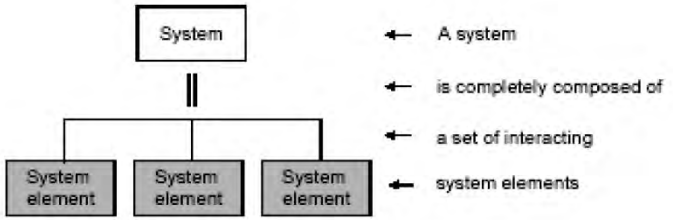


What is a System? (cont)

System and System Element Relationship

ISO/IEC TR 24748-1

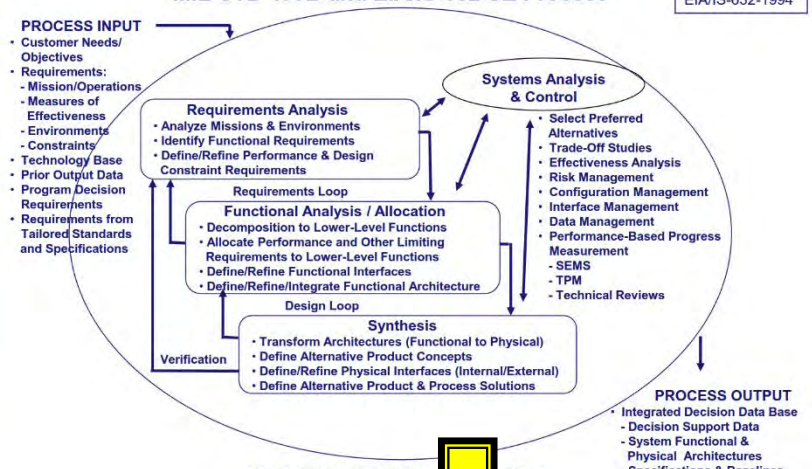
(This concept is critical to understanding 15288 and the INCOSE SE Handbook)



What is the SE Process (cont)?

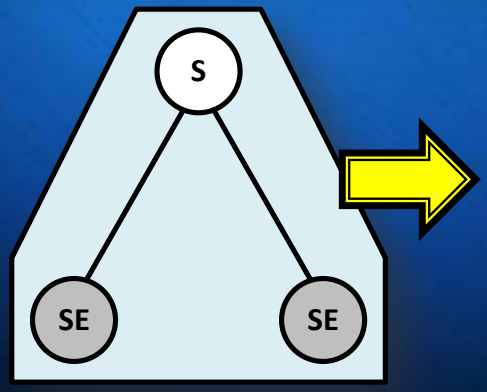
MIL-STD 499B and EIA/IS-632 SE Process

MIL-STD-499B
EIA/IS-632-1994



System

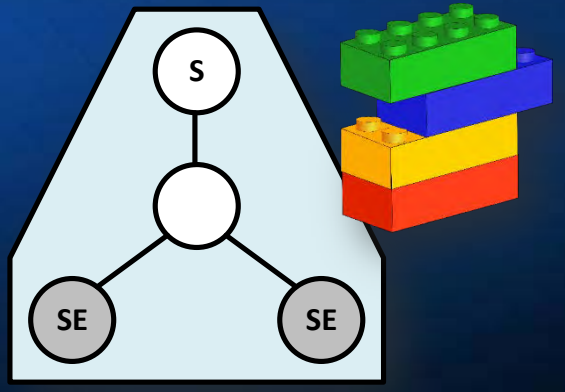
System Element



Stakeholder Needs & Requirements (SNR)

System Requirements Definition (SR)

Architecture Definition Process (AD)

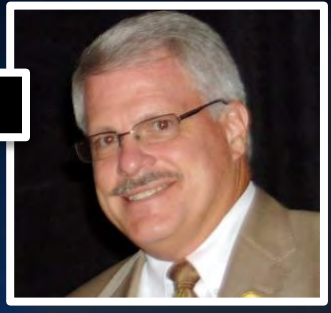


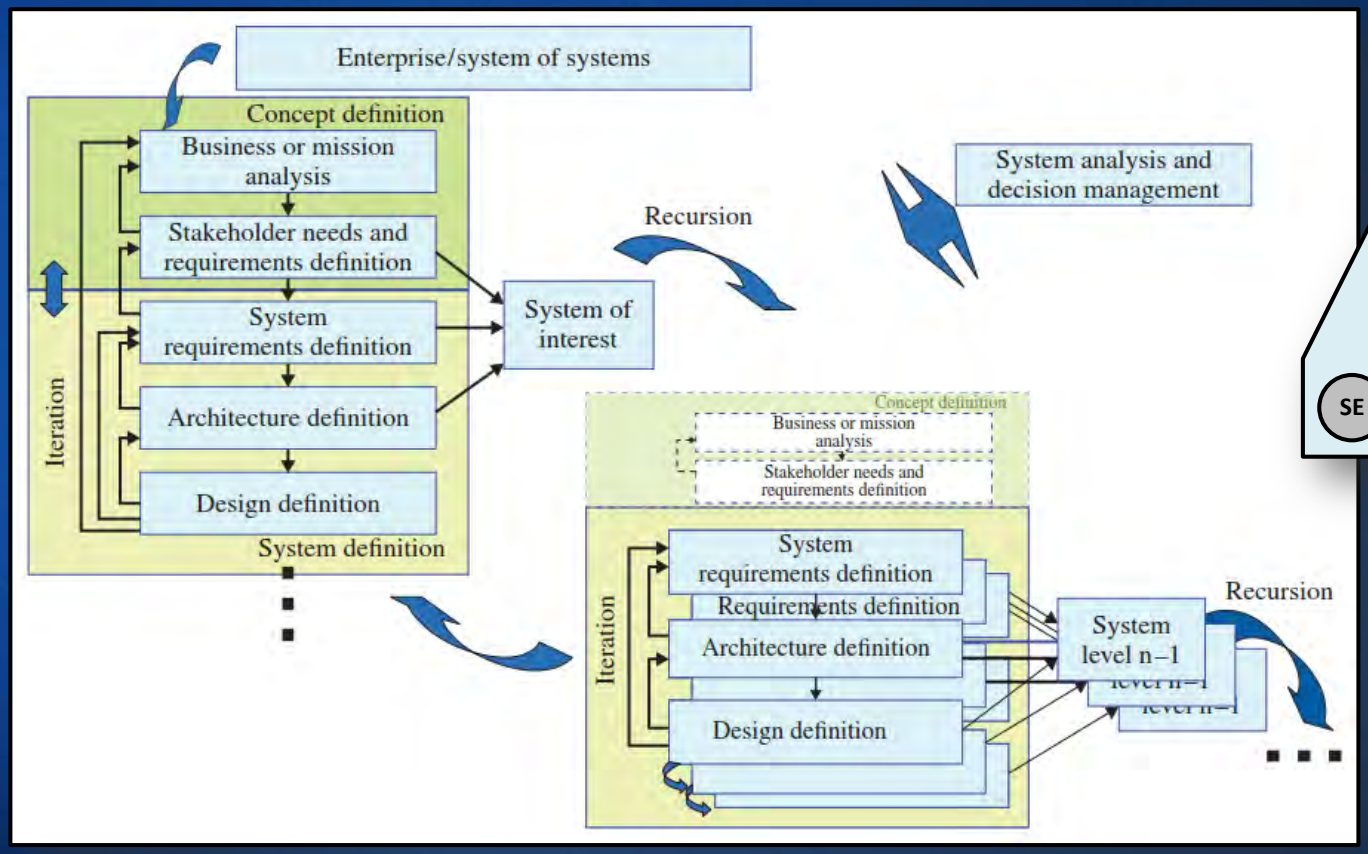
*Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

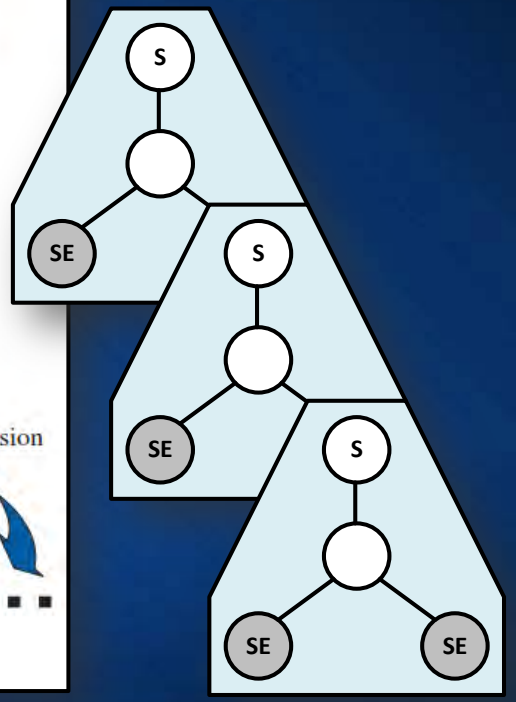
OBJECTIVES

APPLY ITERATION AND RECURSION PRINCIPLES

Garry Roedler







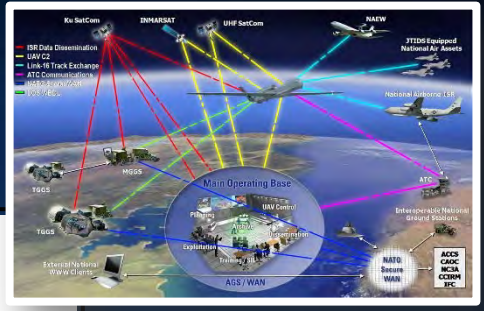
Iteration and Recursion by Garry Roedler

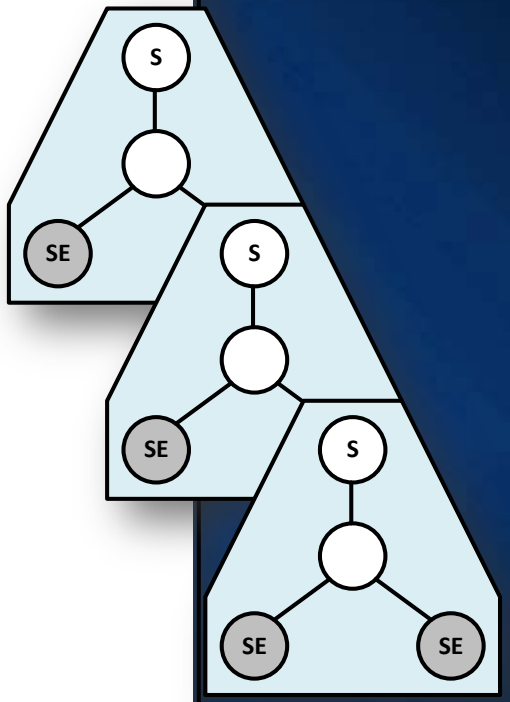
Apply to SoS-VEE Model

Source: Systems Engineering Handbook , Fourth Edition, Figure 3.5, Garry Roedler

OBJECTIVES

APPLY ITERATION AND RECURSION TO NATO AGS SYSTEM

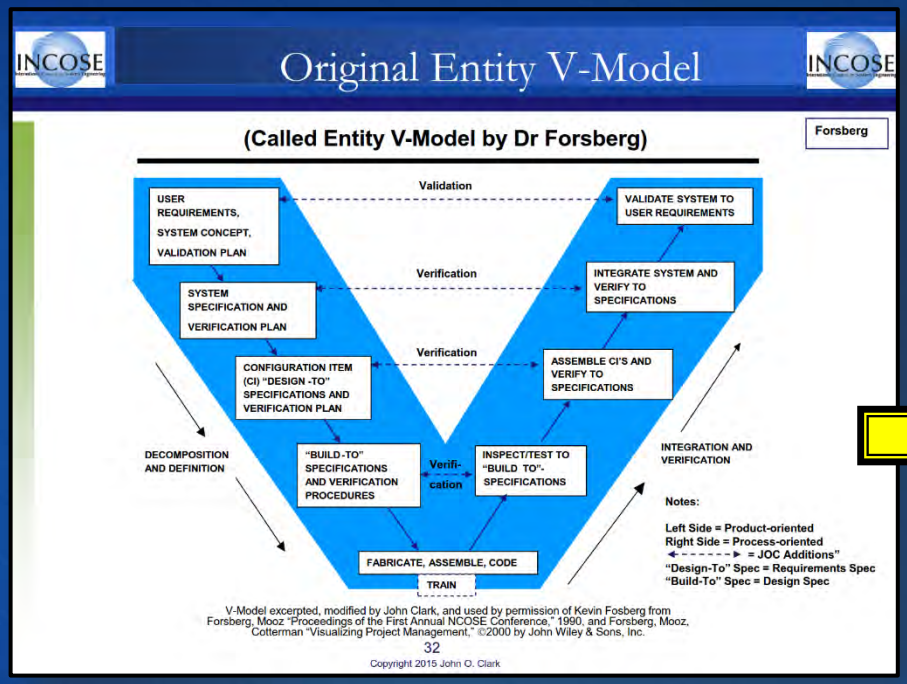


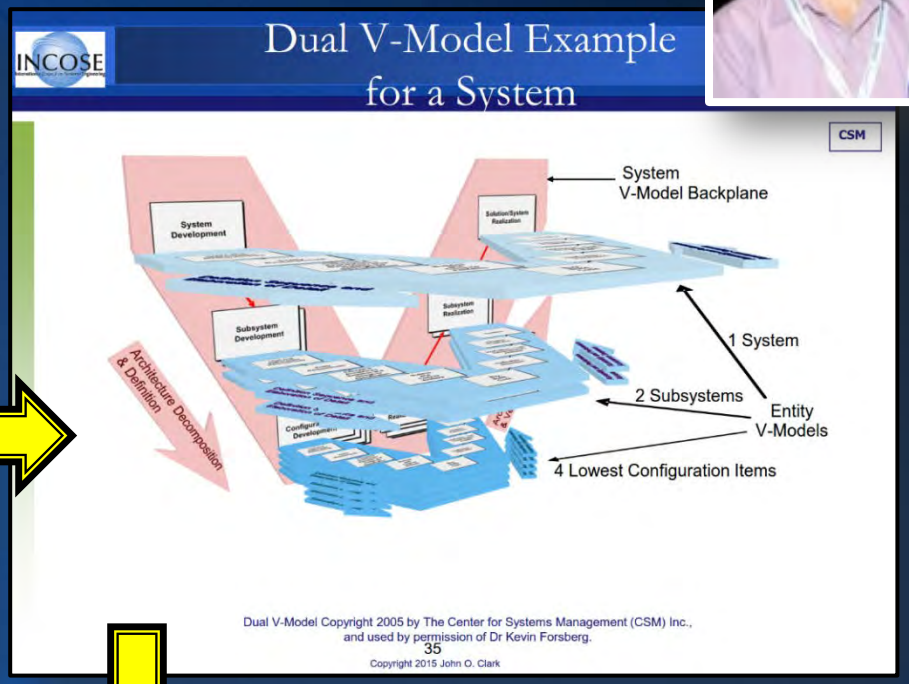


SoS-VEE Model

CREATING AN SoS-VEE (ENTITY) LAYER

Entity V-Model by Dr Kevin Forsberg*

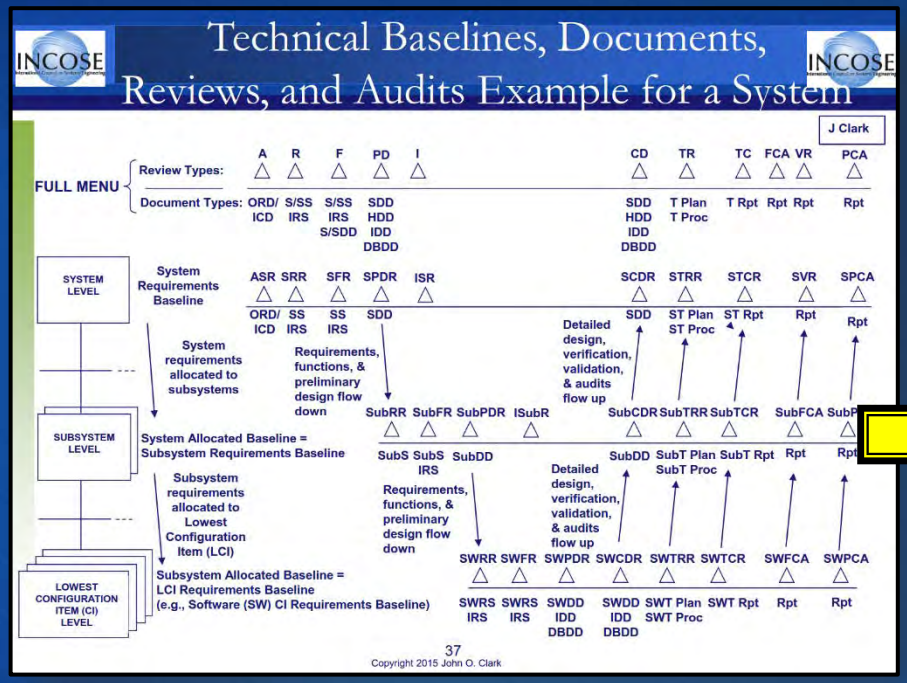


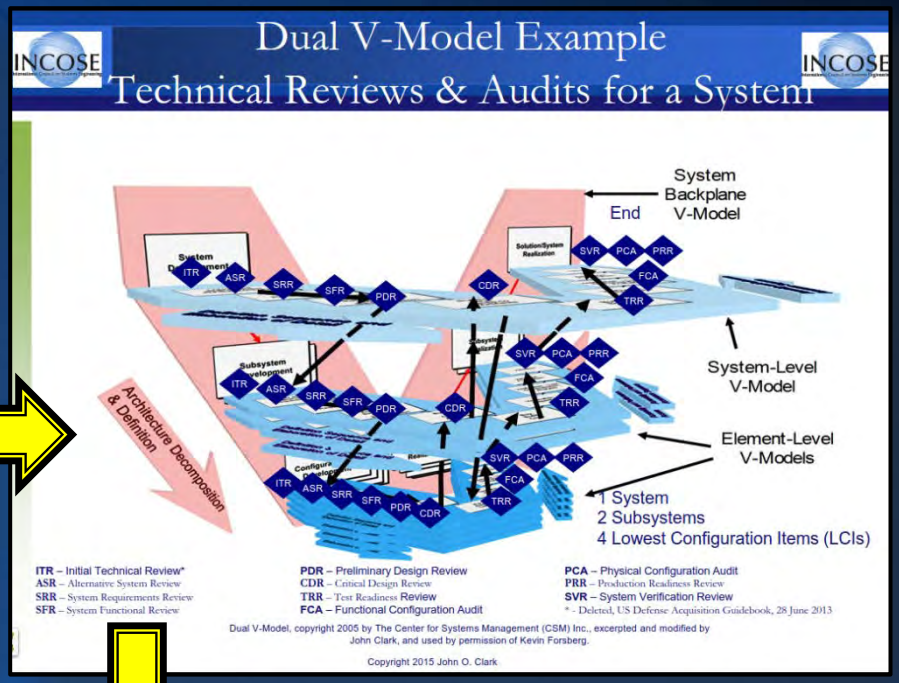


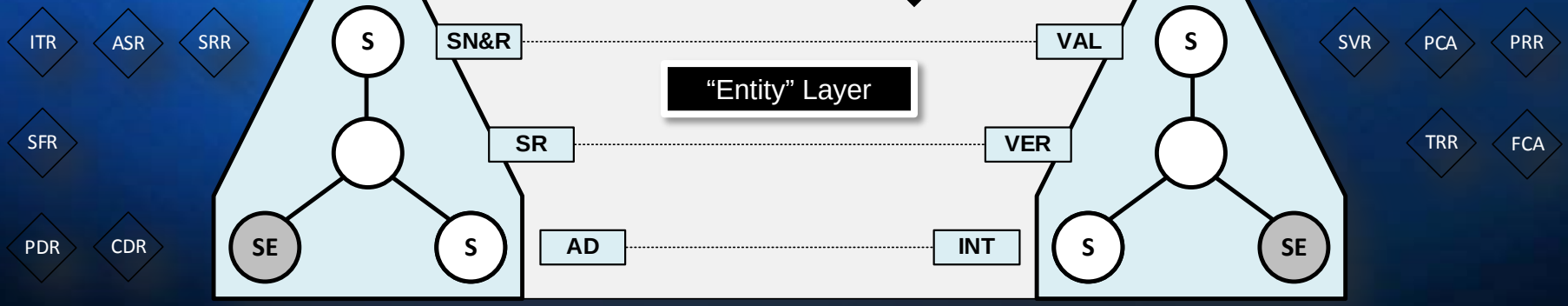
*Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

SoS-VEE Model

ASSIGN REVIEW AND AUDIT MILESTONES







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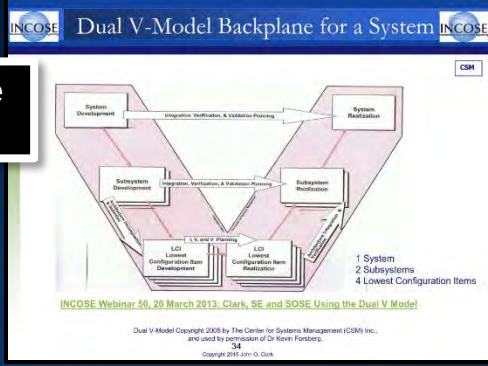
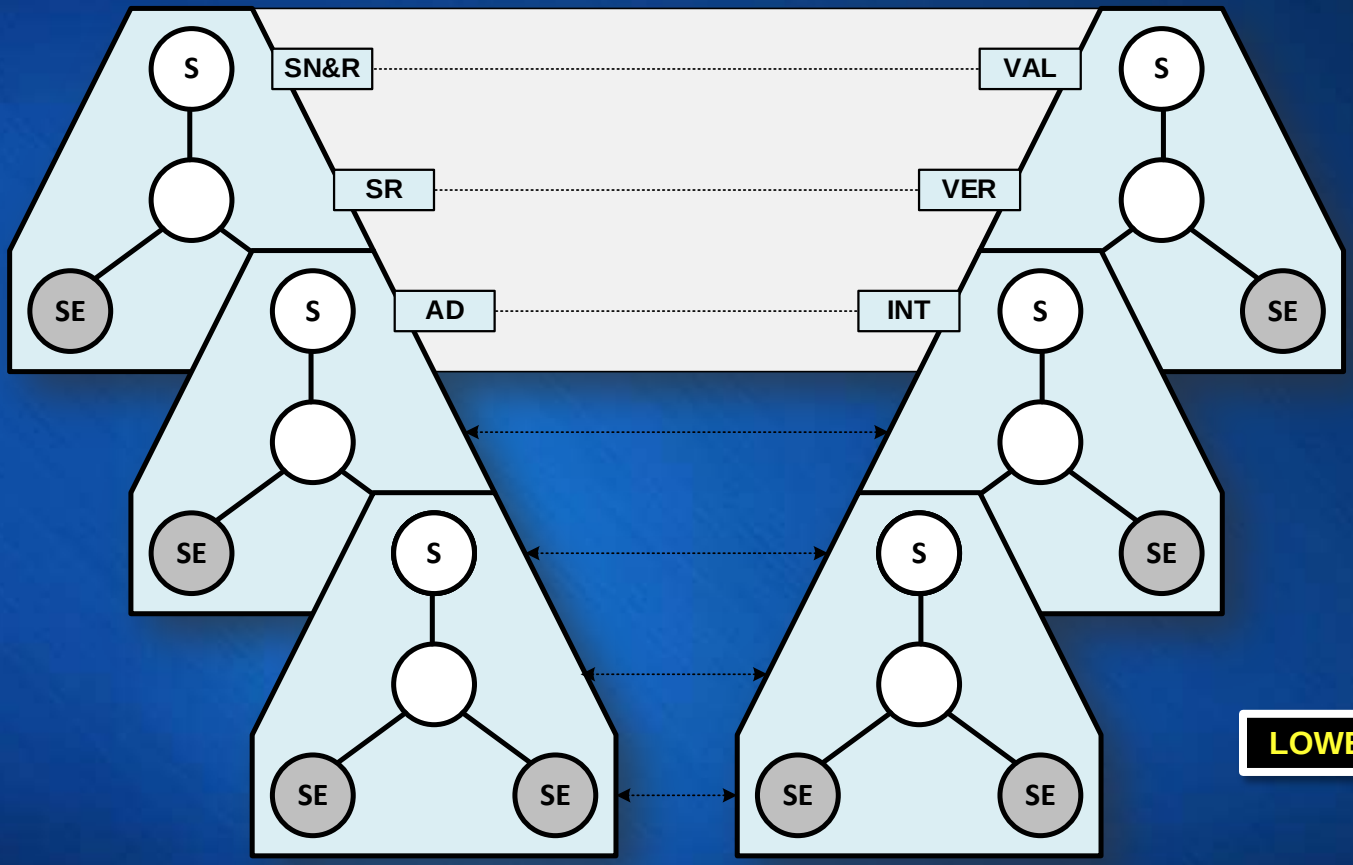
SoS-VEE Model

BUILDING THE HIERARCHY

Dual V-Model Backplane
by Dr Kevin Forsberg*





SYSTEM

SUBSYSTEM

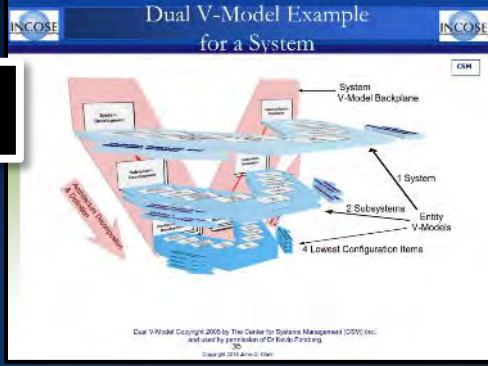
LOWEST CONFIGURATION ITEM

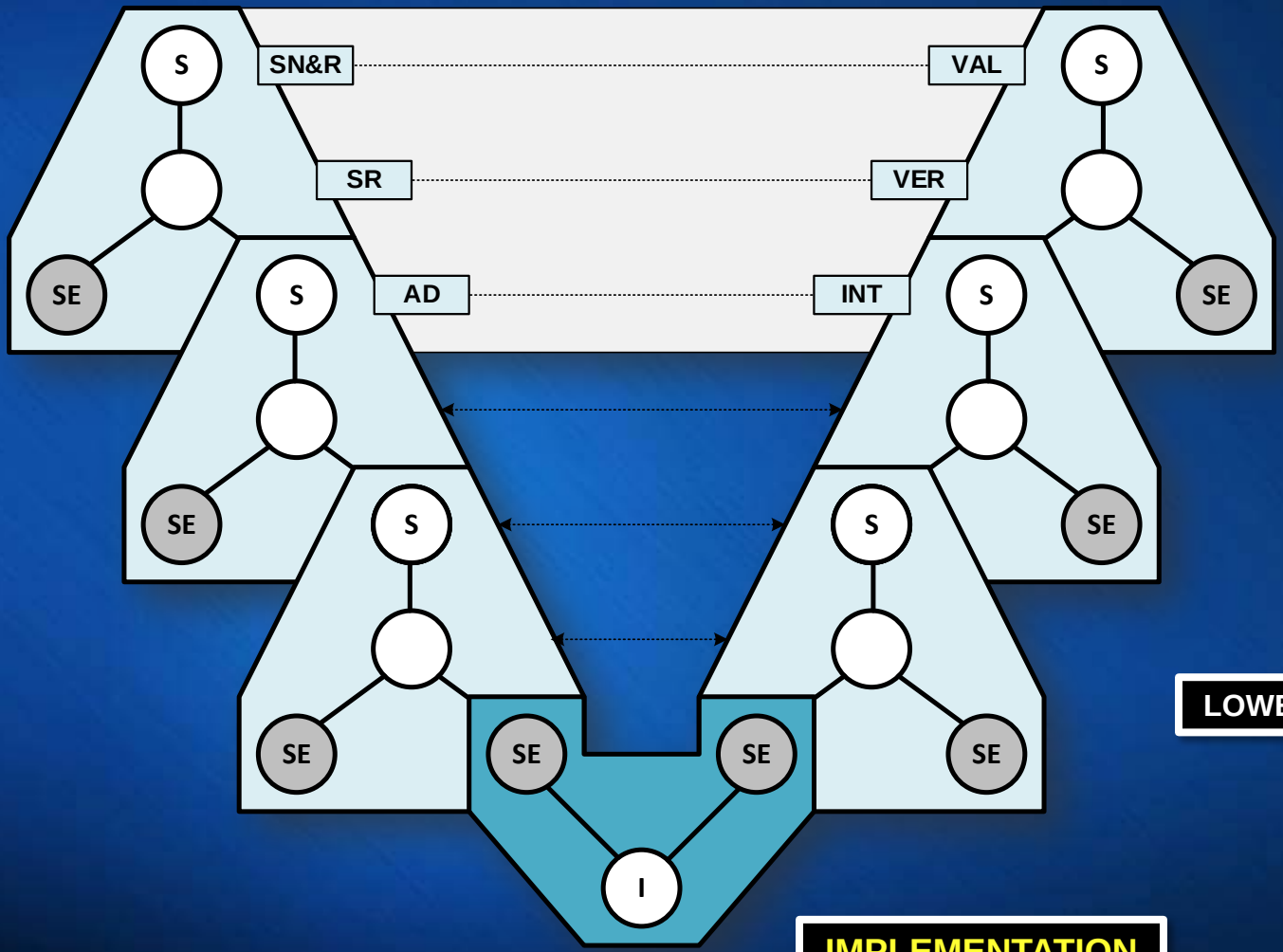
*Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

SoS-VEE Model

IMPLEMENTING SYSTEM ELEMENTS

Dual V-Model by Dr Kevin Forsberg*





SYSTEM

SUBSYSTEM

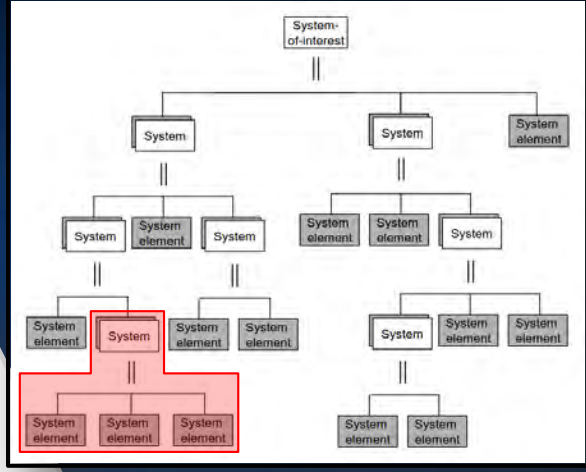
LOWEST CONFIGURATION ITEM

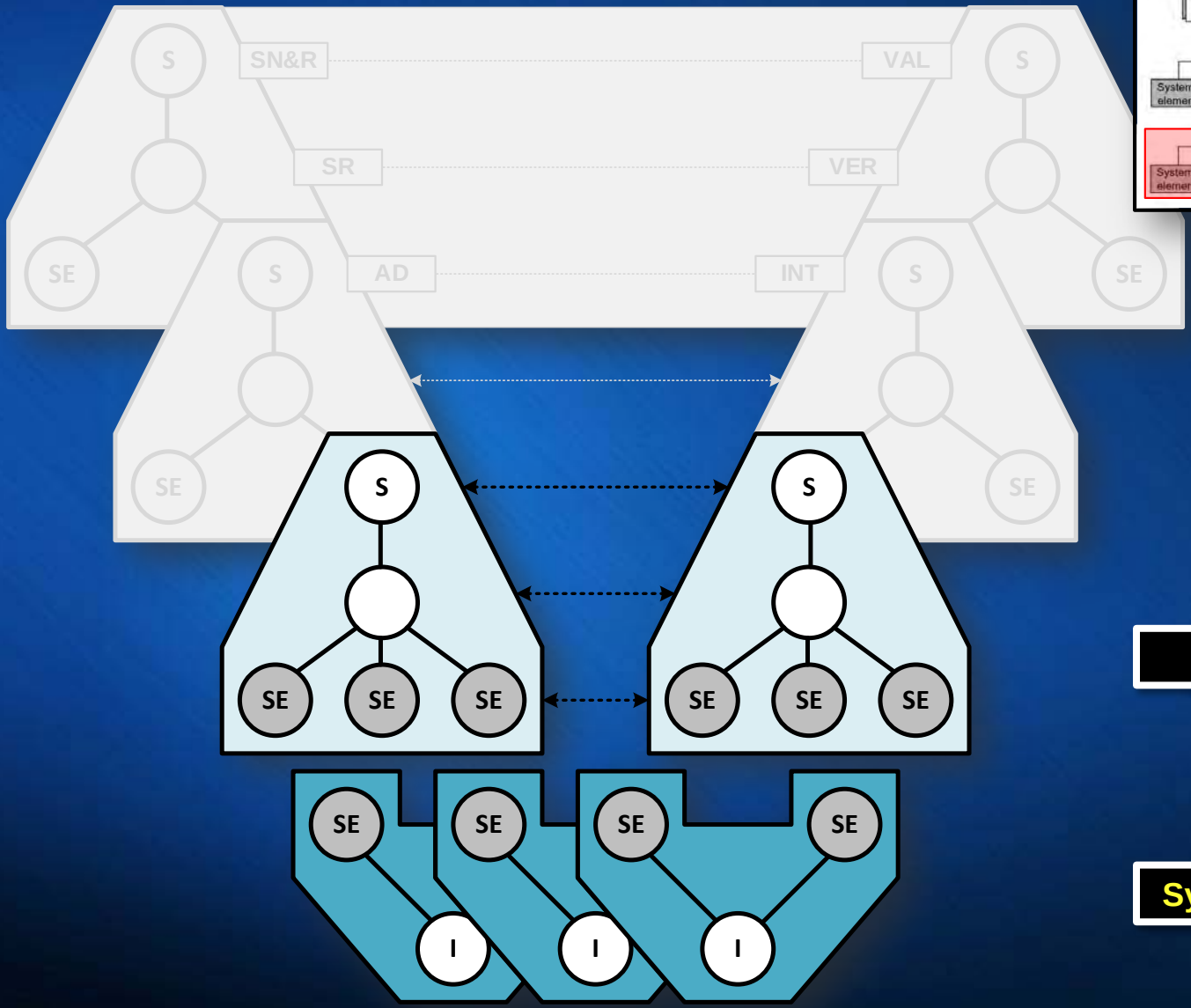
IMPLEMENTATION

*Source: "SoSE from the SE Standards, INCOSE SE Handbook, and Dual V-Model Perspective", INCOSE Webinar 72, Feb 18, 2015, John Clark

SoS-VEE Model

SYSTEM WITH SEVERAL SYSTEM ELEMENTS





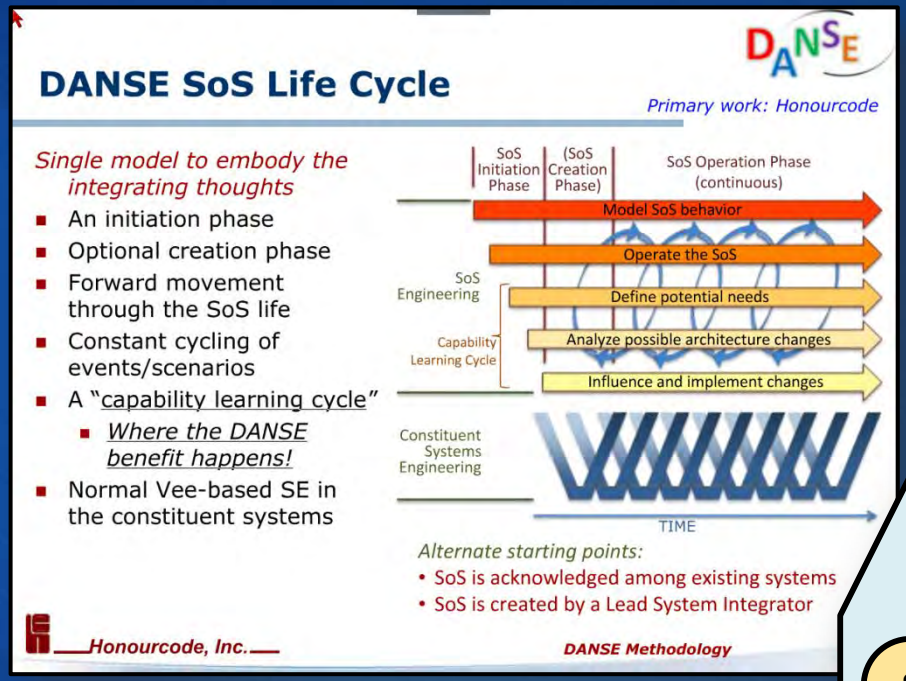
System

System Elements

SoS-VEE Model

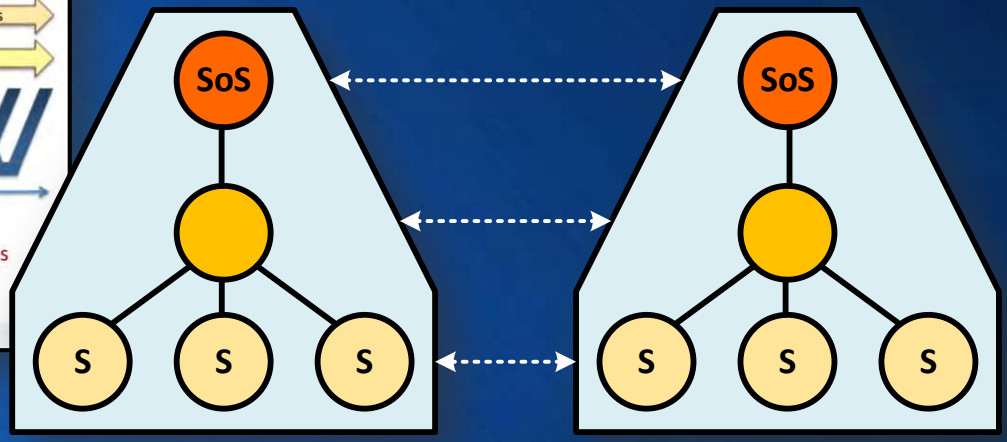
DANSE SoS LIFE CYCLE vs. SoS-VEE

Eric Honour

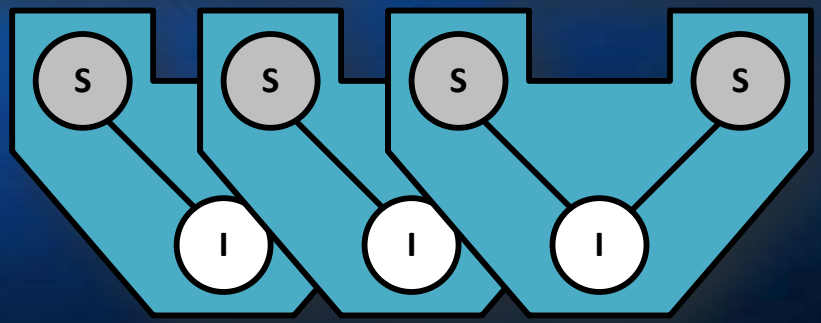


DANSE SoS Life Cycle*

System of Systems Engineering



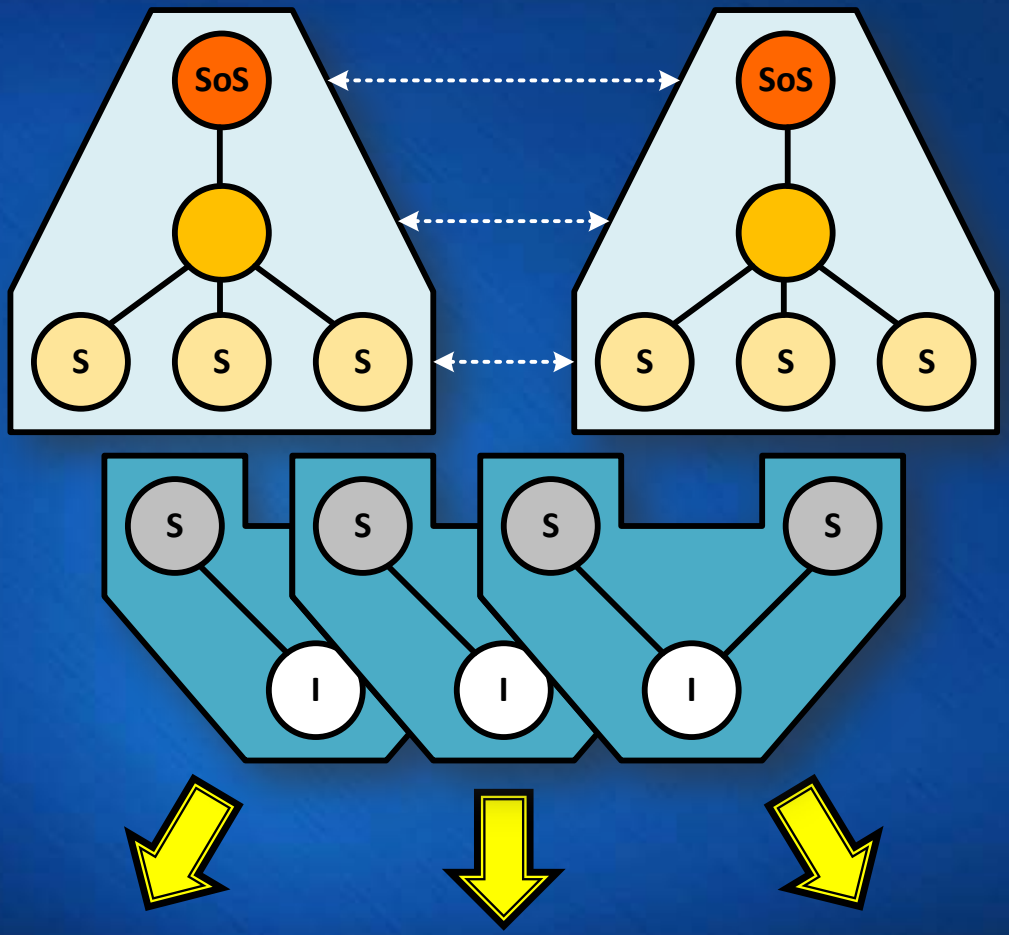
Constituent Systems Engineering

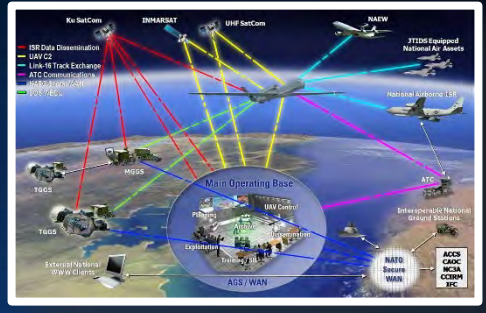


Source: "DANSE – Final Report on SoS Methodology and Tools", INCOSE SoS WG Series, June 26, 2015, Eric Honour

SoS-VEE Model

INDIVIDUAL SYSTEM LIFE CYCLE NEEDS





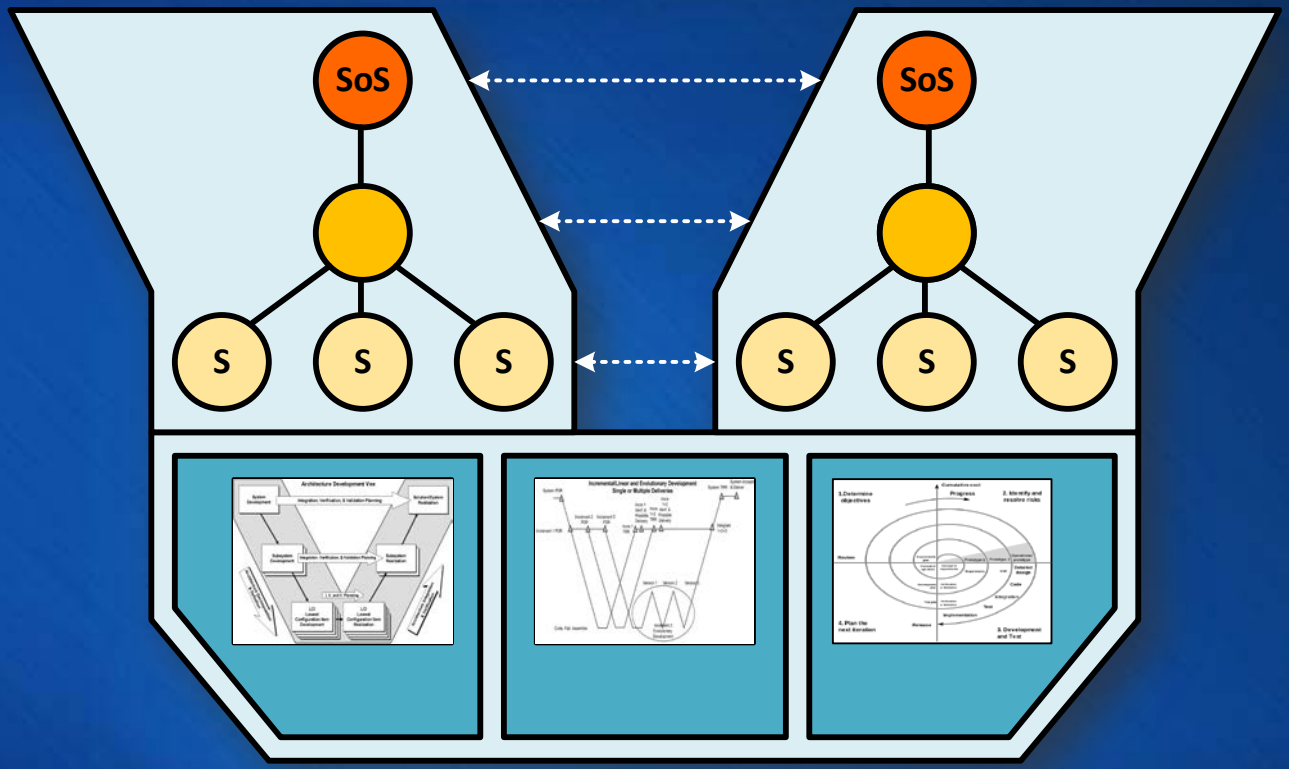
System of Systems Engineering

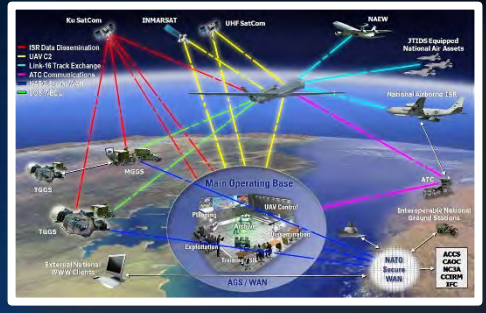
Constituent Systems Engineering

Individual System Life-Cycle Needs

SoS-VEE Model

INDIVIDUAL SYSTEM LIFE CYCLE NEEDS





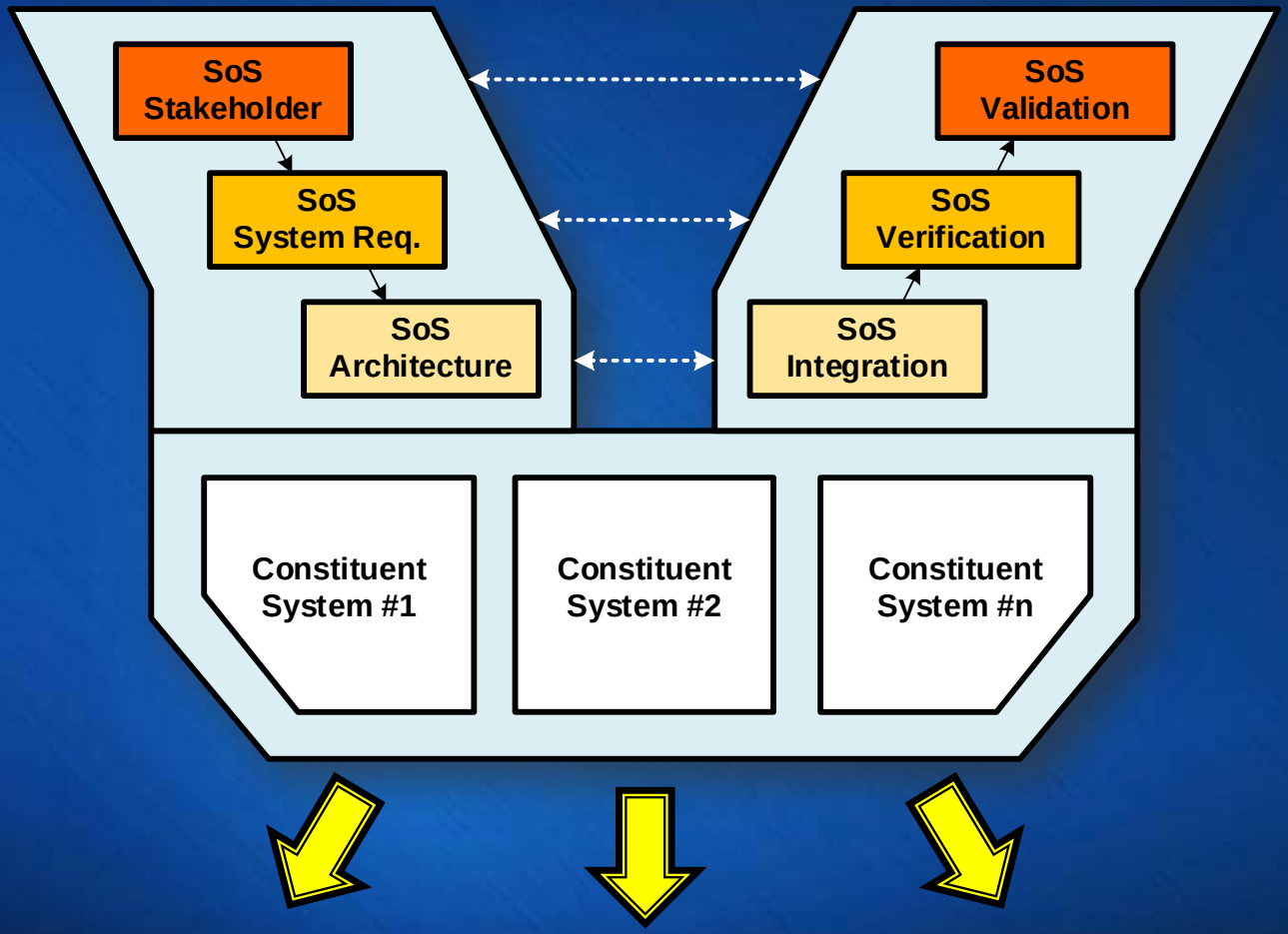
System of Systems Engineering

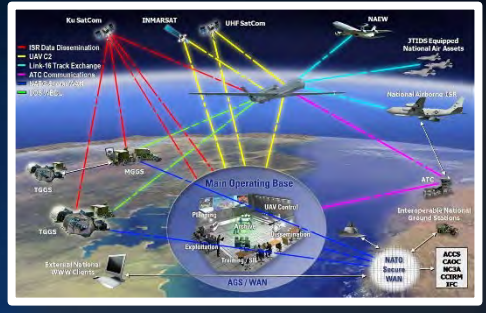
Constituent Systems Engineering

Individual System Life-Cycle Needs

SoS-VEE Model

INDIVIDUAL SYSTEM LIFE CYCLE NEEDS





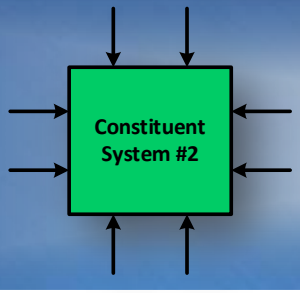
System of Systems Engineering

Constituent Systems Engineering

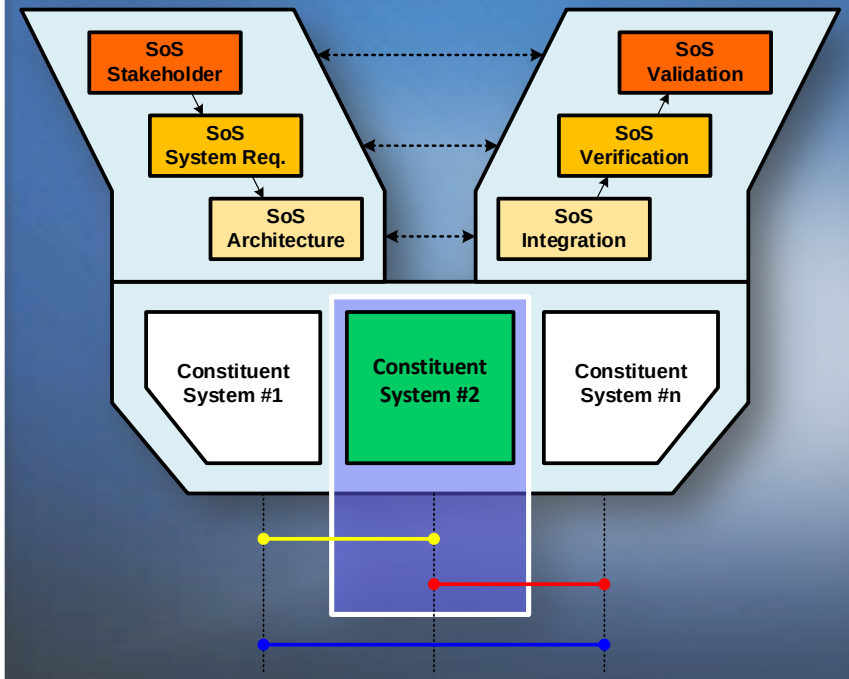
Individual System Life-Cycle Needs

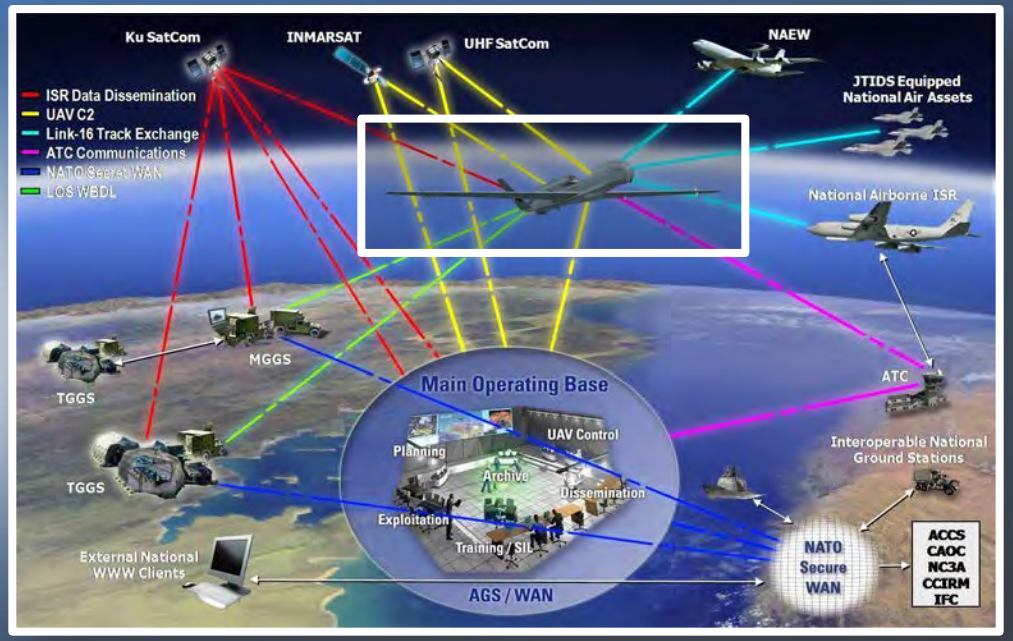
SoS-VEE Model

SYSTEM VS. SYSTEM OF SYSTEMS ENGINEERING



SYSTEMS ENGINEERING

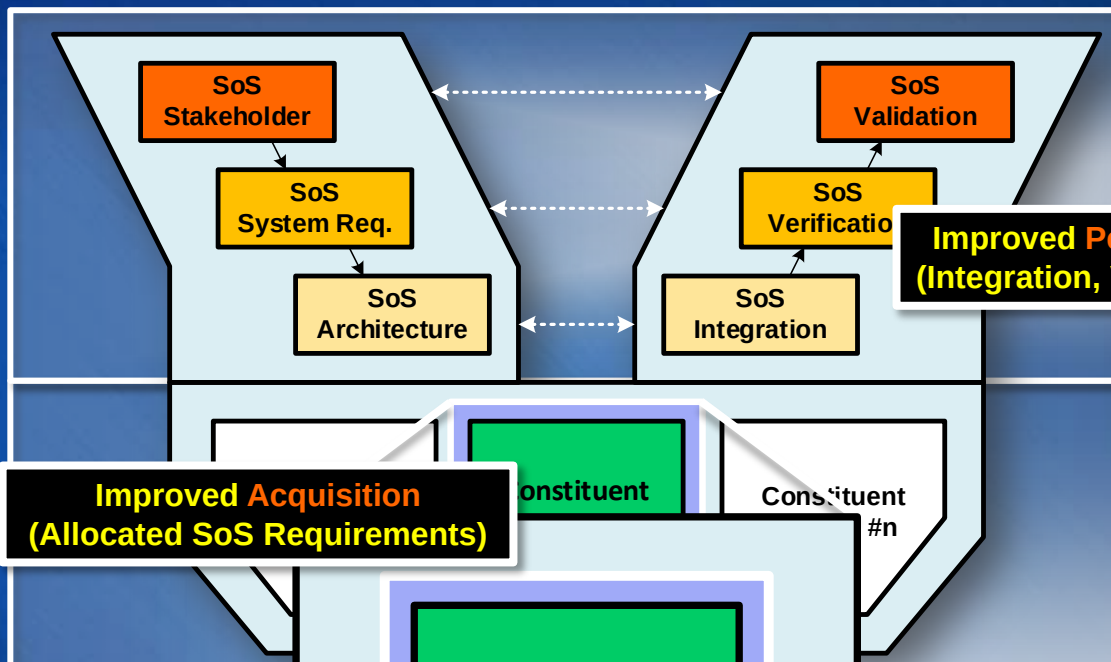




SYSTEM OF SYSTEMS ENGINEERING USING SoS-VEE MODEL

SoS-VEE Model

REVIEW AGAINST OBJECTIVES

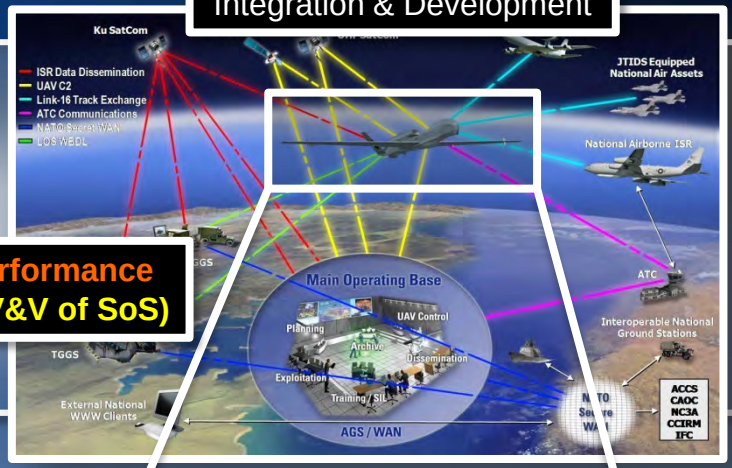


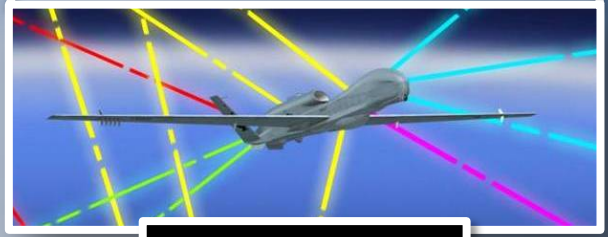
Improved Acquisition (Allocated SoS Requirements)

Improved Performance (Integration, V&V of SoS)

Improved Interoperability (Identified Interfaces)

Joint Capability Integration & Development

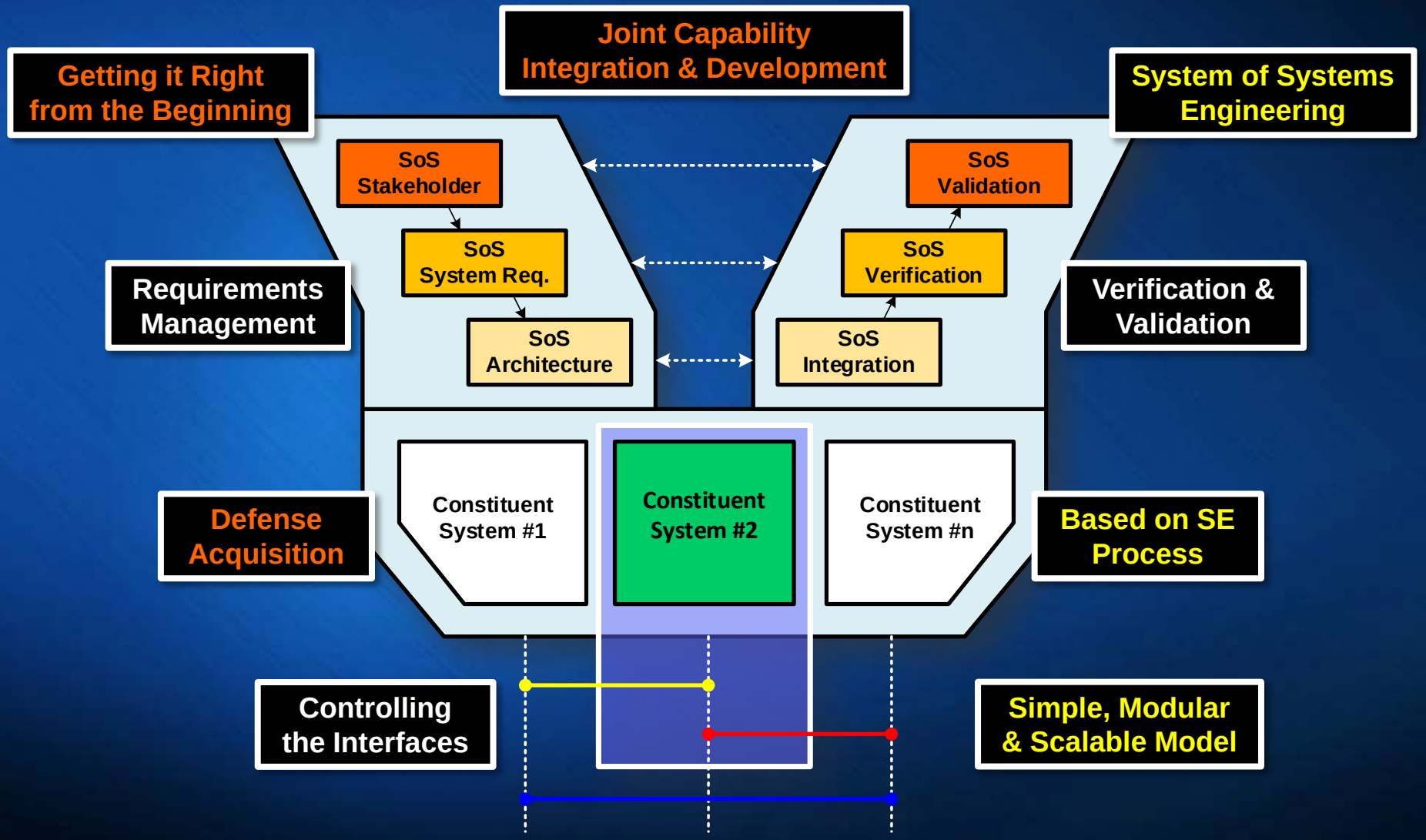




Individual Defense Acquisition

SoS-VEE Model

REVIEW AGAINST OBJECTIVES (CONT'D)

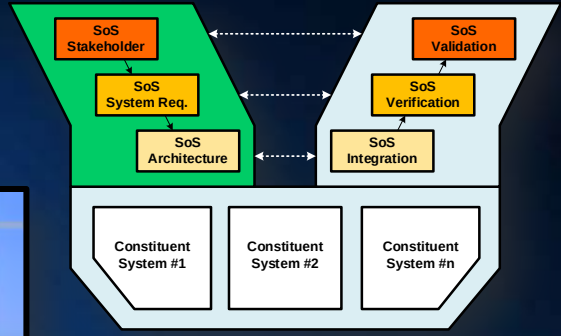


PROGRESS

- Problem Statement
  - Challenges of System of Systems Engineering
- Objectives
  - Simple Model Useful for System of Systems Engineering
- Offered Solution: SoS-VEE Model
  - Main Building Block
  - Building the Model
  - Review against Objectives
- **Proof of Concept**
  - Application to System of Systems Engineering
  - Application to Project Management
  - Application to Conceptual MBSE (Outlook)
- Summary

PROOF OF CONCEPT

APPLICATION TO OTHER INDUSTRIES



Turning Large Projects into Precision Guided Programs

A Case for a Program Development Life-Cycle Model

Oliver M. Hoehne, PMP
Senior Professional Associate & Project Manager
Parsons Brinckerhoff, Transit & Rail Systems
2 Gateway Center, 18th Floor, Newark, NJ 07102
hoehneom@pbworld.com

Abstract. *"In World War II it could take 9,000 bombs to hit a target the size of an aircraft shelter. In Vietnam, 300. Today we can do it with one laser-guided munition from an F-117" [1]. The development of laser guided weapons (Figure 1) has dramatically improved the accuracy of GP (general purpose) weapon guidance and delivery [2].*

Figure 1: General Purpose Weapon Delivery with Laser Guidance K

As was the case in World War II and Vietnam, large programs undertaken t
not hit their targets the first time either, and are often pla
degraded project capabilities. INCOSE acknowledges the v
in addressing those issues and discusses several system
approaches to manage projects successfully. However, none of the existing
known or even accepted in the transportation industry, with some of the rea
as simple as the use of a system development life-cycle in an infrastructure

This paper describes the search for the "right" SDLC that is applicable to l
infrastructure programs, compares several existing SDLC models against
criteria, and determines that a new program development life-cycle (PDLC)

The author acknowledges that there may be more than one PDLC model. T
proposed (as presented in Figure 2) is based on the standard VEE model
laser guided weapon described above, will provide a guidance kit to sup
execution and testing of large programs. The proposed PDLC model is
Program-VEE (Pg-VEE™) model[1] and will be describe in this paper,

Welcome to the Webinar – if you have not dialed into the audio portion, please do so now. In the U.S., dial 1-855-747-8824, passcode **4348124177**. If you are outside the U.S., the webinar discussion forum includes a list of toll-free numbers for different countries. Please note that your phone is automatically on mute when you join to avoid disturbing other participants.

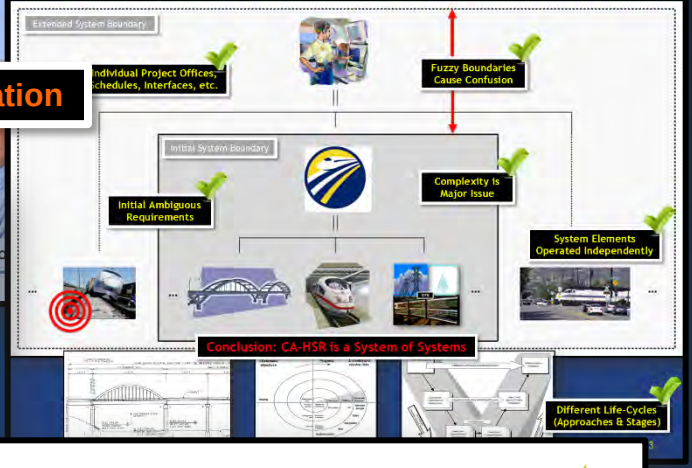
INCOSE Webinar Seri

Wednesday 22 July 2015

From Dual VEE to Dual Use–
Introducing the SoS-V
Model to Improve t
Acquisition, Interoperability and
Performance of large System-

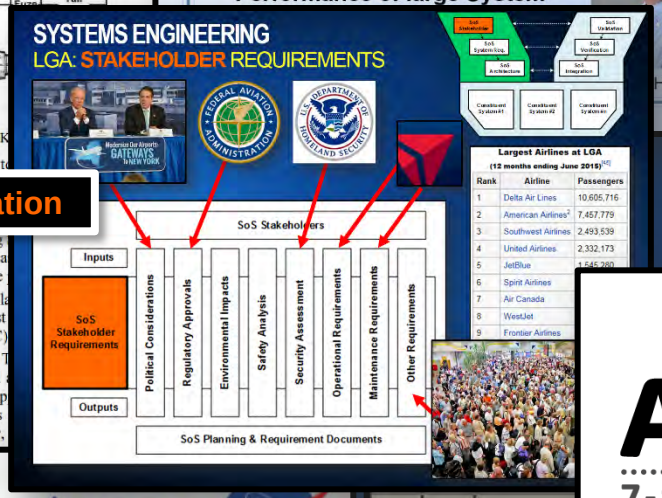
Transportation

CALIFORNIA HIGH-SPEED RAIL FROM AN SOS PERSPECTIVE



SYSTEMS ENGINEERING
LGA: STAKEHOLDER REQUIREMENTS

Aviation



Largest Airlines at LGA
(12 months ending June 2015)

Rank	Airline	Passengers
1	Delta Air Lines	10,605,716
2	American Airlines	7,457,779
3	Southwest Airlines	2,493,539
4	United Airlines	2,332,173
5	JetBlue	1,545,280
6	Spirit Airlines	
7	Air Canada	
8	WestJet	
9	Frontier Airlines	

AFIS EMEA WORKSHOP
7-9 October 2015 • PARIS

Energy

INCOSE IEEE NASA

ENERGYTECH 2015

November 30 - December 2
Cleveland, Ohio
In collaboration with Infragard and
The Cleveland Engineering Society

TRACK 5 SELLIER

System of Systems

From Dual VEE to Dual Use – Introducing the SoS-VEE™ Model to Improve the Acquisition Interoperability and Performance of large System-of-Systems (SoS) Programs

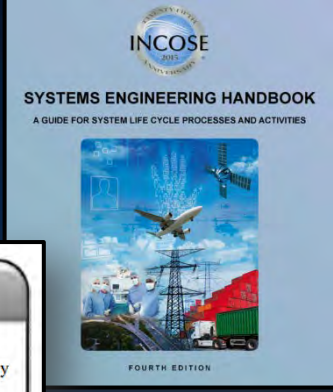
▸ Mr. Oliver Hoehne, *Parsons Brinckerhoff*

Defense

NATIONAL DEFENSE INDUSTRIAL ASSOCIATION NDIA

PROOF OF CONCEPT

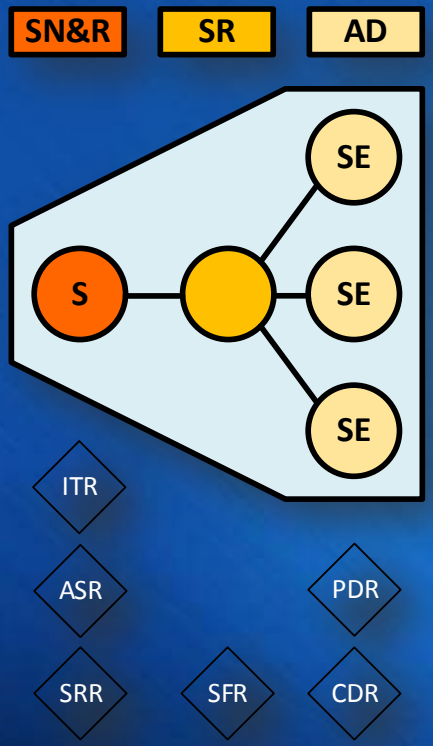
PROJECT MANAGEMENT



Stakeholder Needs & Requirements (SN&R) Definition Process

Inputs	Activities	Outputs
• Source documents • Project constraints • Major stakeholders identification • Preliminary life cycle concepts • Problem or opportunity statement • Business requirements • Alternative solution classes • Preliminary validation criteria • Validated requirements • Preliminary MOE needs • Preliminary MOE data • Business requirements traceability • Life cycle constraints • Stakeholder needs • System requirements traceability	• Prepare for stakeholder needs and requirements definition • Define stakeholder needs • Develop the operational concept and other life cycle concepts • Transform stakeholder needs into stakeholder requirements • Analyze stakeholder requirements • Manage the stakeholder needs and requirements definition	• Stakeholder needs and requirements definition strategy • Life cycle concepts • System function identification • Stakeholder requirements • Validation criteria • MOE needs • MOE data • Stakeholder requirements traceability • Initial RVTM • Stakeholder needs and requirements definition record

Dependencies | Activities | Deliverables



- *Acceptable*: Proceed with the next stage of the project.
- *Acceptable with reservations*: Proceed and respond to action items.
- *Unacceptable: Do not proceed*—continue this stage and repeat the review when ready.
- *Unacceptable: Return to a preceding stage.*
- *Unacceptable: Put a hold on project activity.*
- *Unsalvageable: Terminate the project.*

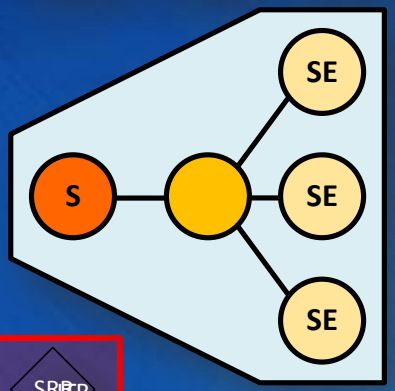
Decision Gates

Source: SE Handbook, Fourth Edition, Figure 4.4 and Section 3.2.2

PROOF OF CONCEPT

PROJECT MANAGEMENT

SN&R | SR | AD



SRR PDR

Stakeholder Needs & Requirements (SN&R) Definition Process

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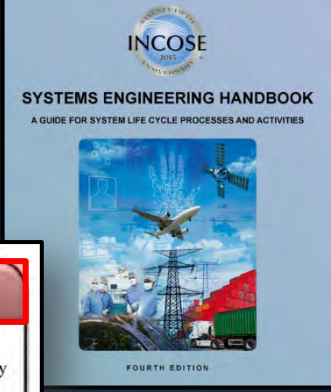
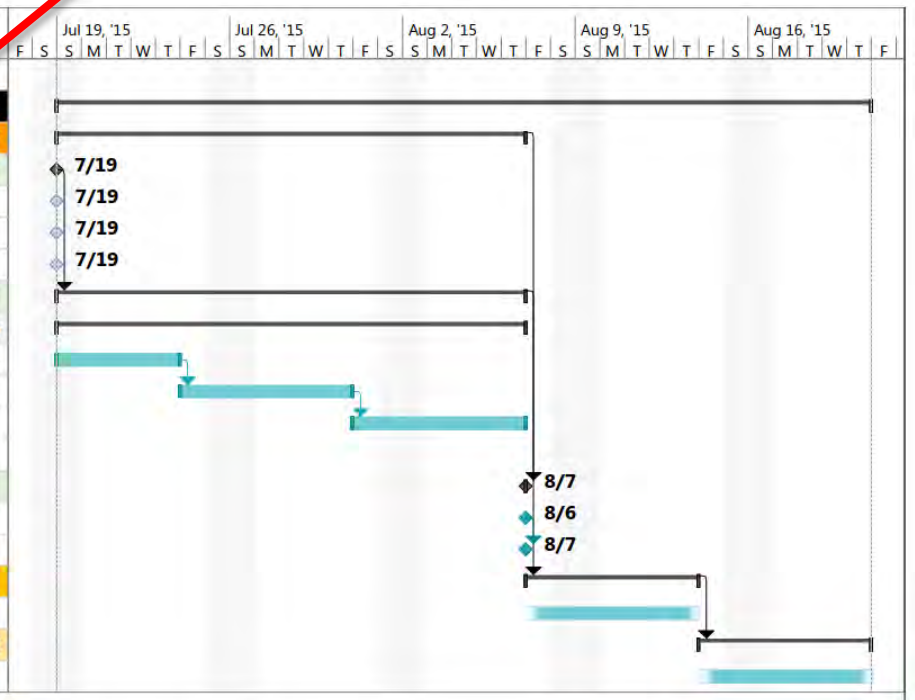


ID	Task Name	Duration	Start
1			
2	**Phase**	**24 days?**	**Sun 7/19/15**
3	**Stakeholder Needs & Requirements (SN&R)**	**14 days?**	**Sun 7/19/15**
4	Dependencies (Inputs)	0 days	Sun 7/19/15
5	Source Documents Available	0 days	
6	Project Contraints Available	0 days	
7	Other Inputs Available	0 days	
8	Deliverables (Outputs)	14 days?	Sun 7/19/15
9	**[D] SN&R Strategy**	**14 days**	**Sun 7/19/15**
10	[A] Actviity 1	5 days	Sun 7/19/15
11	[A] Actviity 2	5 days	Fri 7/24/15
12	[A] Actviity #n	5 days	Fri 7/31/15
13	[D] Deliverable #n		
14	Milestones (Decision Gates)	0 days	Thu 8/6/15
15	System Requirements Review (SRR)	0 days	Thu 8/6/15
16	...	0 days	Fri 8/7/15
17	**System Requirements (SR)**	**5 days**	**Fri 8/7/15**
18	...	5 days	
19	**Architectural Design (AR)**	**5 days**	**Thu 8/13/15**
20	...	5 days	



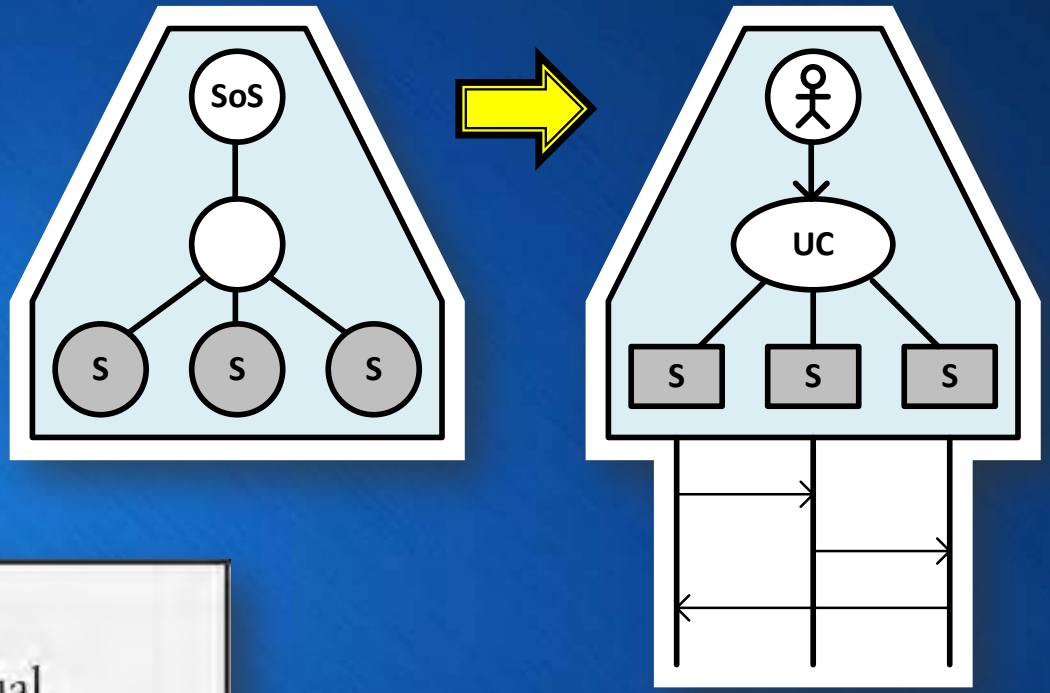
PROOF OF CONCEPT

APPLICATION TO CONCEPTUAL MBSE

Stakeholder Needs & Requirements (SNR)

System Requirements Definition (SR)

Architecture Definition Process (AD)



Actor(s)

Use Case(s)

Sequence Diagrams

17905

Using Conceptual MBSE to Increase the Effectiveness of System Acquisition

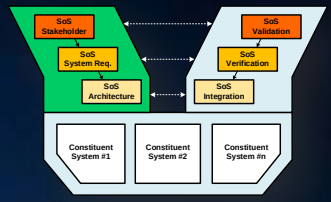
Mr. Oliver Hoehne, *Parsons Brinckerhoff*

Track 02, Modeling & Simulation
October 29, 2015 4:05PM

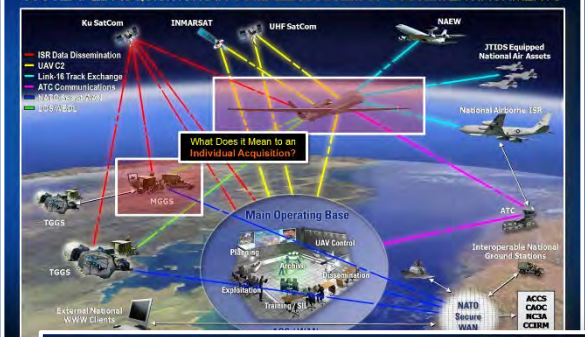
PROGRESS

- Problem Statement
  - Challenges of System of Systems Engineering
- Objectives
  - Simple Model Useful for System of Systems Engineering
- Offered Solution: SoS-VEE Model
  - Main Building Block
  - Building the Model
  - Review against Objectives
- Proof of Concept
  - Application to System of Systems Engineering
  - Application to Project Management
  - Application to Conceptual MBSE (Outlook)
- **Summary**

SoS-VEE MODEL
SUMMARY

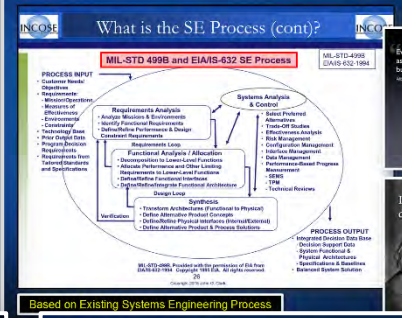


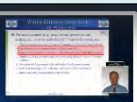
PROBLEM STATEMENT
STOVEPIPED ACQUISITIONS IN COMPLEX SYSTEM OF SYSTEM ENVIRONMENTS

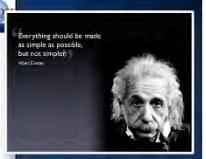


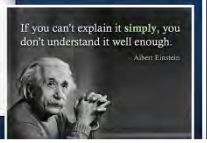
UNDESIRABLE OUTCOMES
RESULTS OF STOVEPIPING OR SILO ENGINEERING

OBJECTIVES
CREATE SIMPLE MODEL USEFUL FOR SoSE

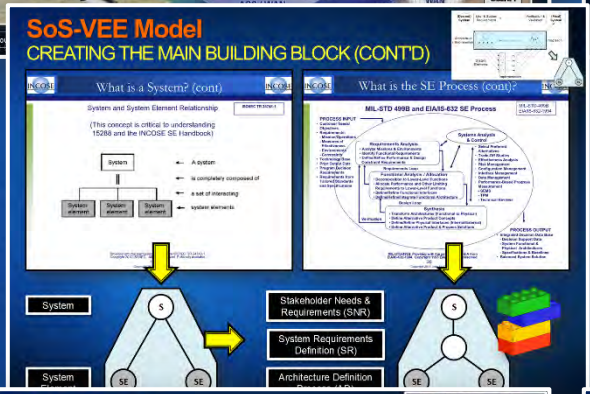




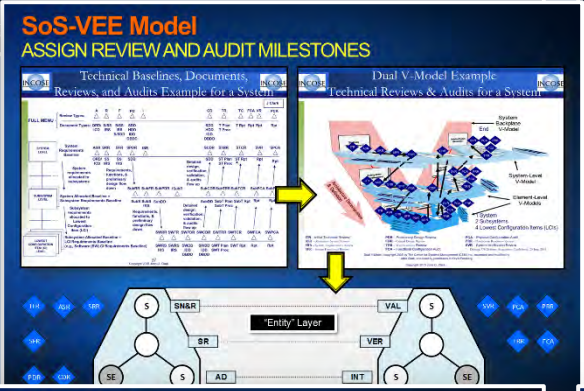




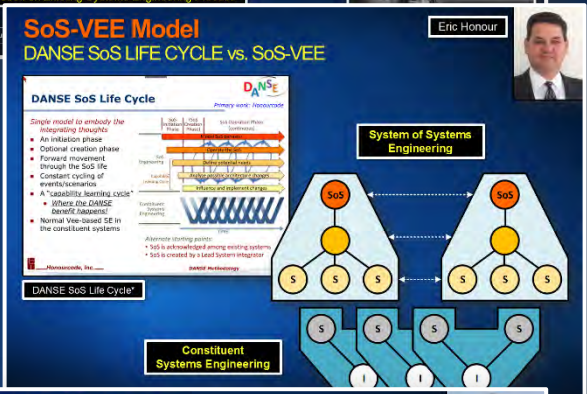
SoS-VEE Model
CREATING THE MAIN BUILDING BLOCK (CONT'D)



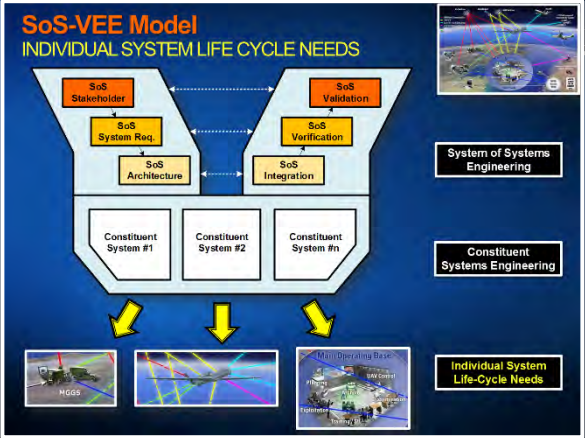
SoS-VEE Model
ASSIGN REVIEW AND AUDIT MILESTONES



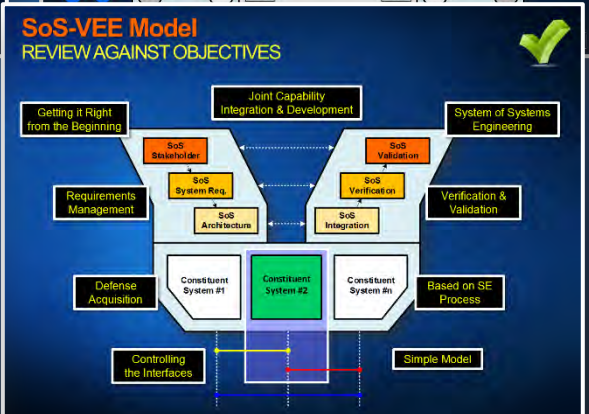
SoS-VEE Model
DANSE SoS LIFE CYCLE vs. SoS-VEE



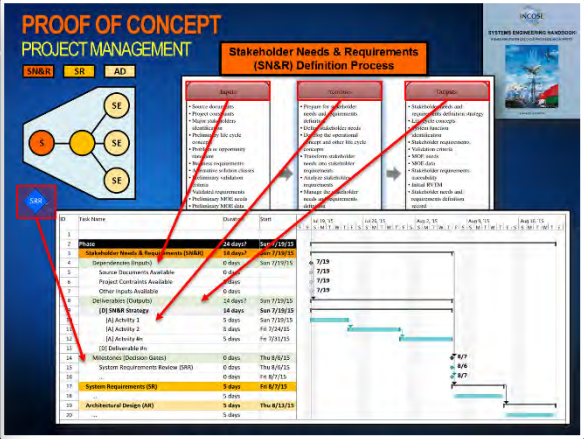
SoS-VEE Model
INDIVIDUAL SYSTEM LIFE CYCLE NEEDS



SoS-VEE Model
REVIEW AGAINST OBJECTIVES

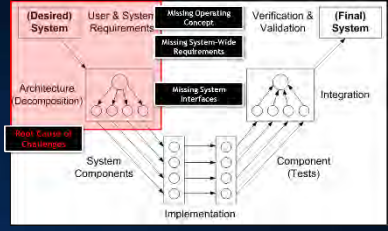


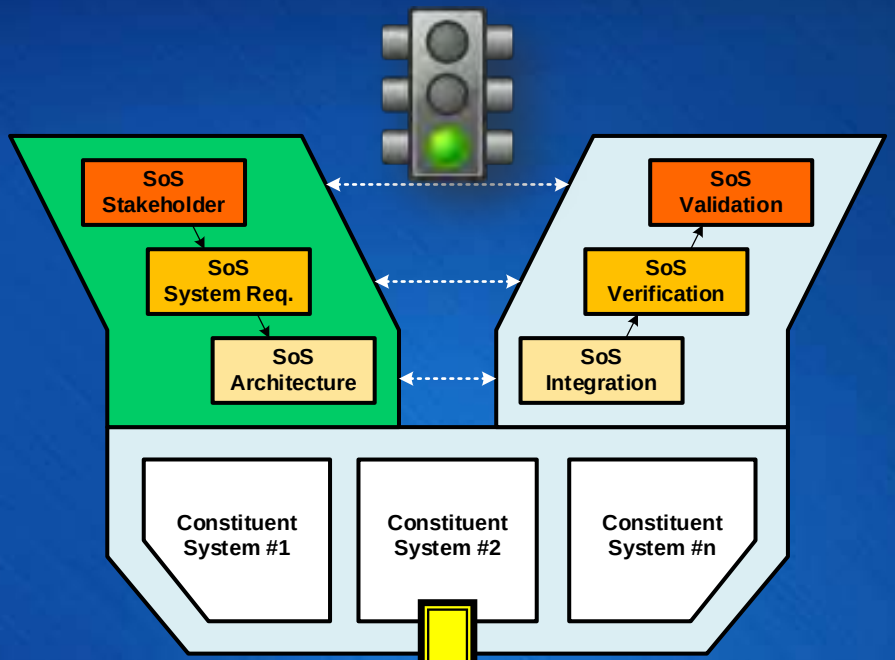
PROOF OF CONCEPT
PROJECT MANAGEMENT

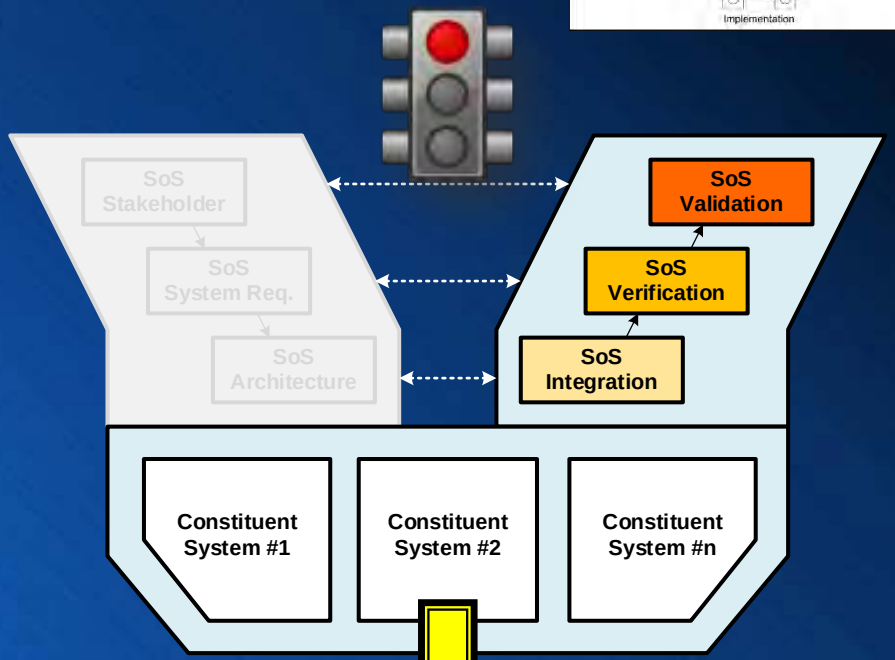


SoS-VEE Model

FINAL WORD: START SoSE EARLY

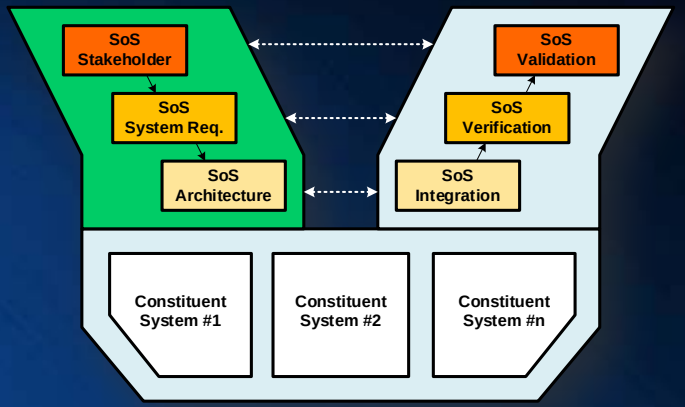






Sources: https://upload.wikimedia.org/wikipedia/commons/9/98/2015_Chevy_Corvette_Stingray_Z06_Debut_at_Detriot_Auto_Show_7.jpg, http://i81.photobucket.com/albums/j236/dimitri_the_pirate/RedneckCarAirConditioner.jpg

SoS-VEE MODEL
QUESTIONS & ANSWERS



Thank You for Your Attention!

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