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# OSD / Tri-Service WebCast

February 23, 2007

## **Mark Schaeffer**

Director

Systems and Software Engineering  
Deputy Under Secretary of Defense  
(Acquisition and Technology)

## **Douglas Wiltsie**

Assistant Deputy

Acquisition and Systems Management  
Assistant Secretary of the Army  
(Acquisition Logistics and Technology)

## **Carl Siel**

Chief Systems Engineer

Assistant Secretary of the Navy  
(Research, Development and Acquisition)

## **Terry Jagers**

Chief Engineer

Assistant Secretary of the Air Force  
(Acquisition)

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***DoD Systems and Software Engineering***

Mr. Mark Schaeffer



# Systems and Software Engineering Mission Statement

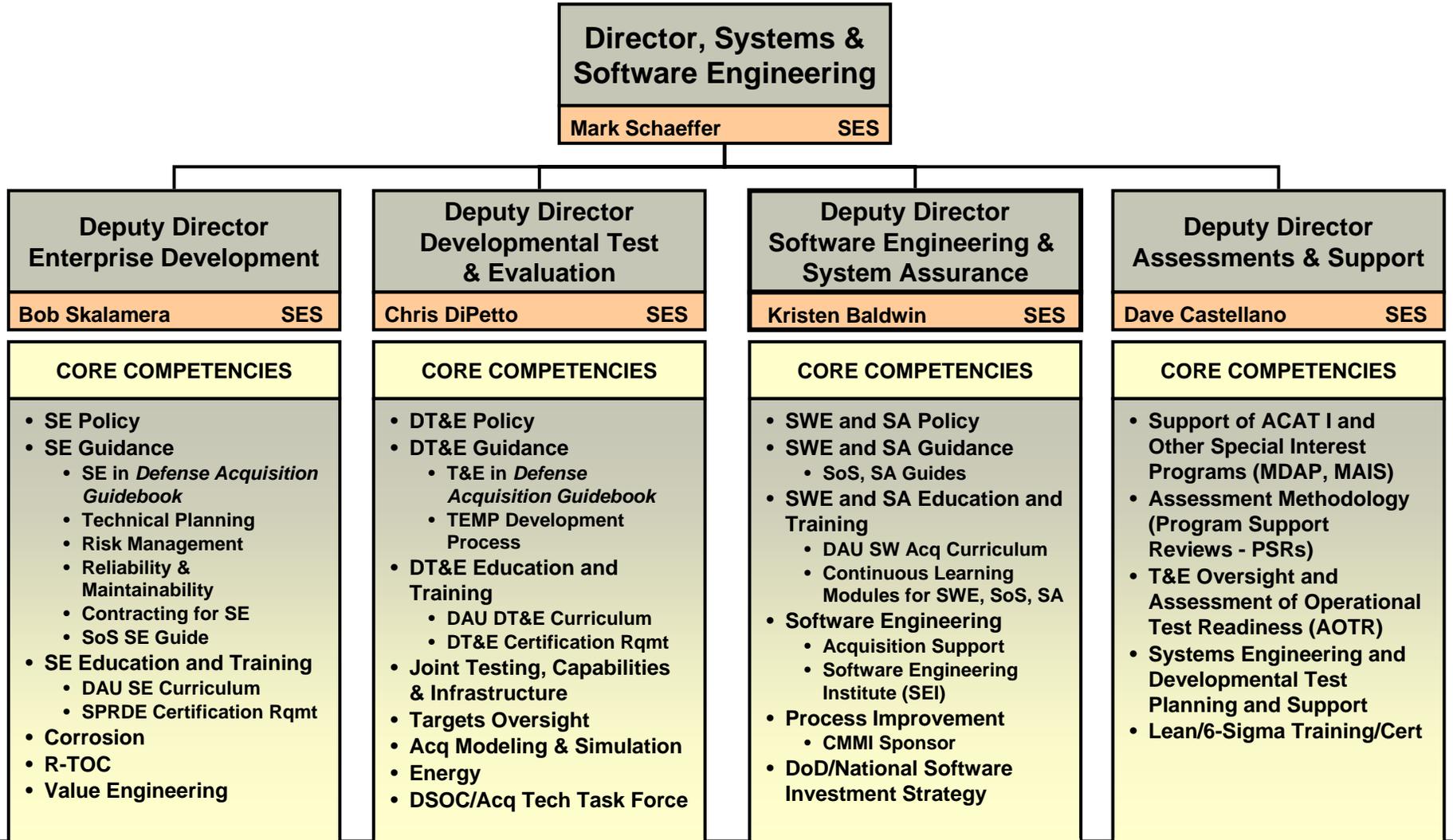
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- Promote the application of sound systems and software engineering, developmental test and evaluation, and related technical disciplines across the Department's acquisition community and programs
- Raise awareness of the importance of effective systems engineering and drive the state-of-the-practice into program planning and execution
- Establish policy, guidance, best practices, education, and training in collaboration with academia, industry, and government communities
- Shape acquisition solutions and promote early technical planning
- Provide technical insight to program managers and leadership to support decision making

***Evolving System Engineering Challenges***



# State of Systems Engineering Director, Systems & Software Engineering



*Acquisition program excellence through sound systems and software engineering*



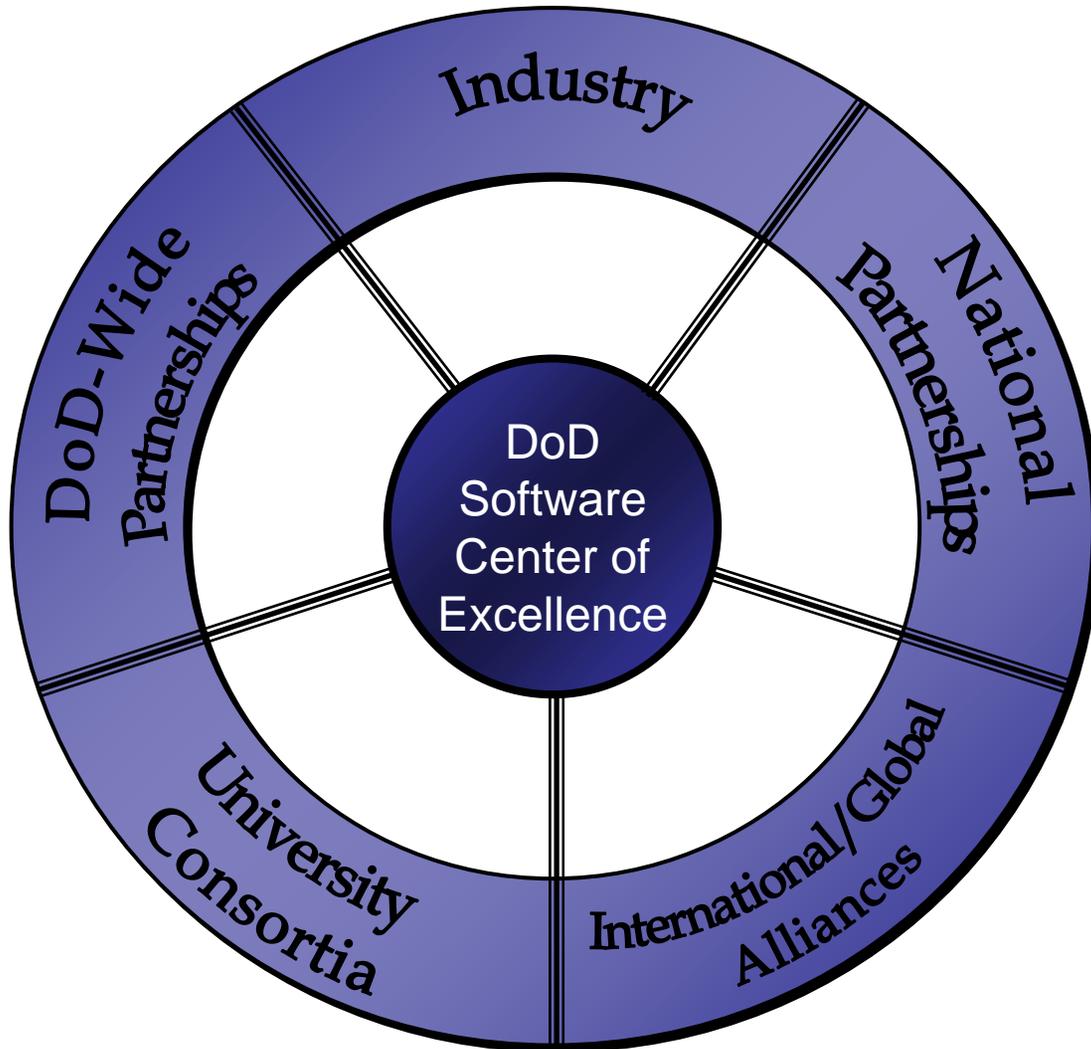
# Systems Engineering Revitalization Effort

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- Issued Department-wide Systems Engineering (SE) policy
- Issued guidance on SE, T&E, and SE Plans (SEPs)
- Integrated DT&E with SE policy and assessment functions--focused on effective, early engagement of both
- Working with Defense Acquisition University to revise curricula (SPRDE, T&E, PQM, LOG, PM, ACQ, FM, CONT)
- Established SE Forum to ensure senior-level focus within DoD
- Leveraging close working relationships with industry and academia
- Instituted system-level assessments in support of DAB, OIPT, DAES, and in support of programs
- Instituted a renewed emphasis on modeling and simulation in acquisition



# Establishing a DoD Software Center of Excellence



## DoD Software Center of Excellence

- Support Acquisition Success
- Improve State-of-the-Practice of Software Engineering
- Leadership, Outreach and Advocacy
- Foster Resources to Meet DoD Needs

## Software Focus Areas

- Identification of issues
- Creation of partnerships
- Consolidation/execution of initiatives



# Looking Ahead

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- Through the Systems and Software Engineering Center of Excellence, continue to:
  - Evolve Policy, Guidance, Education & Training, and Outreach
  - Execute Program Support Reviews to support OSD leadership at Milestone reviews and individual programs & PMs
  - Develop the foundation for software and system assurance policies and strategies to improve the state of practice
  - Revitalize DT&E efforts to increase the likelihood of successful IOT&E
  - Strengthen early and continuous lifecycle involvement of SE at system and System of Systems levels, beginning at Concept Decision/Milestone A

# OSD / Tri-Service WebCast

*SE View from Army*

Mr. Douglas K. Wiltsie



# **SE View from Army**

## **23 February 2007**

Douglas K. Wiltsie

Assistant Deputy

Acquisition and Systems Management

Office of the Assistant Secretary of the Army

Acquisition Logistics and Technology



# Sec. Bolton's Challenges

- Systems Engineering:
  - Does not help us politically
  - Does not stabilize funding
  - Does not belong in the Requirements Process
  - Does not clearly address System of Systems



# Army System Engineering Policy

The **Army System Engineering** program and policy approved (13 June 2005 )

- Requires a SEP for each program
- Establishes a System Engineer within each program and PEO
- Establishes Army System Engineering Forum (ASEF)
- Establishes peer review at all major technical reviews
- Establishes the PEO as the SEP approval authority



DEPARTMENT OF THE ARMY  
OFFICE OF THE ASSISTANT SECRETARY OF THE ARMY  
ACQUISITION LOGISTICS AND TECHNOLOGY  
103 ARMY PENTAGON  
WASHINGTON D.C. 20310-0103

JUN 13 2005

SAAL-SSI

MEMORANDUM FOR PROGRAM EXECUTIVE OFFICERS  
DIRECT REPORTING PROJECT MANAGERS

SUBJECT: Army Systems Engineering Policy

The Under Secretary of Defense for Acquisition, Technology and Logistics issued policy to reinvigorate systems engineering within the Department of Defense. Guidance for implementing systems engineering across Army Acquisition, Logistics and Technology is enclosed.

The Assistant Deputy for Acquisition and Systems Management, Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology, will chair an Army Systems Engineering Forum (ASEF) that is chartered to institutionalize effective systems engineering practices across our workforce and programs, and to promote collaboration across our requirements, acquisition, logistics, and testing communities. Each Program Executive Officer and Direct Reporting Program Manager is to designate a Chief System Engineer to participate on the ASEF. I expect the ASEF to plan, coordinate, manage, and execute initiatives for the resurgence of effective systems engineering, balancing programmatic cost, schedule, and supportability with technical reality. Within two weeks, please provide the name of your Chief System Engineer to Dr. James Linnehan, SAAL-SSI, (703) 604-7430, or e-mail: james.linnehan@saalt.army.mil.

Systems engineering excellence can integrate all elements of our U.S. Army community into a process driven disciplined team, producing timely, affordable, high quality products meeting the needs of our warfighters. I look forward to working with you to make this vision a reality and compelling success.

Claude M. Bolton, Jr.

Assistant Secretary of the Army  
(Acquisition, Logistics and Technology)

Enclosure

CF:  
USD(AT&L)  
CG, AMC  
CG, TRADOC



# Current Focus

- System Engineering is being done in Army programs; we need to ensure that it is consistent across the PEOs
- Training Is widely available but standards need to be established; we need to identify what's available and tailor to PEO/PM needs
- Requirements are done outside of the SE process; engage TRADOC on C4ISR migration and identify new processes for SoS development
- Integrate Science and Technology into Systems Engineering revitalization



# Army System Engineering Forum

- Chartered to revitalize SE
- PEO Chief Engineers, RDECOM, TRADOC, ATEC, UAH, SEI
- Identify and resolve common issues across and above PEOs and PMs
  - Training for effective SE
  - Inject SE into the requirements process
  - SE for SoS/interoperability across programs
- Share lessons learned, best practices using Army Knowledge Online (AKO)
- Develop effective Guidance across PMOs and RDECOM S&T Programs



# Capability Based Acquisition

**Army is transitioning to more and more Capability Based acquisition.**

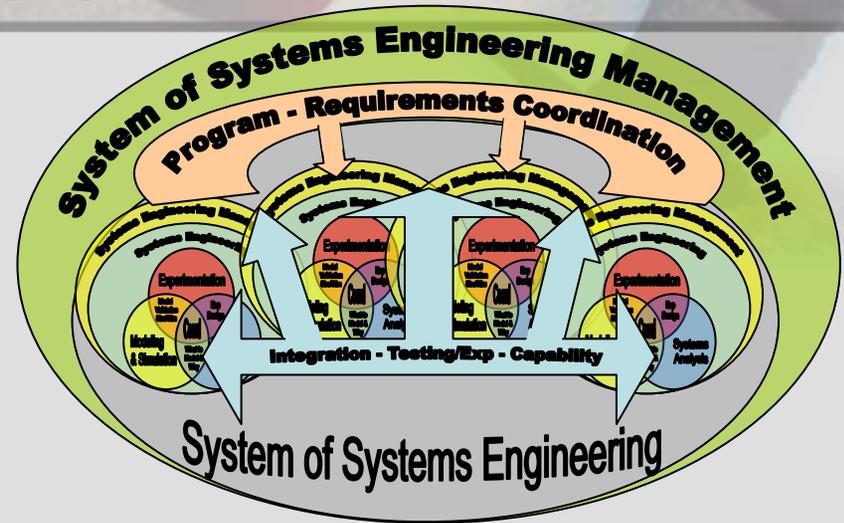
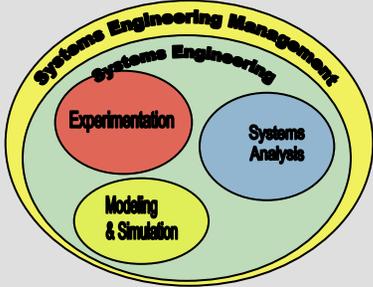
- Software blocking – Ensures end to end operability for all current and future battle command
- Future Combat System- 1st Army System of Systems capability based acquisition focused on developing and procuring a brigade level set of equipment
- Army Missile and Space – Develops the requirements and products to provide Air and Missile Defense capability
- Joint Network Node (JNN) to Warfighter Information Network-Tactical (WIN-T) – Current AOR network interoperability with future network.
- Counter rocket and mortar – continual evolution of requirements
- Counter Improvised Explosive Devices – evolving/changing requirements and environments.
- Force Protection



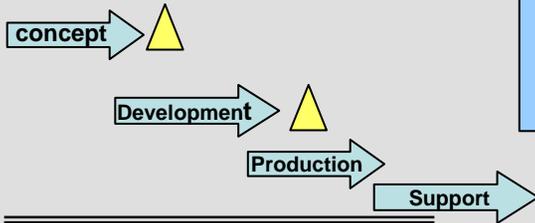
# Introduction: The Paradigm Shift

## “MEGA SYSTEM”

### Well Bounded System



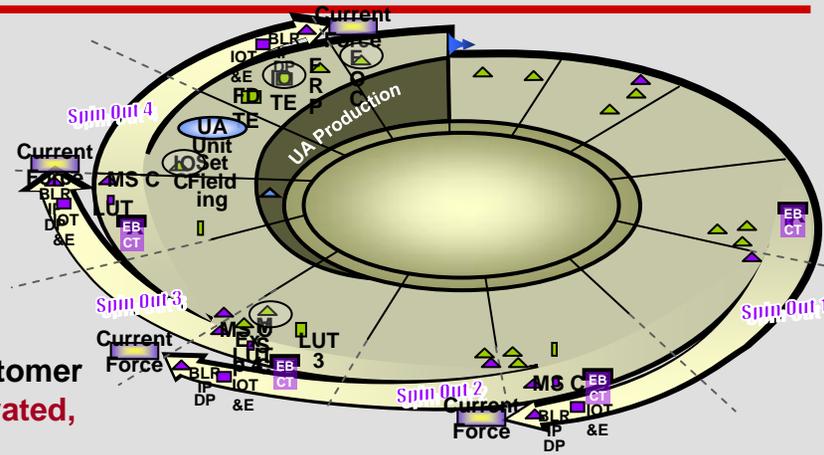
**Must Change**  
Perspective  
Boundaries  
Process  
People (KSAs)  
Tools



Year 1

Year 8

Transform to provide multiple innovative overmatching capability options to the customer  
**Evolve** supporting processes into an **integrated, cross commodity, cross community** SOS environment.



### Delivery of Right Capabilities on Schedule on Budget



# Training

## **Goal: Provide Consistent and Appropriate Levels of Training Across the Army Acquisition Community**

- Survey training opportunities and certification requirements
- Establish Technical Authority level SE Training
- Establish PM/DPM SE Level Training
  - SE Management
  - Incorporate SE into PM structure
- Establish Technical Level SE Training
  - Focus on implementation and execution of SE
  - Focus on PM SE
  - Lead to certain level of certification
- Consider University Consortium for SE through University of Alabama, Huntsville (UAH)



# Requirements Generation

**Goal: To Integrate SE into the Requirements Development Process, Especially for Complex Interdependent Programs**

- Establish methods to support requirements generation at the System of Systems or Enterprise Level and help define the trade space
  - ASA(ALT)/TRADOC Capability Engineering Framework (CEF) Initiative for engineering the requirements/acquisition interface
  - Program Execution Working Group for cross PEO/TRADOC SE for C4ISR migration
  - Software Blocking
- Stepping stone to Joint System of Systems requirements
- Generation Process (e.g. SIAP, SIGP, JBMC2, NCOE)
  - Without Joint Level overarching requirements, System Level requirements could be met and still not meet Joint Requirements



# Army Strategic S/W Improvement Program

**Goal:** To dramatically improve the acquisition of software intensive systems

## **Objectives:**

- Foster migration to a model-based system and software acquisition process improvement
- Institutionalize broad-based oversight, management, and technical expertise
- Apply an integrated system and software engineering approach to programs and improvement
- Systematically incorporate lessons learned, best practices, and new technology into policies, practices and processes

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***DoN System Engineering Revitalization***

Mr. Carl Siel

# ASN (RDA) Chief Systems Engineer

## DoN System Engineering Revitalization

23 February 2007

Mr. Carl Siel  
ASN(RDA) Chief Systems Engineer  
carl.siel@navy.mil





# Topics

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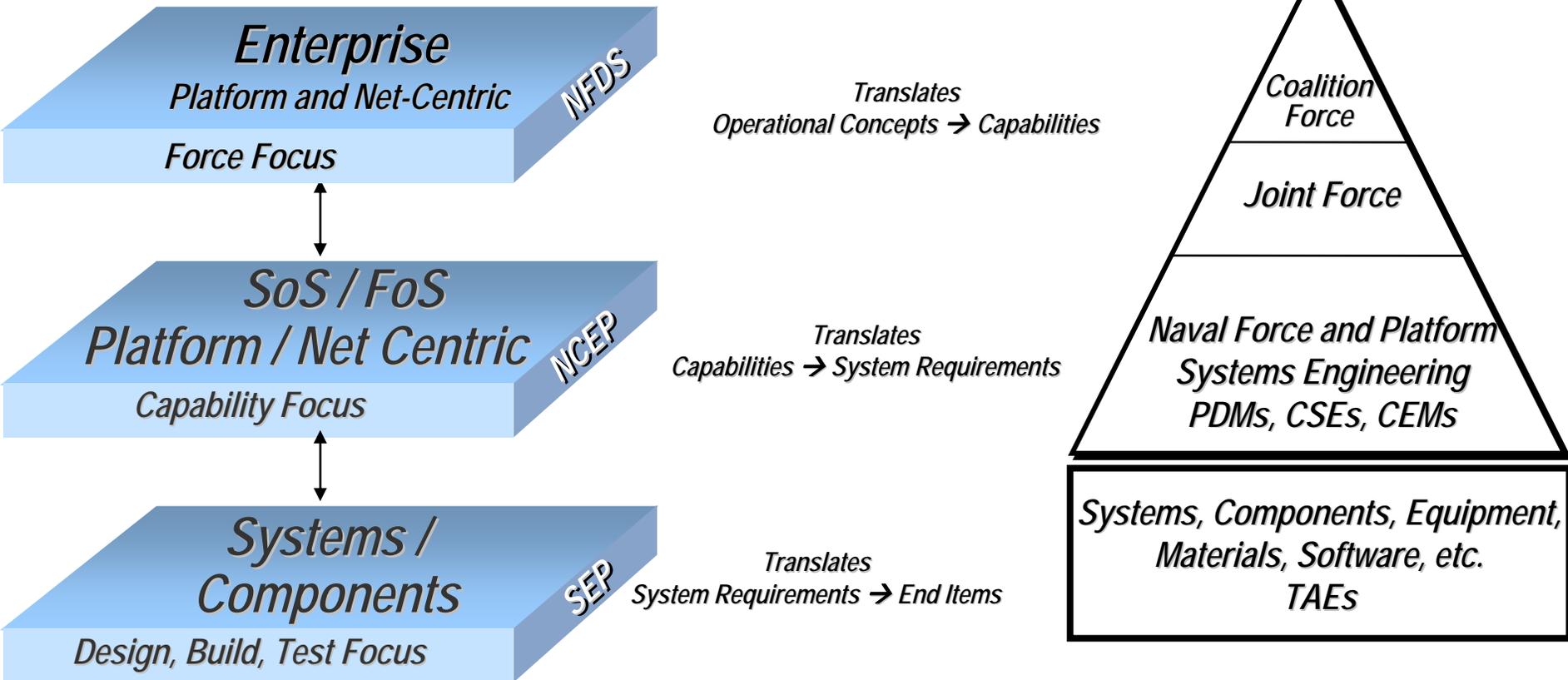
**R**DA  
**C**HIEF  
**S**YSTEMS  
**E**NGINEER

- ◆ Capability Based System Engineering
- ◆ System Engineering Planning
- ◆ System of Systems Engineering
- ◆ Net-Centric Integration and Interoperability Management
- ◆ Large Scale SoS Capability Assessment
- ◆ Software Process Improvement
- ◆ System Engineering Human Resource Management



# Capability-Based System Engineering

**R**DA  
**C**HIEF  
**S**YSTEMS  
**E**NGINEER



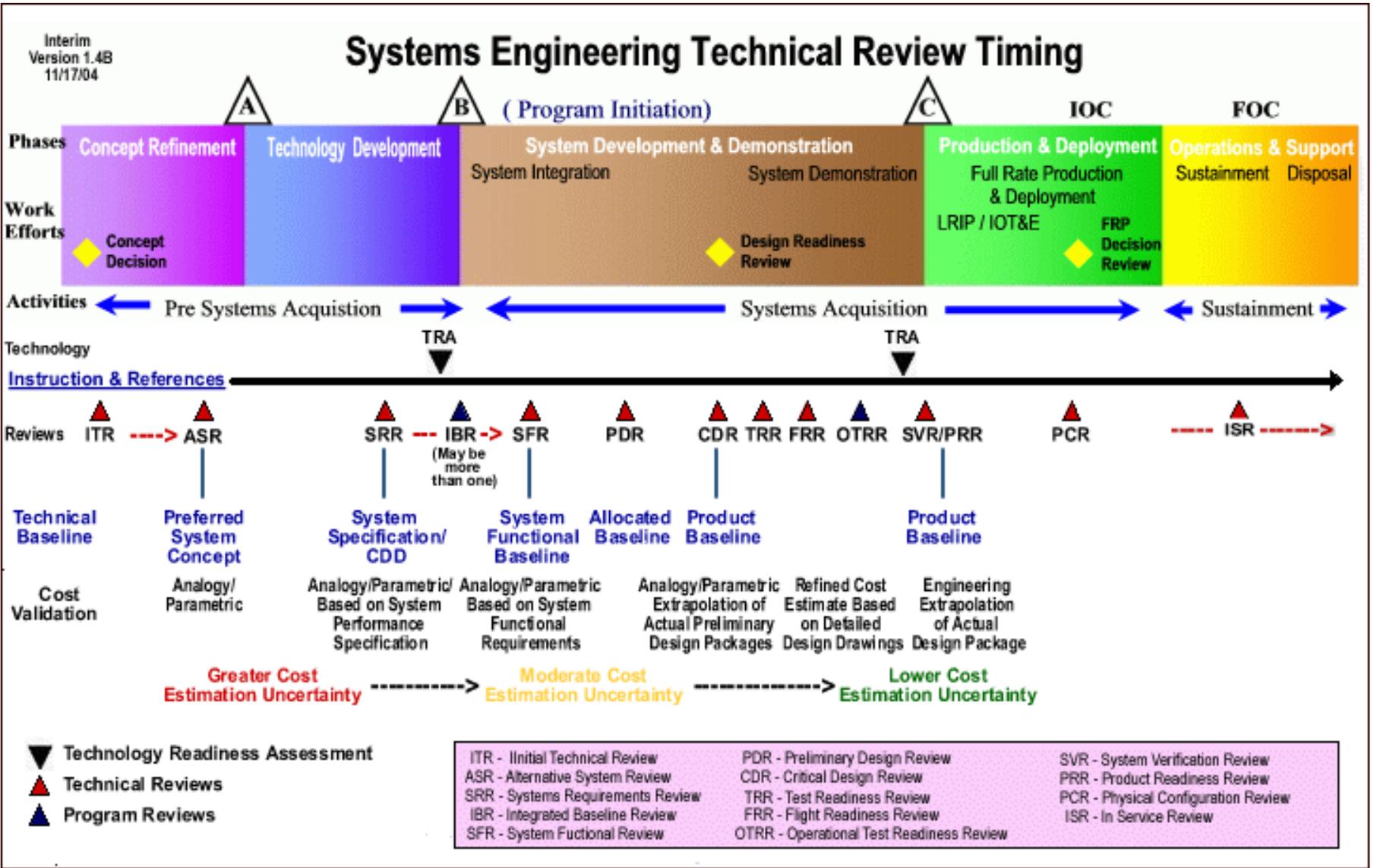
Requires Alignment of Multiple Processes, Process Owners and Products



# System Engineering Planning

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ENGINEER

- ◆ Upfront and early involvement in SE Planning
  - With PMO's and respective SYSCOM engineering communities
  - Ensure appropriate SE practices, based on program maturity & complexity
- ◆ Cross-SYSCOM SEP LSS process underway
  - Streamline development, review and approval processes
- ◆ Planning is occurring, need to ensure real execution
- ◆ Encouraging SYSCOM-wide engineering processes
  - System Engineering Technical Review (SETR) Process





# System of Systems Engineering

**R**DA  
**C**HIEF  
**S**YSTEMS  
**E**NGINEER

## Naval System of Systems Engineering Guidebook Vol 1

## Naval System of Systems Engineering Guidebook Vol 2



6 November 2006

## Naval SoSE Guidebook

- ◆ Developed to support Mission level capability-based acquisition decision making
- ◆ Presents best practices for capability-based acquisition and systems engineering
- ◆ Provides processes, methods, and tools to aid interoperable and integrated systems
- ◆ Particularly suited to System of Systems or Family of Systems
- ◆ Supports Naval or Joint Force Operations
- ◆ Version 2 is available

<https://ncee.navy.mil> (Requires CAC)



# Net-Centric Integration & Interoperability (I&I) Management

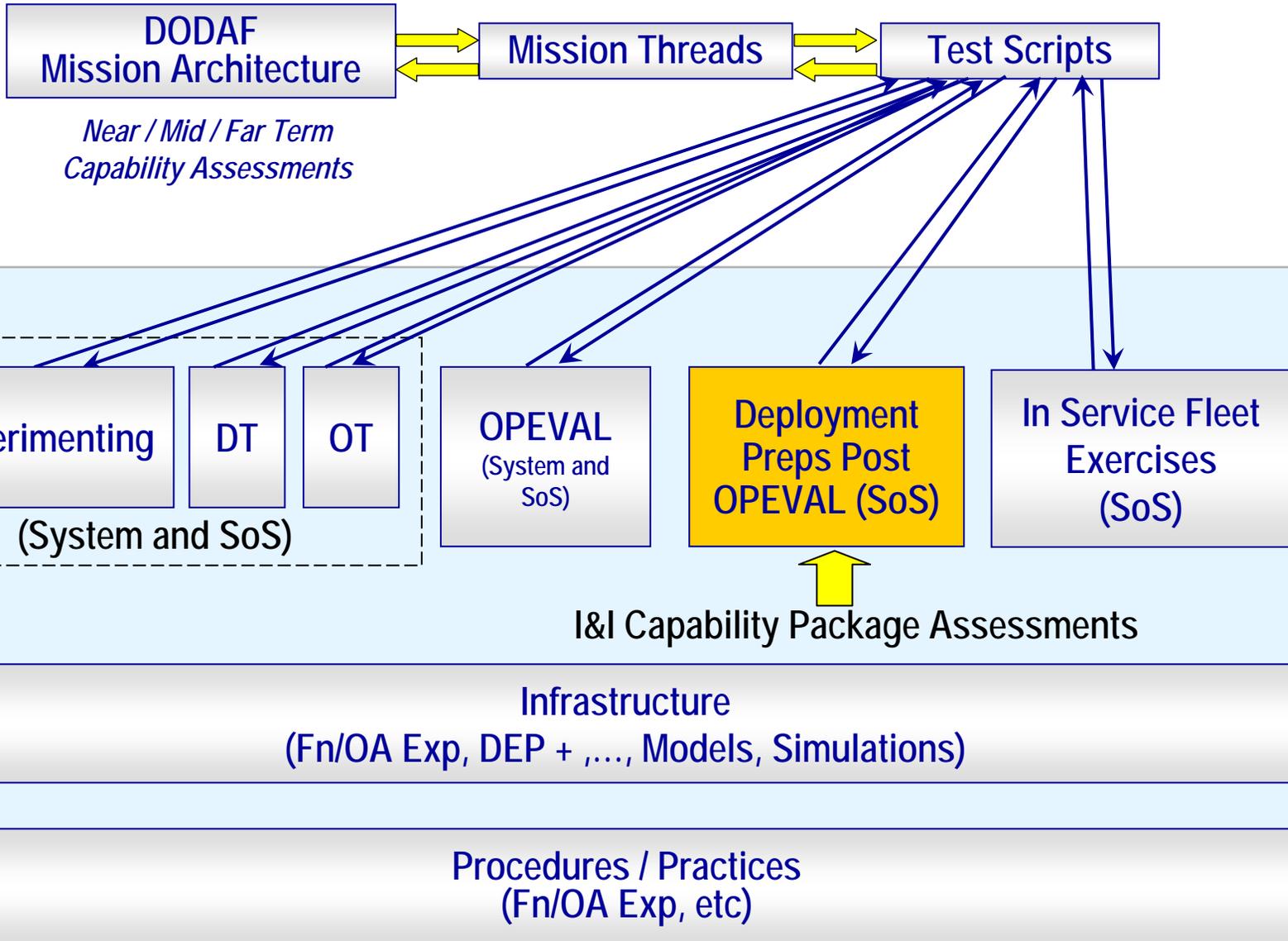
**R**DA  
**C**HIEF  
**S**YSTEMS  
**E**NGINEER

- ◆ Establish a management structure and plan for managing net-centric I&I of Naval Power 21 (NP21) systems and platforms
- ◆ Describe the procedures, processes and authorities of the acquisition community for the design, development, testing and fielding of NP21 systems
  - Information Support Plans (ISP)
    - Standardize development, review, approval, and submission as the means to coordinate I&I activity
    - Compliance with standards, consistency with interface systems
  - Net Ready Key Performance Parameters (NR-KPP)
    - Address the technical aspects to support operational and requirements communities
  - Architectures
    - Increase their usability
  - Capability Package Assessments
    - Conduct large scale, net-centric, SoS evaluations to assess overall mission performance



# Large Scale SoS Capability Assessments

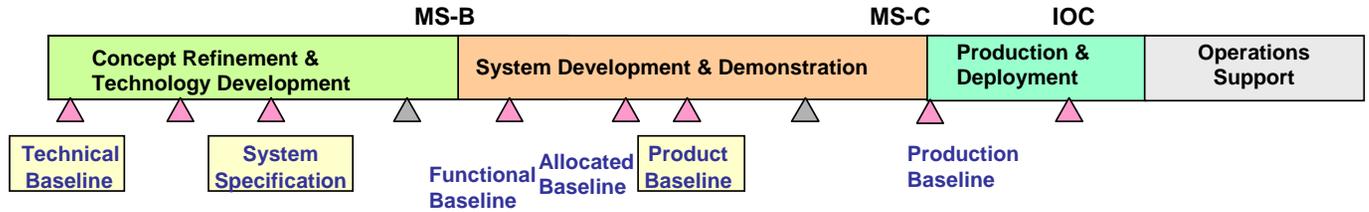
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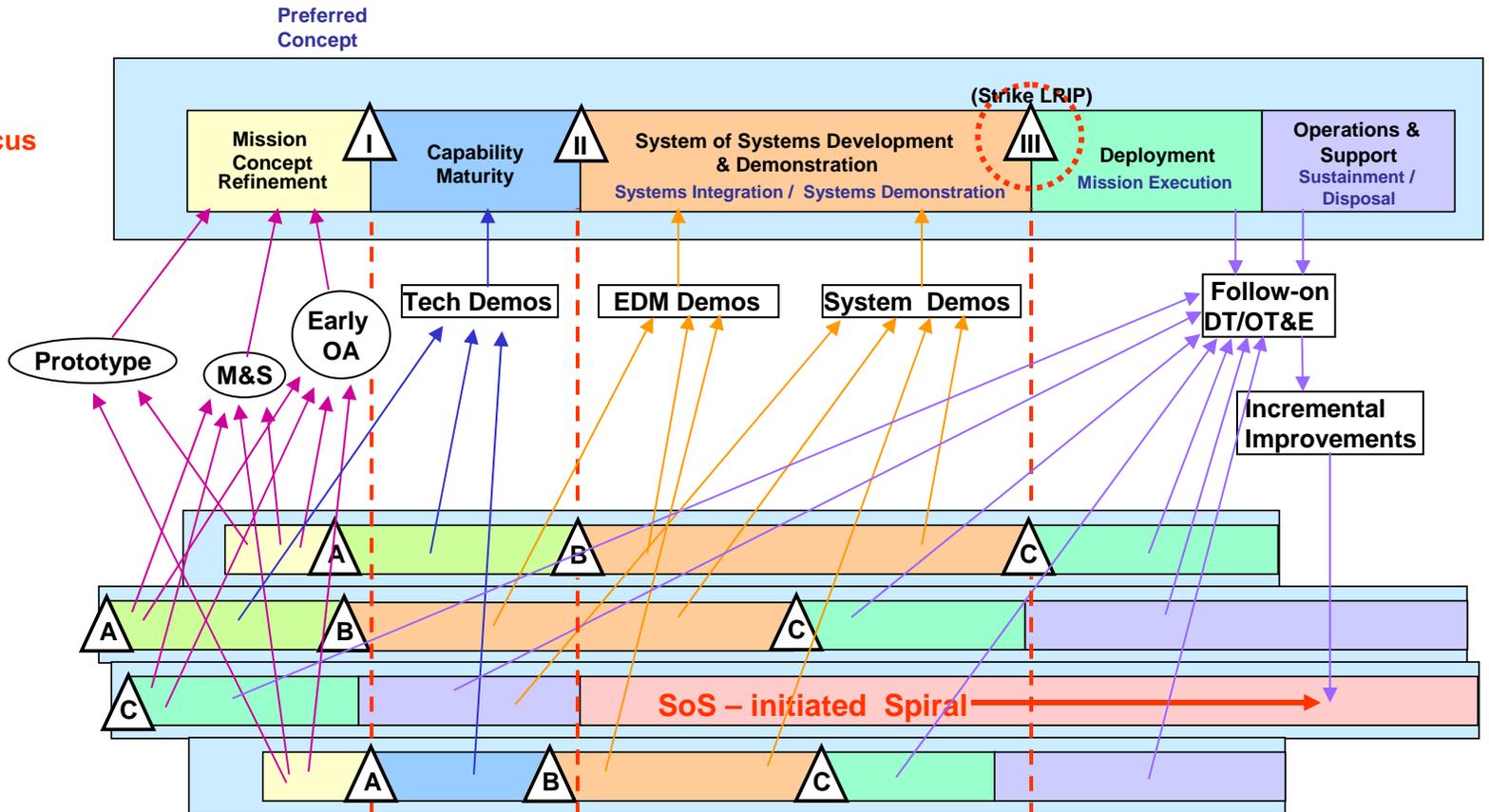


# Integrated SoS/Mission Assurance

**System Focus**  
**DoD 5000**



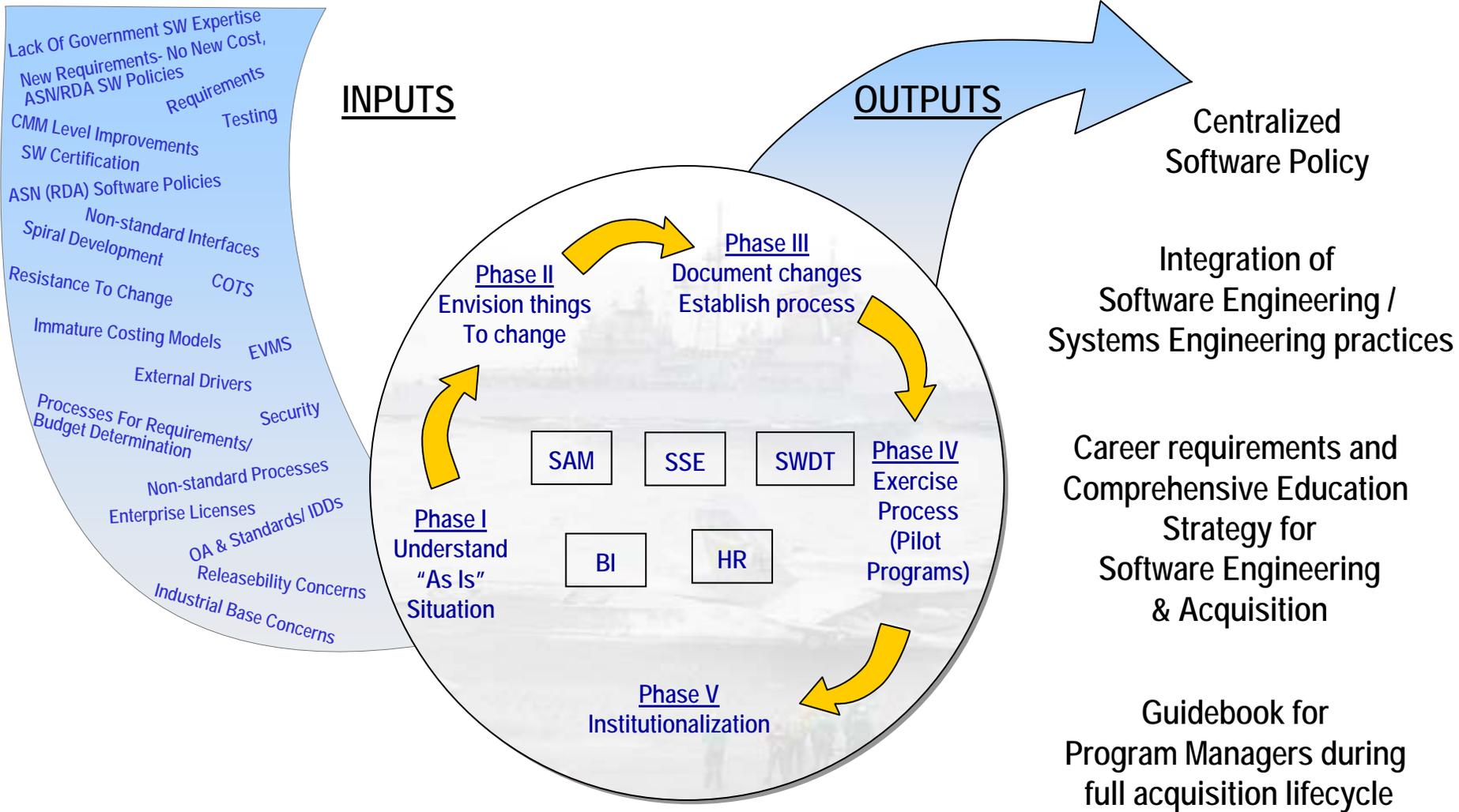
**SoS/Mission Focus**  
**DoD 5000**





# Software Process Improvement

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**SYSTEMS**  
**ENGINEER**





# SE Human Resource Management

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ENGINEER

- ◆ Maintaining a healthy engineering capability, aligned to the needs of the DoN Acquisition Enterprise (NAE), is fundamental to the delivery of new systems and to support those already in service
  - HQ, SYSCOM's, PEO's, Warfare Centers, System Centers, In Service Centers (Shipyards, Depots, etc)
- ◆ Establish skills, training, job assignment, and certification hierarchy
  - General system engineering practices
  - Component and System engineering
  - Platform (Air, Land, Sea, Shore Sites) and Net-Centric System engineering
  - Enterprise System engineering
- ◆ Ability to track and account current engineering personnel and postulate future needs



# SE Human Resource Competency

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**E**NGINEER

Mission Capability Strategic Plan  
Near / Mid / Far  
Technology shifts overtime

- Workload predictions
- Strategy > Rule #1 > *Don't Force\_\_\_ your thinking*
- Numbers / Demographics

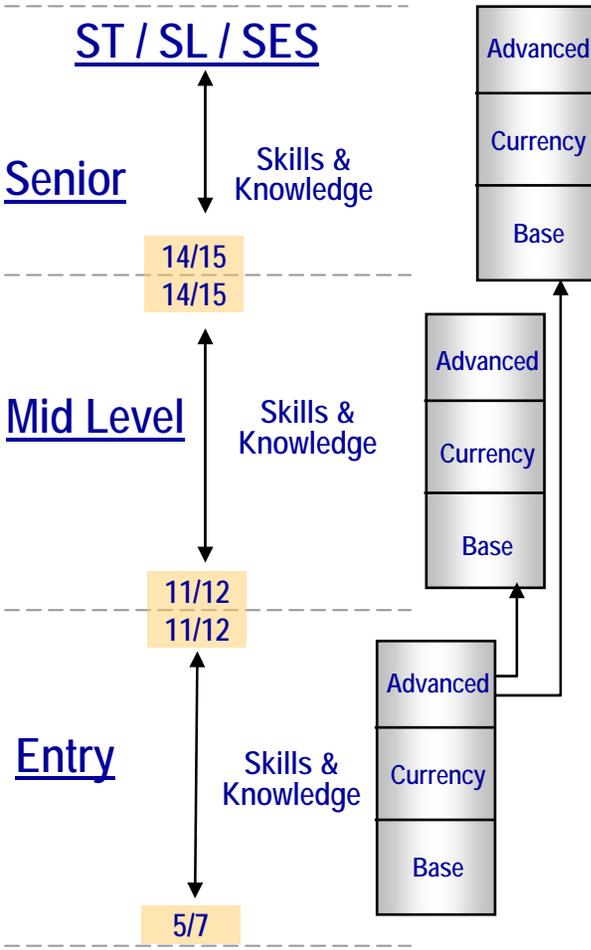
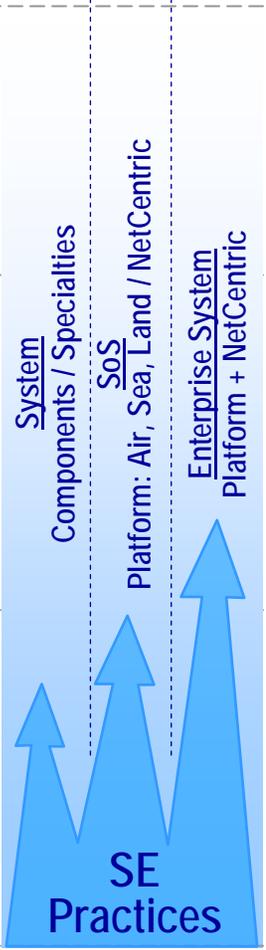
## Expectations

- Formal
  - DAU, NPS, Uni
  - Conferences
- Informal
  - Details volunteer
  - Rotation volunteer
  - Direct assessment
  - "Pools"
- DAW IA
  - PE License
  - Warrant (Like Contracts)

In depth knowledge / Broad based knowledge  
- Expert Ability to Exercise

- Increasing Breadth or  
- Increasing Depth  
- Ability to Exercise

- Understanding the basics of SE  
"Lust to Dust"





# Conclusion

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ENGINEER

- ◆ Capability Based System Engineering
- ◆ System Engineering Planning
- ◆ System of Systems Engineering
- ◆ Net-Centric Integration and Interoperability Management
- ◆ Large Scale SoS Capability Assessment
- ◆ Software Process Improvement
- ◆ System Engineering Human Resource Management

QUESTIONS?

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***Air Force “Pre-Acquisition” SE***

Mr. Terry Jagers

# ***Headquarters U.S. Air Force***

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*Integrity - Service - Excellence*

## **Air Force “Pre-Acquisition” SE: Technical Planning and Investment to Inform the Decision-Making Process**



**Mr. Terry Jagers, SES  
Chief Engineer  
Office of the Assistant Secretary of the Air Force  
(Acquisitions)  
23 February 2007**

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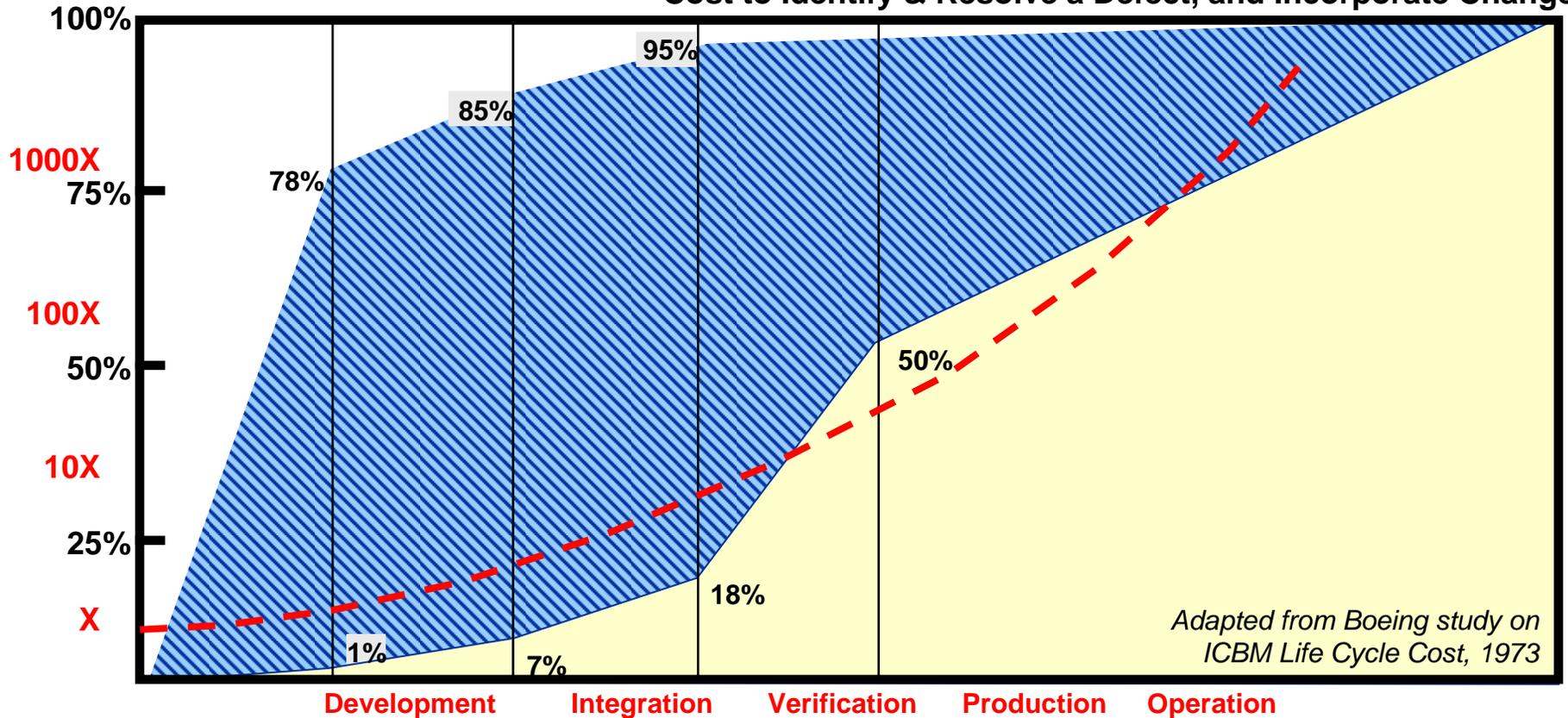


# Early Decisions: Key Life Cycle Cost Drivers

## Cumulative LCC

### Cost to Fix

- Percent of Baseline LCC Incurred
- Percent of Baseline LCC Committed
- Cost to Identify & Resolve a Defect, and Incorporate Change



Concept Development	Advanced Development	Full Scale Development	Production	Operations and Support
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# Benefit of Early SE Investment

## Notional Cost Profile

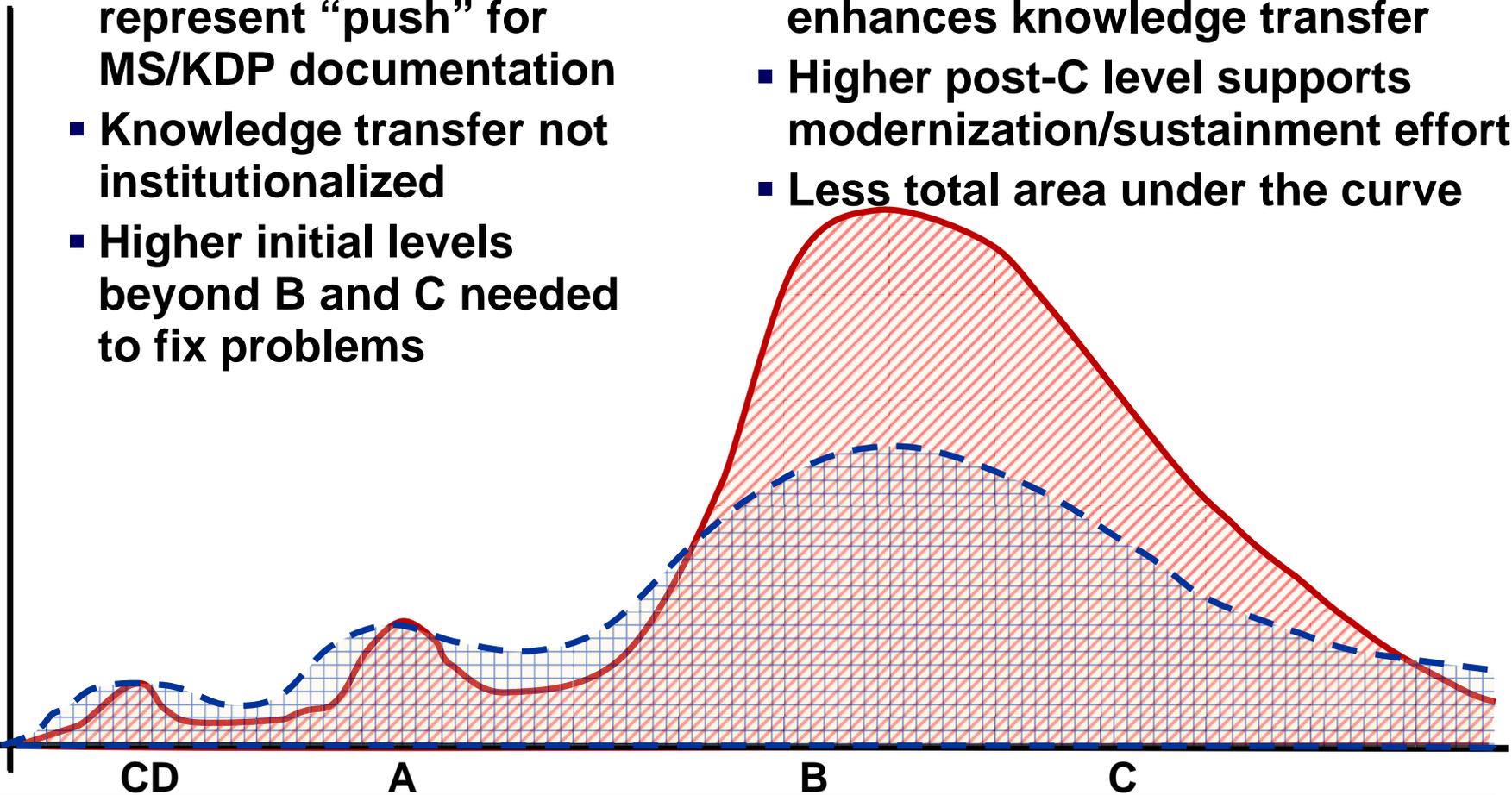
IS 

COULD-BE 

- Peaks at CD, A, and B represent “push” for MS/KDP documentation
- Knowledge transfer not institutionalized
- Higher initial levels beyond B and C needed to fix problems

- Lower peaks; less falloff; enhances knowledge transfer
- Higher post-C level supports modernization/sustainment efforts
- Less total area under the curve

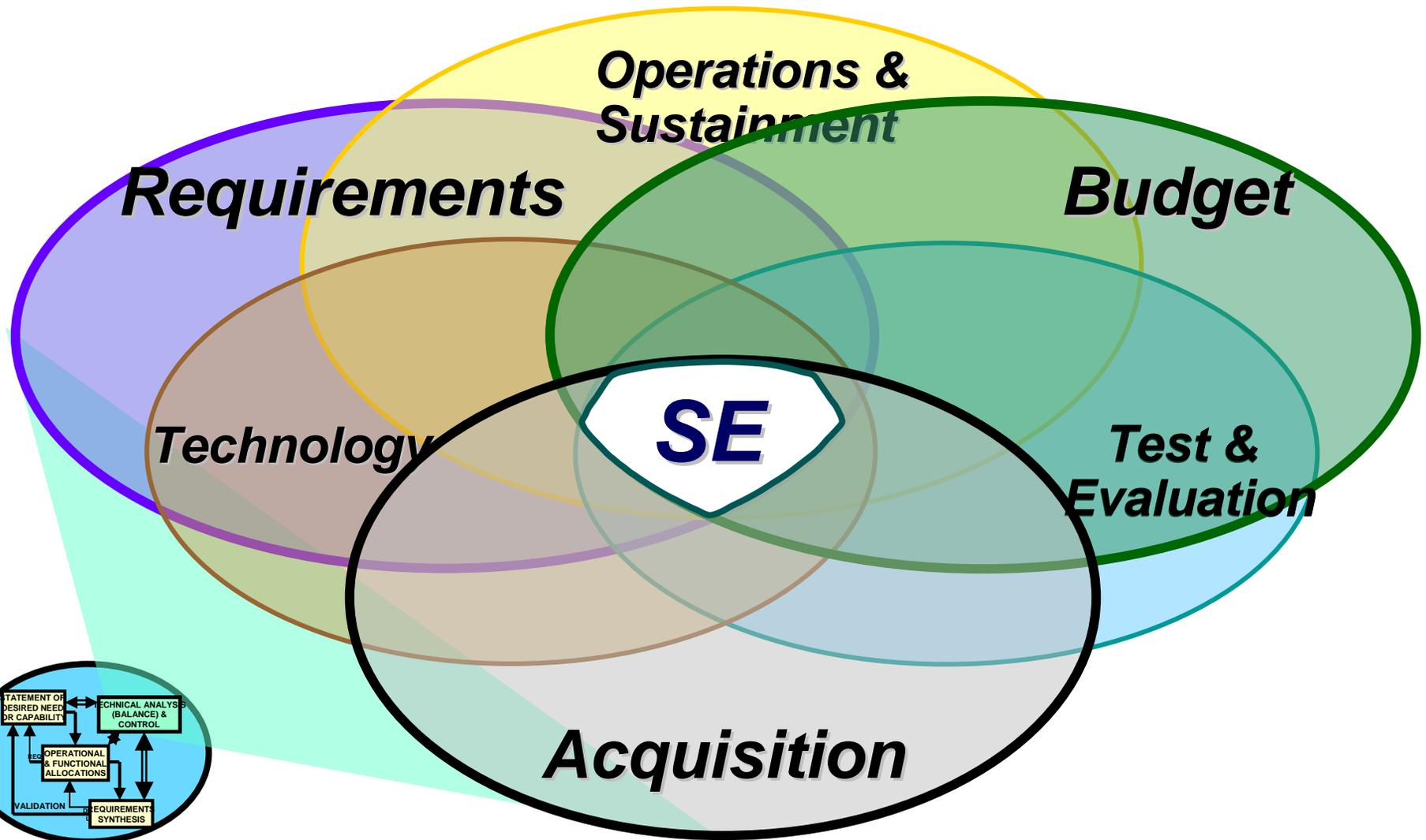
SE SPENDING, HEADCOUNT, etc.



*Integrity - Service - Excellence*



# *SE as Requirements Transformation Mechanism: First Steps in “Big A”*





# For More Information...

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## OSD

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