



N65236-ENGOPS-BRIEF-0024-1.0

# Comprehensive Training For Your Engineering Workforce

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**NDIA Systems Engineering Conference, October 26, 2006**

**Improving operational effectiveness through C<sup>4</sup>ISR common integrated solutions**





# Presentation Outline

- Introduction to SPAWAR Systems Center Charleston
- General Training
- Systems Engineering Training
- Development and Certification Opportunities
- Summary





# Introduction to SPAWAR Systems Center Charleston (SSC-Charleston)

- Where we fit
- What we are known for
- Who we are
- Vision



# SPAWAR



## Where We Fit

**SPAWAR**  
Space and Naval Warfare  
Systems Command



**President**

**non-DoD**

**Secretary of Defense**

**Secretary of the Navy**

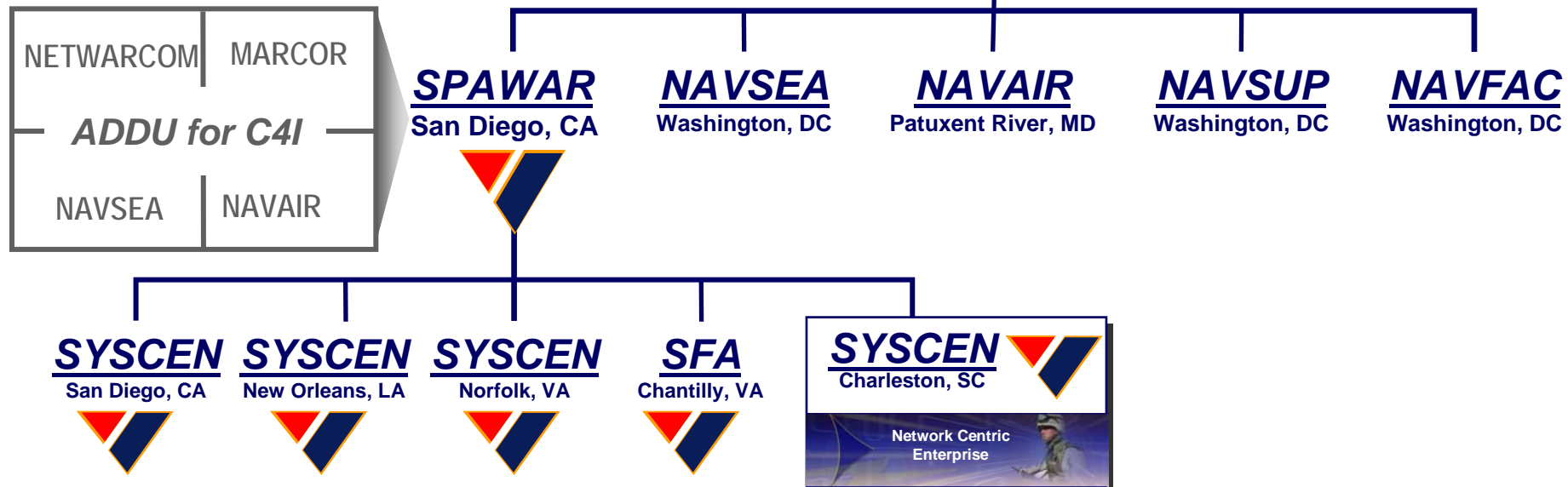
**Other DoD**

**CNO**

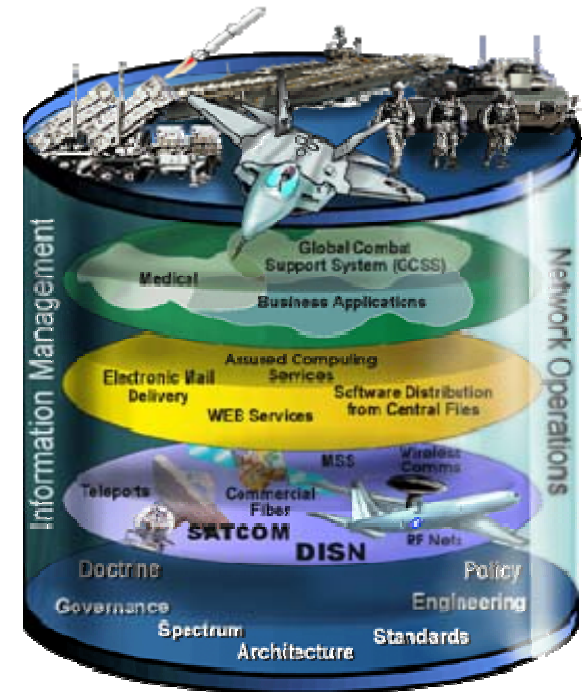
Fleet Support

**ASN (RDA)**

Acquisition

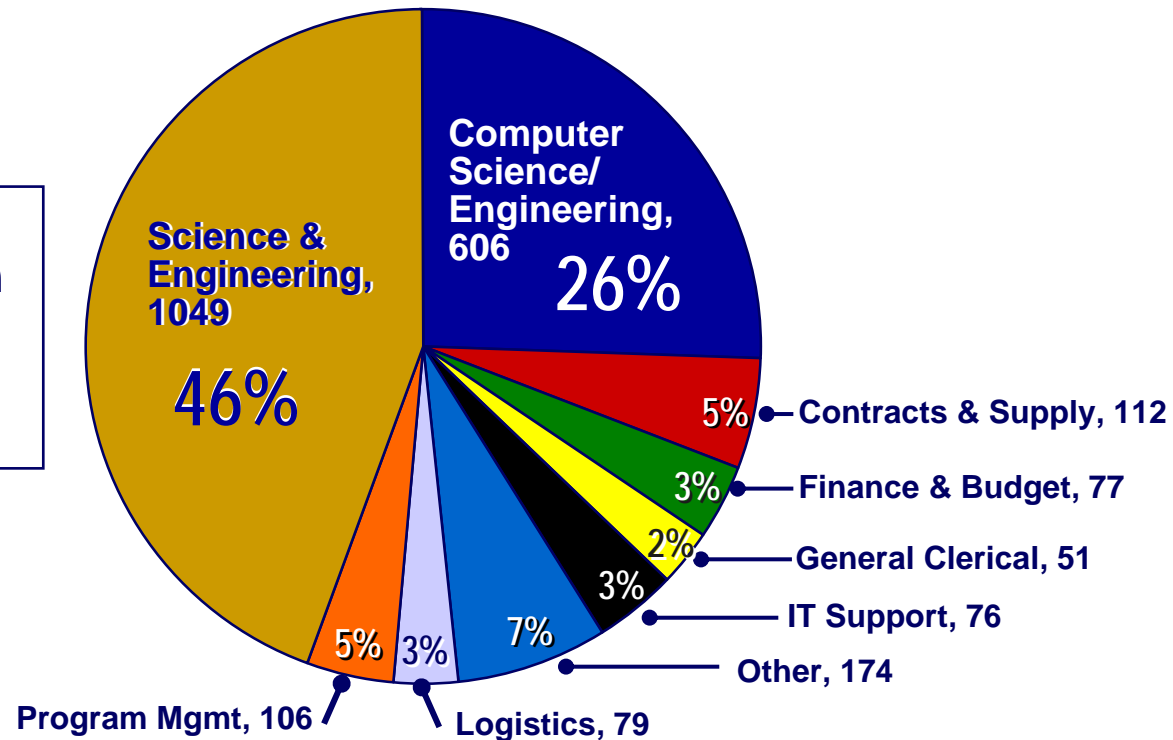


- **Developer of FORCEnet joint collaborative assessment tools** that promote netCentric interoperability and reduce system redundancy
- **Principal SPAWAR provider for Joint and Homeland Security C4I solutions** in a responsive manner.
- **Navy's most efficient provider of critical engineering** and acquisition expertise for Navy/Joint commands and other federal agencies
- **Rapid integrator and deployer of interoperable technologies** to the Navy, Federal Government, and Joint Warfighter
- **Developer and employer of life-cycle logistic support solutions** in a web-enabled portal environment



## A Large Systems & Software Engineering Organization

Over 70% of workforce is in an engineering or computer-related discipline



- The solutions to the global war on terror developed by SPAWAR result from good systems and software engineering.
- Systems engineering is our core competency.
- Total workforce of ~ 2,300 employees.



- **Vision**

- Develop and maintain a World Class Systems Engineering Organization

- **Approach**

- Achieve Command-wide operational consistency
- Based on ISO 15288 – systems engineering
- Based on ISO 12207 – software engineering
- Measure using best practices of CMMI®

- **Benefits**

- Facilitates sharing of tools, documentation, templates, and other artifacts needed by project engineers
- Project Engineers will implement projects quicker; with improved monitoring, effectiveness, quality and efficiency

*“Engineering is the key to our survival. Look to the future.”*

*James Ward, Executive Director, SSC Charleston*



# General Training

- **Competency Development Roadmap**
- **Mandatory Training**
- **Employee Development Plans**







# 2007 Competency Development Focus Areas

- **Warfighter/Customer Focus – top priority**
- **Process Improvement**
  - Lean Six Sigma
  - CMMI
- **Systems Engineering**
- **Strategic Planning**
- **Acquisition**
- **DAWIA (Defense Acquisition Workforce Improvement Act)**
- **Information Assurance**
- **Executive Leadership – groom Sr. Execs**
- **National Security Personnel System (NSPS)**
- **Degree Programs**

**Issued by the Executive Director annually to kick off  
employee development planning cycle**



- **Mandatory training – legislated/regulatory**
  - Anti-terrorism, Security, Safety, Privacy Act, Sexual Harassment Prevention, etc
  - ~ 30 topics that are mandatory for all employees or for position-specific roles (Travelers, Supervisors, Contracting, etc)
  - Centrally funded
- **Required / Recommended training**
  - To support Command competency goals
  - Matrix of offerings and roles
  - Usually centrally funded



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# Example Guidance Matrix

Initiative	Course or Equivalent	Basic	Intermediate	Supervisors
		All Employees	Position Specific (as defined)	
Leadership Development	Federal Executive Institute Applied Learning Program			APPLICATION REQUIRED
	Federal Executive Institute Leadership for a Democratic Society			APPLICATION REQUIRED
	Harvard Business School Senior Executive Fellows			APPLICATION REQUIRED
FORCENET	SPAWAR FY05 Alignment Guidebook (or current version)	Read for Awareness		
	Work Shaping and Acceptance			
	FORCEnet 101 (incl w/WVSA)	RECOMMENDED		
	DOD Architectural Framework Introduction (Tech Brief)		ENGINEERS AND TECHNICIANS	
	DOD Architectural Framework (AFCEA 05503)		ENGINEERS AND TECHNICIANS	
Human Systems Integration	Human Systems Integration 101		SE	
	Human Systems Integration 102			RECOMMENDED

**Similar matrices for SE, CMMI, Lean Six Sigma, DAWIA**



# Employee Development Planning

- **Career Intern New Professional – 2 year plan**
  - Required combination of DAU coursework, rotational experience, Project Management, Scientists to Sea, Technical Report
  - 77 hours of coursework required in year 1
  - 40 hours of DAWIA coursework in year 2
- **Moving to a demand-driven training budget based on inputs to Employee Development Plans**
- **Goals set for 2007**
  - 100% of workforce with White or Yellow Lean Six Sigma (from 85%)
  - 100% of workforce with introductory CMMI® (from 65%)
  - 85% certified for those pursuing DAWIA certification (from 50%)

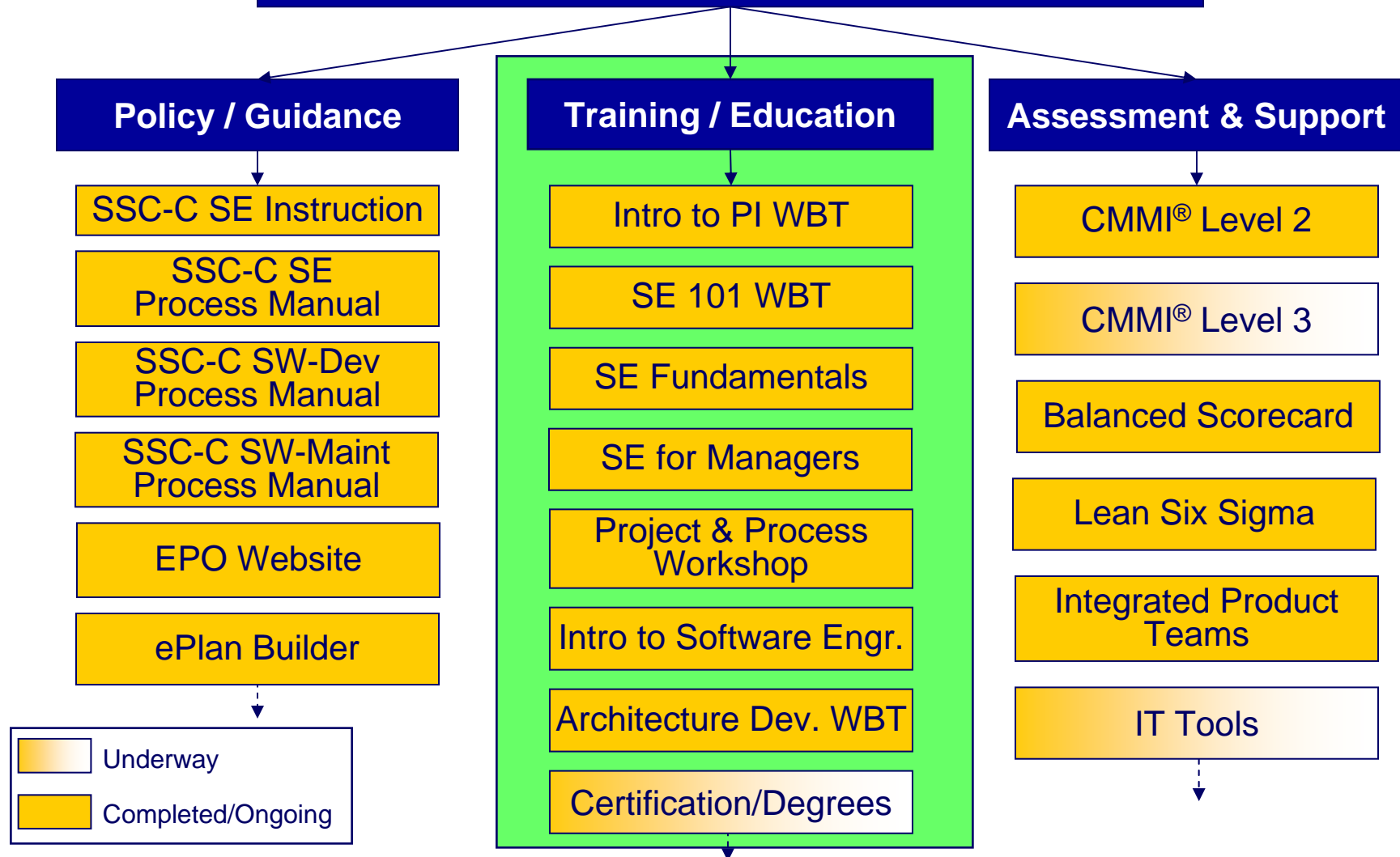


# Systems Engineering Training

- Plan
- Training Architecture
- Training Offerings



## Elements of SSC-C SE Revitalization



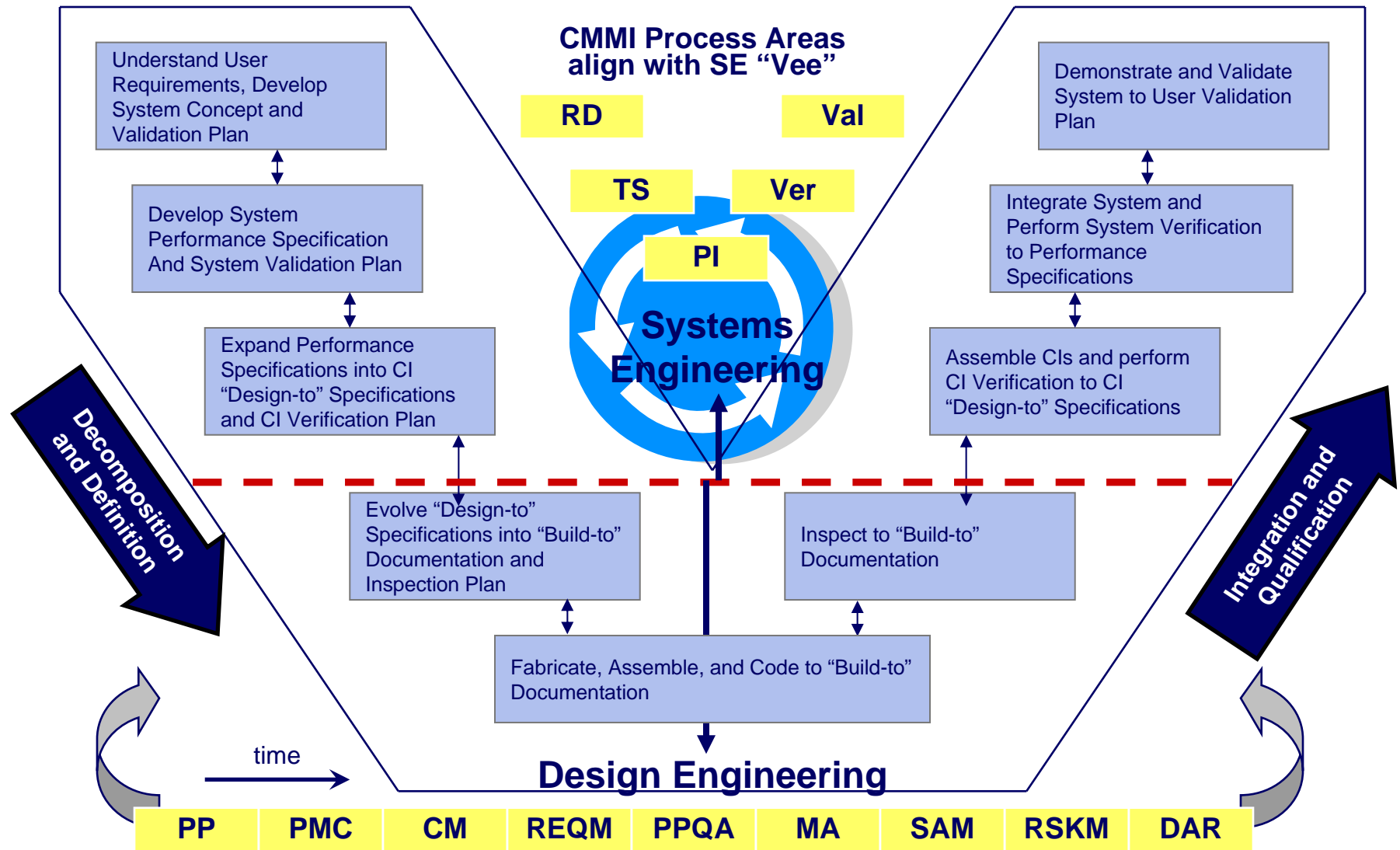


- **Industry-wide issues (NDIA Study – Jan, 2003)**
  - Requirements definition, development, and management not applied consistently
  - Lack of systems engineering discipline and effective SE implementation
- **SSC-Charleston issues prior to 2004**
  - Limited number of skilled, experienced, trained subject matter experts
  - Processes not institutionalized
  - New professionals have not been taught a structured systems engineering process
  - Lack of alignment with process improvement and CMMI® initiative



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# Classic System Engineering "Vee" Diagram Aligning SE with CMMI and Process Improvement







# What do we need to be world class?

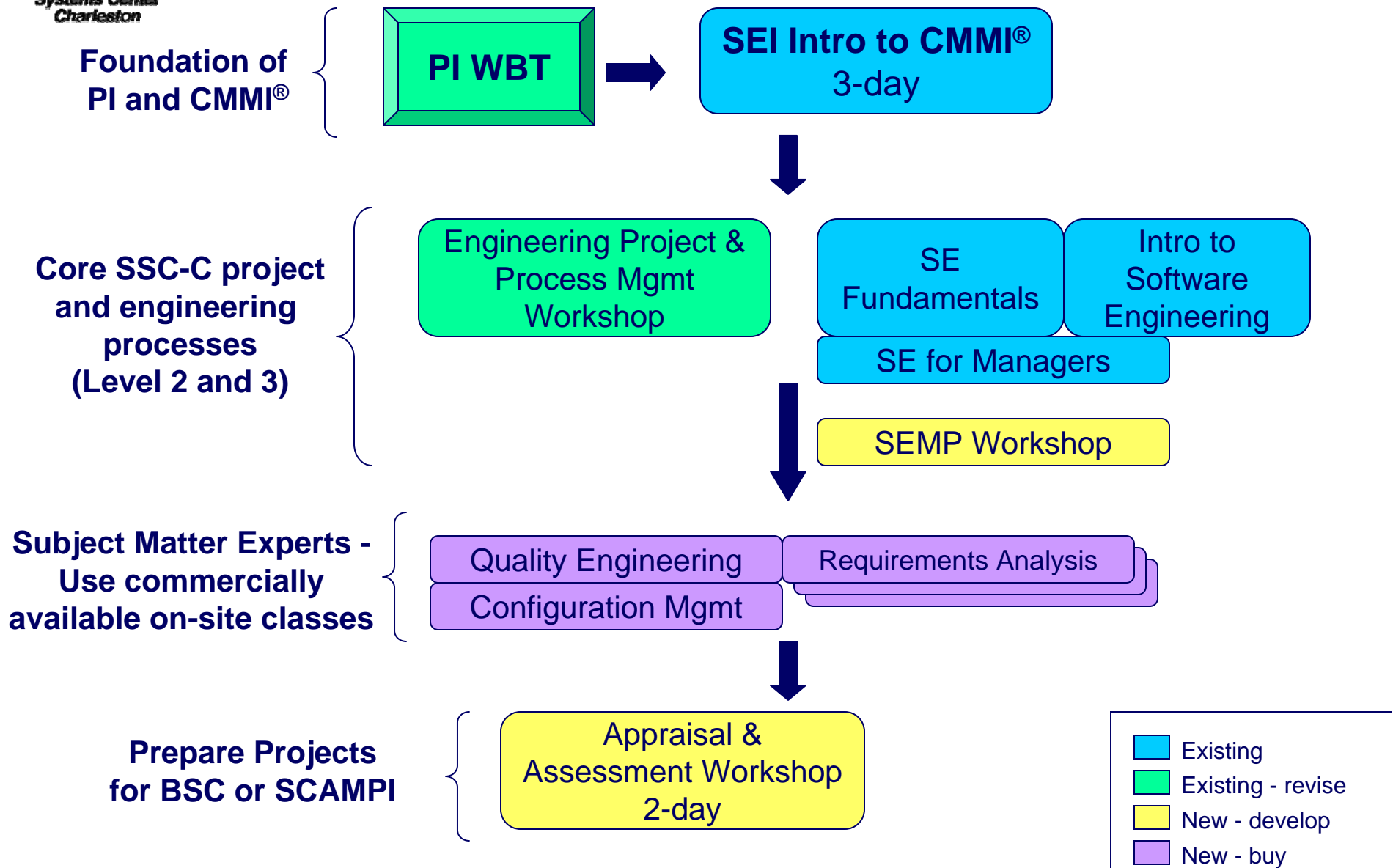
- All employees need a basic understanding of process improvement
- All project teams need to fully understand the CMMI model (all processes, all levels)
  - To understand all of the best practices and maturity levels
  - To comply/prepare for DoD and NAVY policy
- All project team members and supporting personnel need to know how to perform the standard processes and best practices required
  - How to do good SE, CM, QA, Planning, Measurement, Risk, ...
- To properly prepare for and complete an assessment or appraisal, key project team members need to map the project work products to the practices assessed.

**These needs can be depicted in a training architecture**



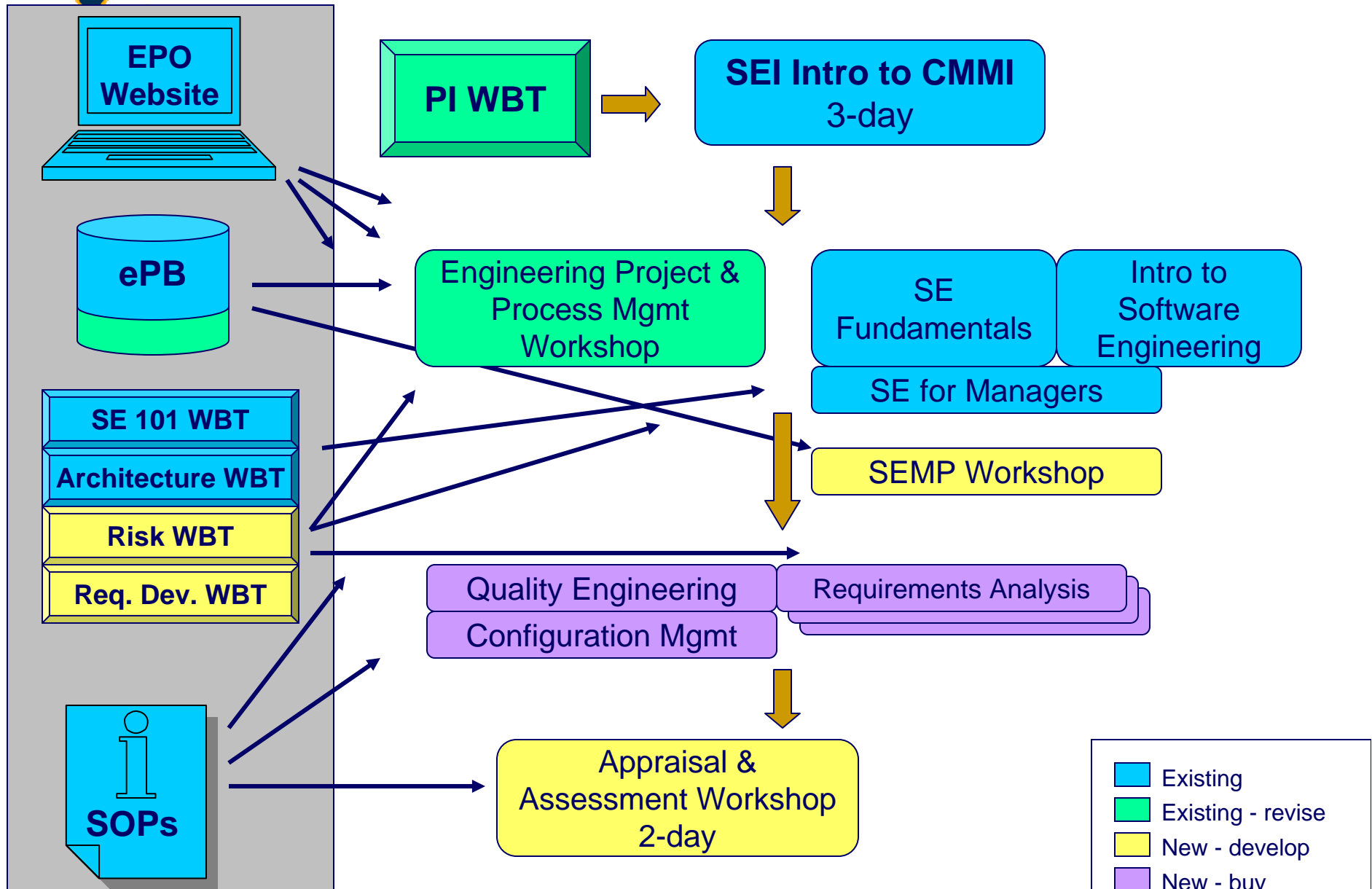
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# Training Architecture

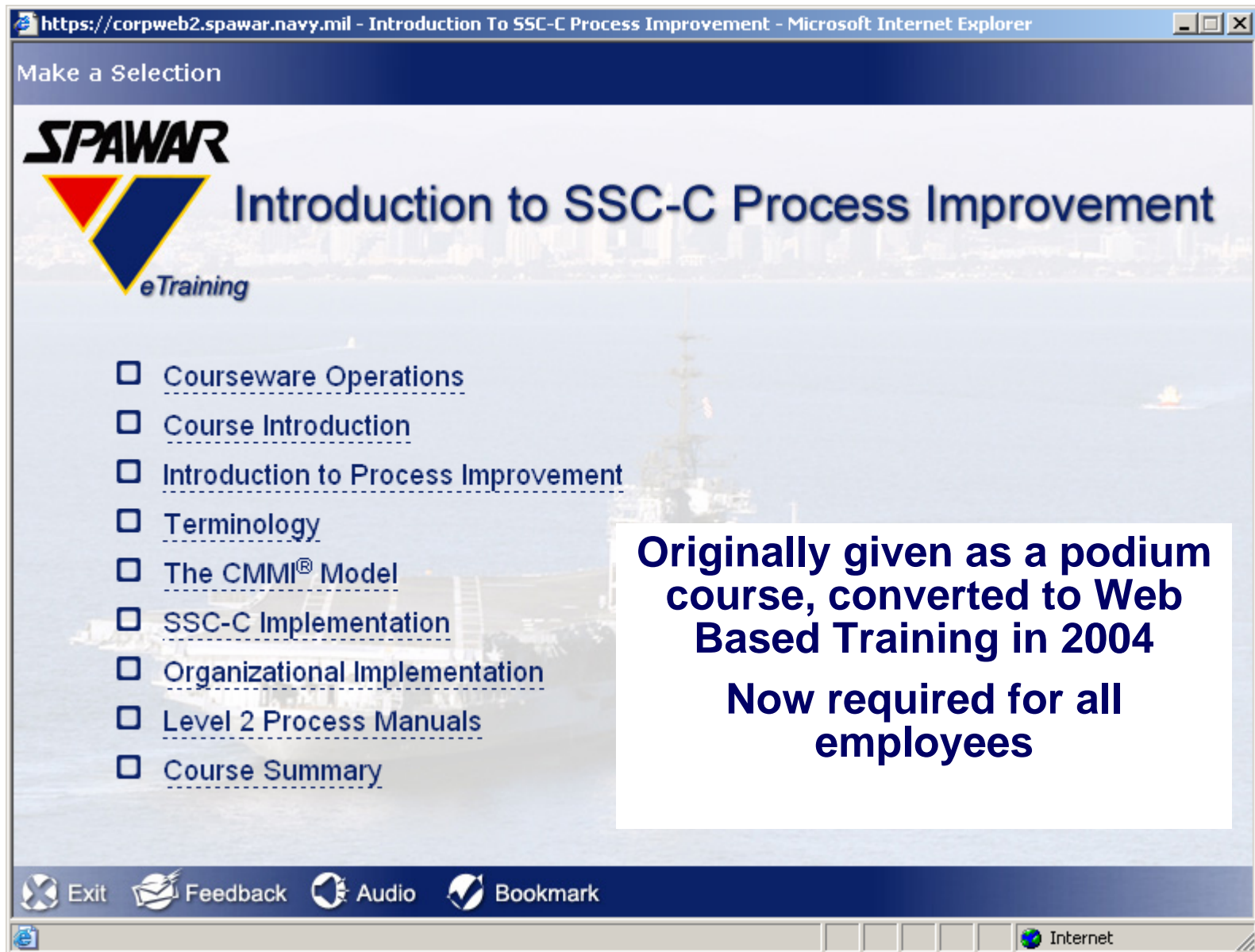




# Supporting Tools




	Existing
	Existing - revise
	New - develop
	New - buy



https://corpweb2.spawar.navy.mil - Introduction To SSC-C Process Improvement - Microsoft Internet Explorer

Make a Selection



## Introduction to SSC-C Process Improvement

*eTraining*

- [Courseware Operations](#)
- [Course Introduction](#)
- [Introduction to Process Improvement](#)
- [Terminology](#)
- [The CMMI® Model](#)
- [SSC-C Implementation](#)
- [Organizational Implementation](#)
- [Level 2 Process Manuals](#)
- [Course Summary](#)

**Originally given as a podium course, converted to Web Based Training in 2004**

**Now required for all employees**

Exit Feedback Audio Bookmark

Internet



- **3-day *Introduction to CMMI®* course teaches the full CMMI® model**
  - Students learn how the best practices build and relate across process areas
  - Learn the terminology
- **SEI-Authorized instructors are well-versed in our implementation to augment material with SSC-C specific content**
  - Highlight SSC-C tools and resources
  - Actively involved in projects, teams, and infrastructure
- **Over 300 employees trained**
  - Want to build a cultural foundation within the engineering departments



- Teach the Systems Engineering process
- 3-day on-site, classroom course
  - Based on SMU SE Masters course
  - Customized to incorporate SSC-C SE process
  - Over 300 SSC-C engineers trained
- 1-day SE for Managers course added



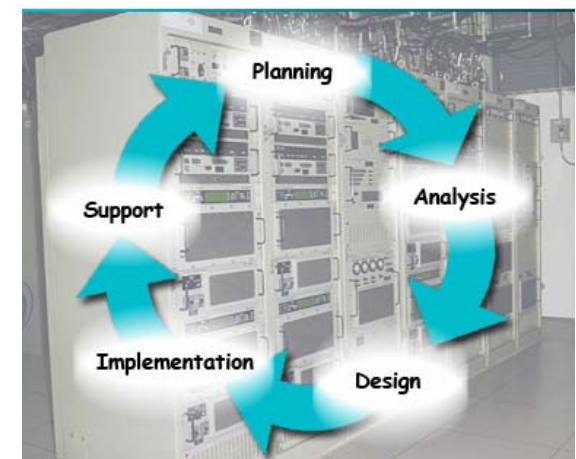
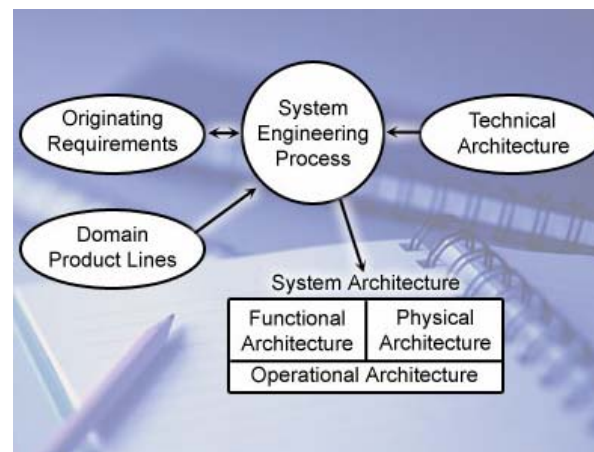
*“Thought provoking, motivating, and challenging. Learning basic SE caused me to brainstorm many different applications of organized system processes. It motivated me to want to begin organizing its application. It also challenged me to apply GOOD SE practices in order to successfully be more efficient in the process..”*

*“It was extremely beneficial to have a professor with extensive knowledge of the subject matter and one who could apply it to the SPAWAR methods.”*

Student Feedback

## • Introduction to Systems Engineering WBT

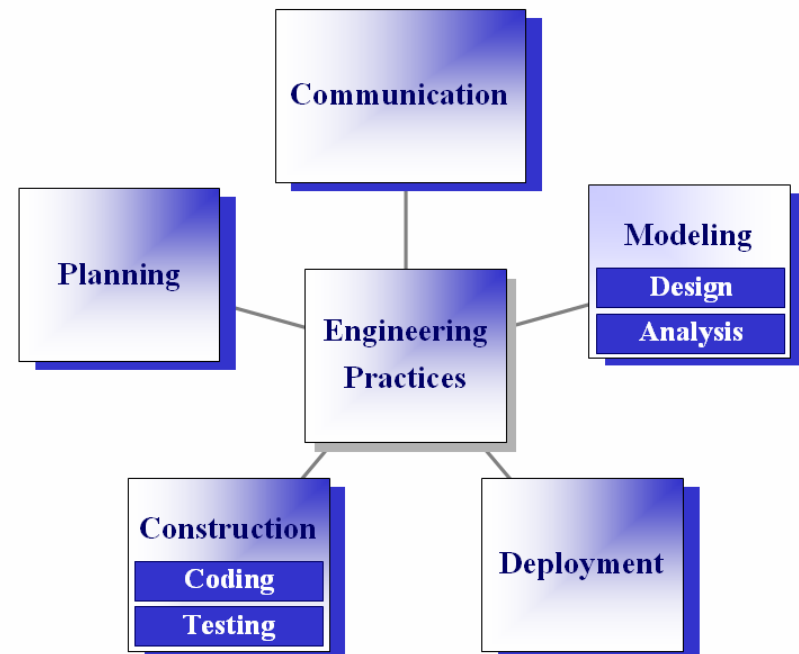
- 10-module web based training
- Closely aligned to SSC-C SE Process, SE Fundamentals Course, and ISO/IEC 15288
- Includes hotlinks to referenced documentation
  - SSC-C Process manuals, policies, standards
- Extensive branching for more detail



- **Similar format to the Systems Engineering Fundamentals**
  - 3 days, primarily lecture
  - Aligned with the SSC-C Software Development Process Manual

- **Course Outline**

- Intro to Software Engineering
- Roles
- Software Engineering Practices
- Software Development Process
- Software Maintenance
- Managing Software Projects
- Tailoring



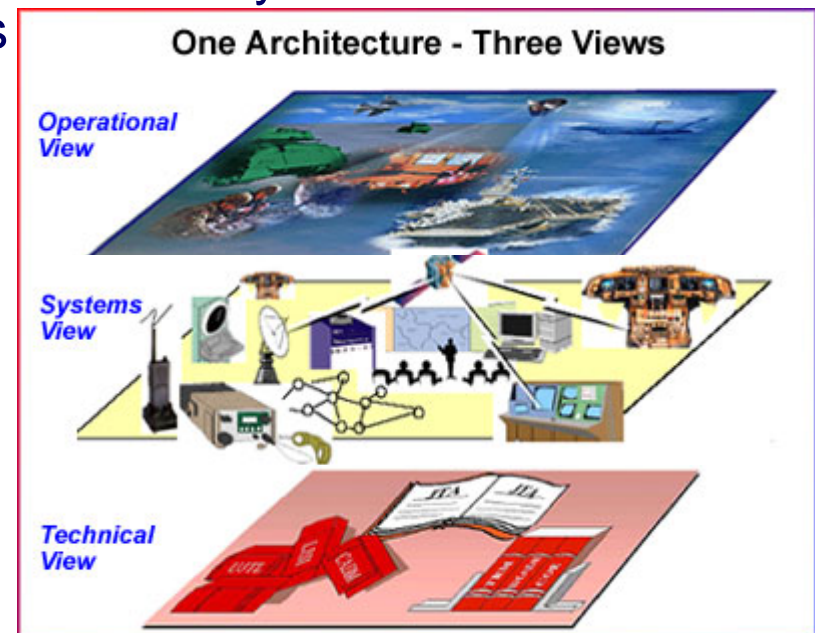




- **Multi-session workshop oriented “how to” class**
- **What is a good process? Is my process good?**
- **How to generate project plans**
  - What makes a good PMP, CM Plan, QA Plan...
  - How to use ePlan Builder
  - Hierarchy of plans (Based on level 2 or level 3 goals)
- **Configuration Mgmt**
  - Are my Configuration Items (CI's) and Change Control adequate?
- **PPQA**
  - How to execute a process review and work product review
- **Measurement and Analysis**
  - Are my measures measurable?
- **Requirements Management**
  - Traceability - simple to complex
- **Monitoring and Control using Reviews**



- **Developing web-based training courses in specific topics**
- **Architecture Development WBT - completed**
  - Introduction to Architecture Development and DoDAF
  - Designed to educate and promote value of system architecture to non-architects and new engineers
  - Tests for understanding
- **Risk Management**
  - Risk identification
  - Analysis tools and techniques
  - Mitigation planning
  - Risk monitoring
- **Requirements Development**



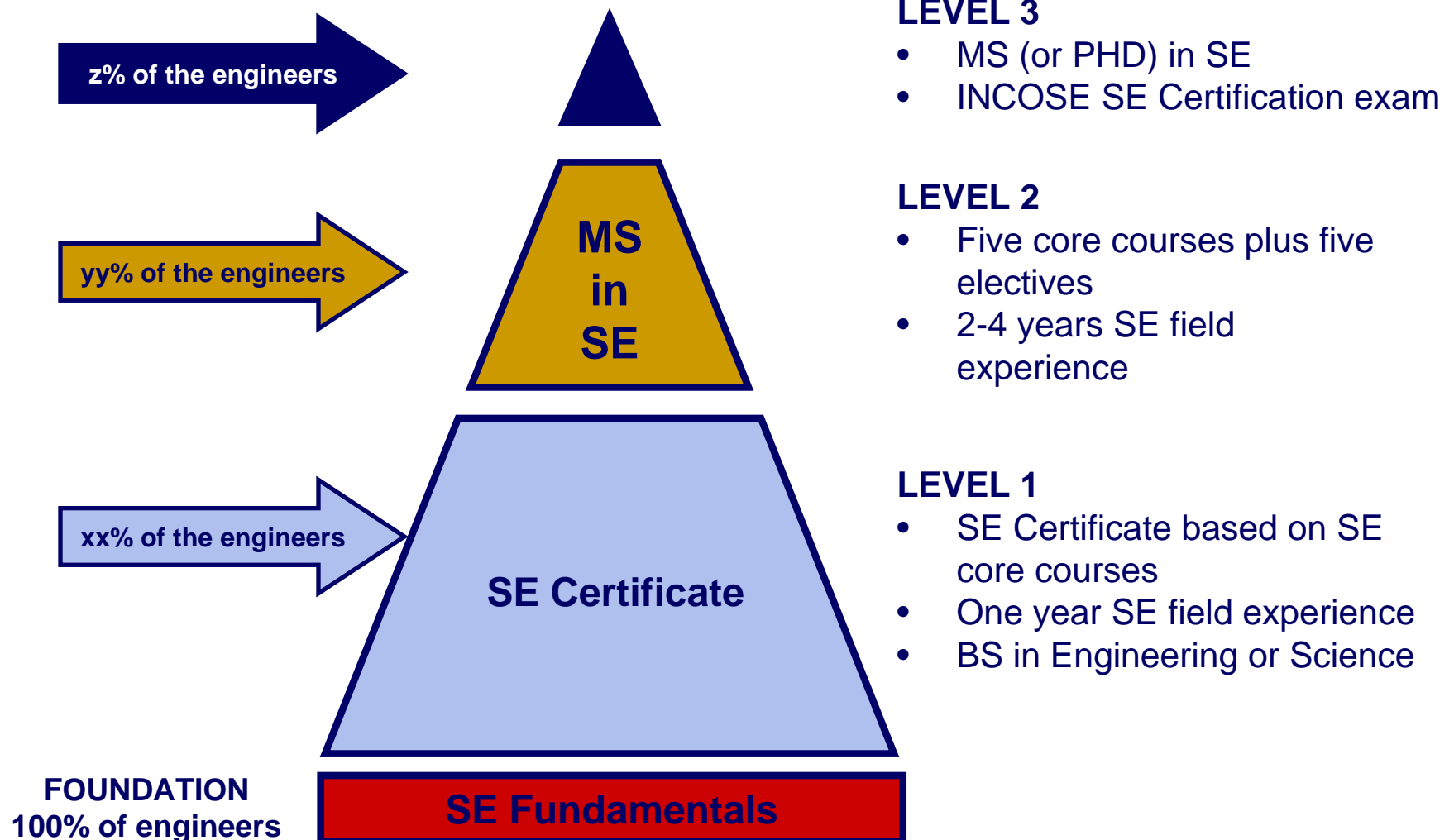


# Development and Certification Opportunities

- Certification Hierarchy
- Certification in Other Disciplines



# Certification Hierarchy – SE Example





# Certification Hierarchy for Other Disciplines

- **Software Certification**
  - Developing tiered hierarchy for SSC-C software professionals similar to SE hierarchy
  - IEEE Certified Software Development Professional (Level 3)
  
- **Architecture Development Certification**
  - FEAC Institute
    - Federal Enterprise Architecture Framework Certification
    - DoD Architecture Framework (DoDAF) Certification
  - Software Engineering Institute (SEI)
    - Software Architecture curriculum



# Summary

- Lessons Learned
- Goals and Results





- **Senior Management support is critical to success**
- **Training Strategy**
  - Everyone needs to be engaged – “train the masses”
  - Create a foundation/baseline of understanding
  - Integrate/align additional courses to build on the baseline
  - Specific training for process owners/subject matter experts
- **Utilize Teams as champions/owners of specific processes**
  - Multi-department representation
  - Each team addressing training and certification needs for their process
- **Resource Centrally**
  - Utilize your organization’s training group
  - Coordinate employee development planning with training implementation
  - Provide funding centrally for mandatory training and key initiatives



## Which one is World Class?



Are you going to take your car to  
the cheapest mechanic?  
or  
To the World Class garage?

The is the  
Systems  
Engineering  
image SSC-C  
wants



**Training and Processes are key to reaching this vision**

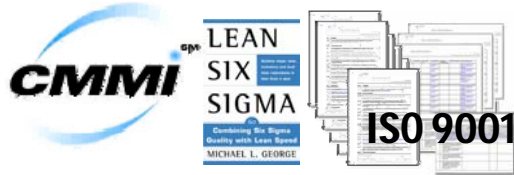




# Summary

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- Aggressive SE Program
- Industry Standards
  - Systems Engineering
  - Software Engineering
- Best Practices



## • Successes

- April 2005 Command Achieved CMMI® Maturity Level 2 as certified by Software Engineering Institute
- June 2006 Common Information Centric Security (CICS) project achieved CMMI Level 3 in 16 of 18 Process areas
- 1<sup>st</sup> SPAWAR Systems Center to achieve these levels

## • Goals

- World-Class SE Program
- Support Command Balanced Scorecard
- April 2007, Command to achieve CMMI® Level 3

## • Automated Tools

- ePlanBuilder
- eWBS



[corpweb2.spawar.navy.mil/cmmi/](http://corpweb2.spawar.navy.mil/cmmi/)

## • Training – 1,600+

- SE Fundamentals - 305
- Web-Based Training courses
  - SSC-C PI; Intro to SE; Arch. Dev.





**Thank you !**

**Any Questions ?**

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