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# Training Your Systems Engineering Workforce

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**NDIA Systems Engineering Conference, October 27, 2005**

A horizontal banner with a dark blue background. On the left, there is a large, stylized yellow arrow pointing to the right. In the center, the words "Net-Centric Enterprise" are written in a large, white, sans-serif font. On the right side, there is a faint, semi-transparent image of a soldier in a combat uniform and helmet, looking forward. The background also features some abstract, glowing lines and shapes, suggesting a digital or networked environment.

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# Presentation Outline

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



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

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

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# SPAWAR



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## Where We Fit

**President**

**non-DoD**

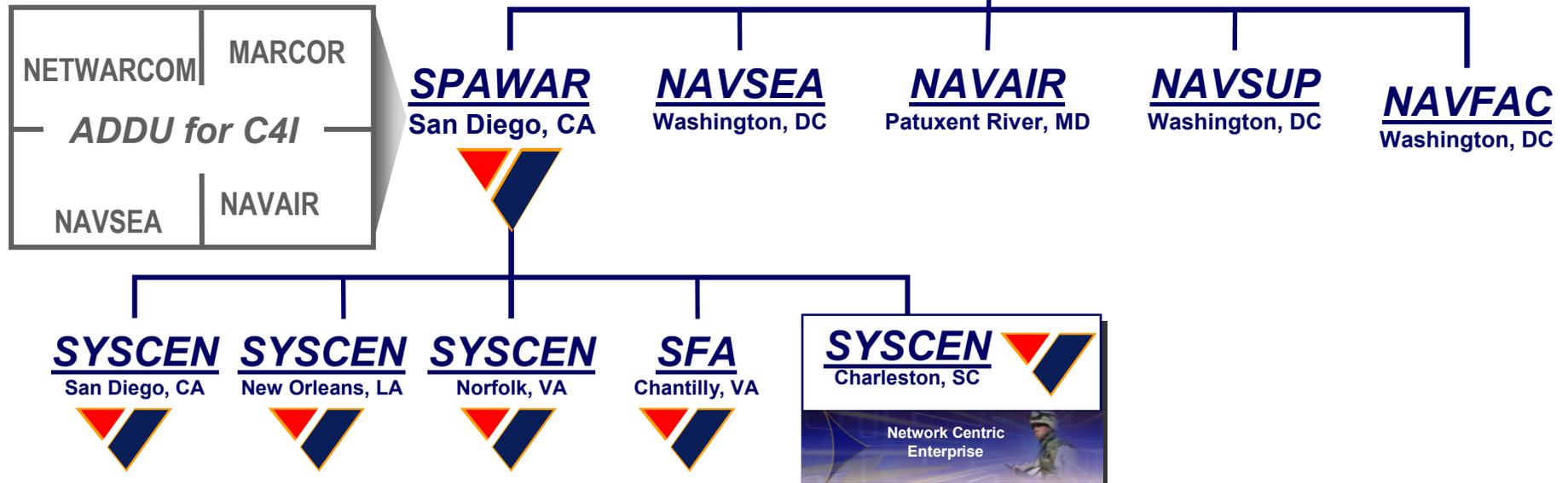
**Secretary of Defense**

**Secretary of the Navy**

**Other DoD**

**CNO**  
Fleet Support

**ASN (RDA)**  
Acquisition





# C4ISR

**C**ommand  
**C**ontrol  
**C**ommunications  
**C**omputers  
**I**ntelligence  
**S**urveillance &  
**R**econnaissance

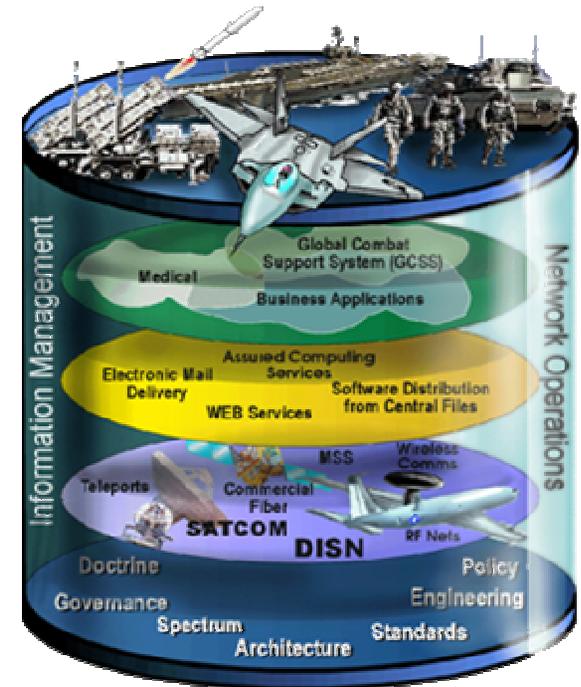
- *Modeling & Simulation*
- *Command & Control*
- *Navigation*
- *Physical & Computer Security*
- *Video Teleconferencing*
- *Information Assurance*
- *Sensors*
- *Communications*
- *Cryptologic & Intelligence*
- *Image Processing*
- *Meteorology*
- *Air Traffic Control*



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## What We're Known For

- **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



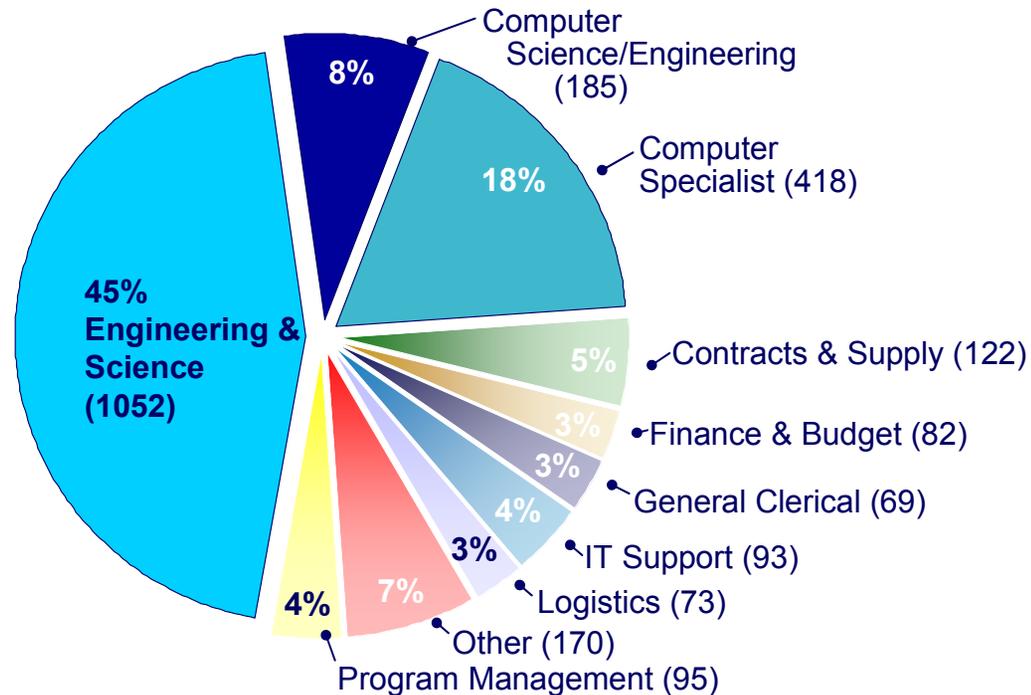


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# Who We Are

## A Large Systems & Software Engineering Organization

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



- The effective and efficient 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 ~ 2300 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 Focus Areas**
- **Mandatory Training**
- **Employee Development Plans**



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- **Corporate Strategy**
  - Navy, SPAWAR, and SSC-Charleston
- **FORCEnet – NAVY integration initiative**
  - SPAWAR Alignment
- **CMMI and Process Improvement**
- **Lean Six Sigma**
- **DAWIA – Defense Acquisition Workforce Improvement Act**
- **Leadership Development - supervisors**
- **Human Systems Integration**
- **National Security Personnel System (NSPS)**



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# Mandatory Training

## All Employees

## Supervisors

Policy &  
Regulatory

Ex: Meet the Fleet; Anti-Terrorism, Info Assurance

Ex: Mgmt Control; EEO; Payroll; etc

Strategy

CNO, HQ, SSC-C Commander's Guidance

Balanced Scorecard

FORCEnet

SPAWAR Alignment; FORCEnet 101

FORCEnet 201

CMMI®

Process Improvement WBT

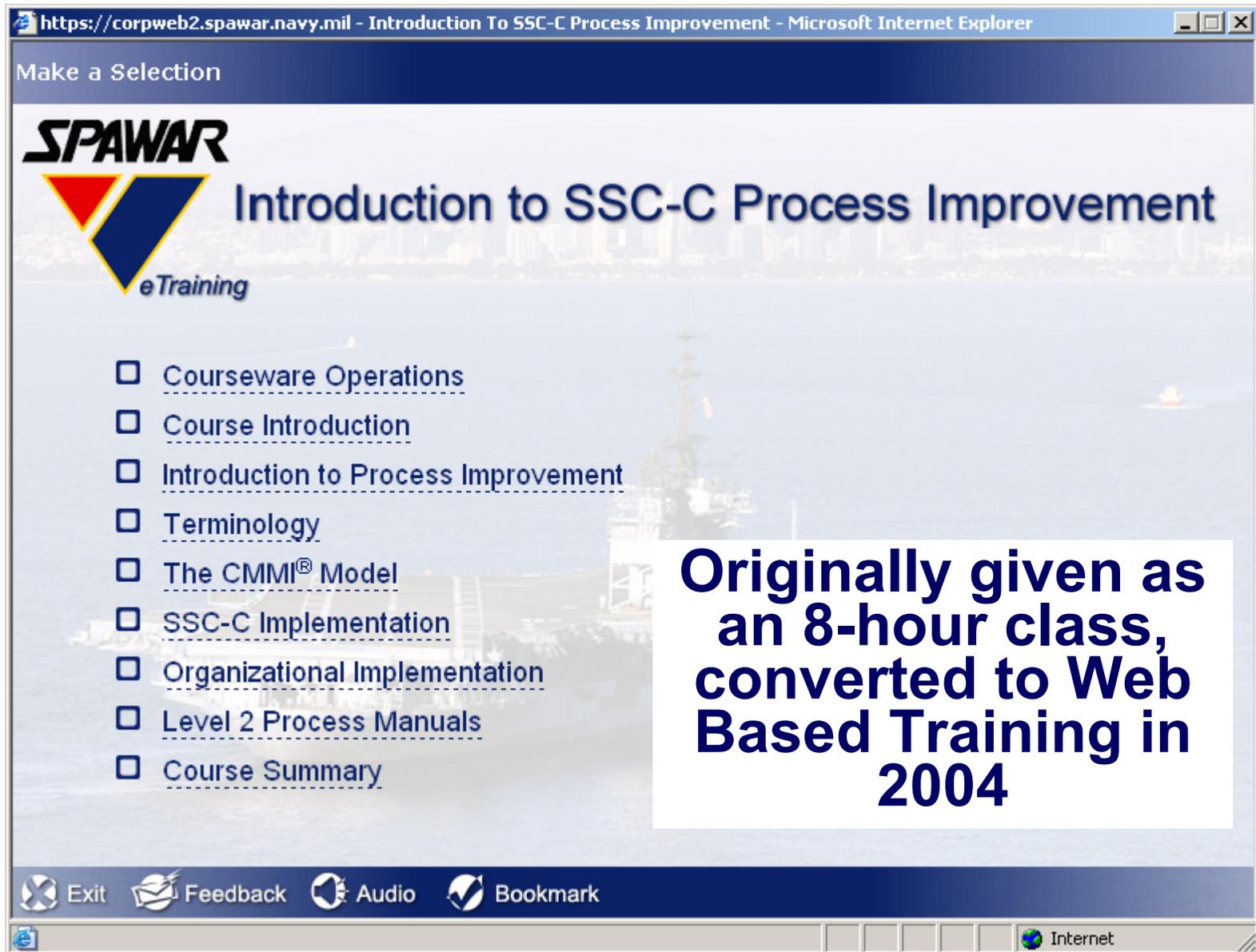
Lean Six Sigma

Six Sigma Intro

Leadership Development

Ex: Federal Executive Institute; Harvard Bus. School

**Mandatory Training may be computer based or instructor delivered**



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

Make a Selection

**SPAWAR**  
*eTraining*

Introduction to SSC-C Process Improvement

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

**Originally given as  
an 8-hour class,  
converted to Web  
Based Training in  
2004**

Exit Feedback Audio Bookmark

Internet



- **Career Intern New Professional – 2 year plan**
  - Required combination of DAU coursework, rotational experience, Project Management, Scientists to Sea, Technical Report
- **Supervisors**
  - Mandatory plus series of recommended
- **Project Managers / System Engineers**
  - Recommended list of available courses and workshops
- **Moving to a demand-driven training budget**
- **Goals set for training x% of population in CMMI<sup>®</sup> and Lean Six Sigma**

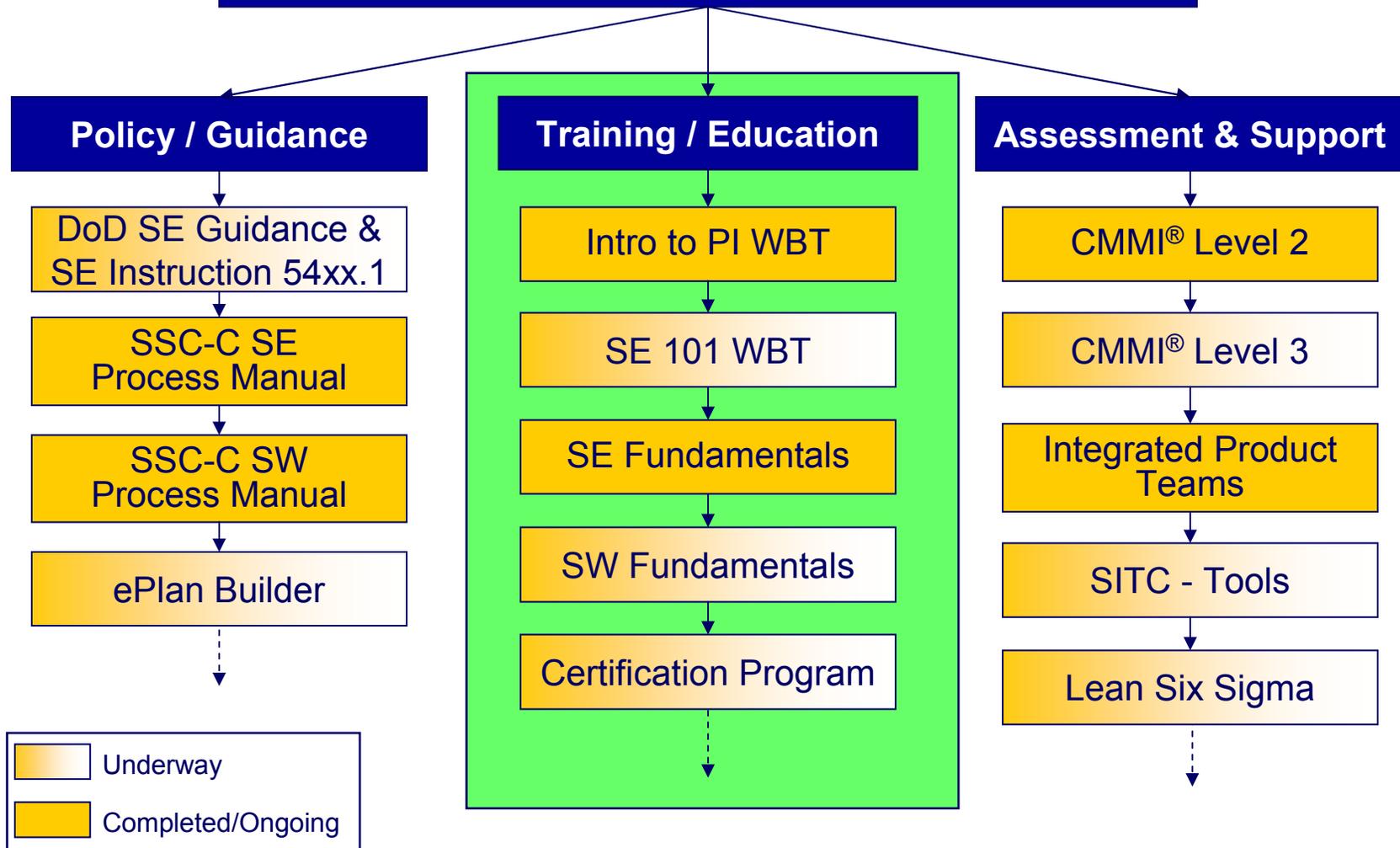
# Systems Engineering Training

- **Plan**
- **Systems Engineering Fundamentals**
- **SE 101 WBT**
- **Introduction to Software Engineering**
- **DoDAF**



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## 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<sup>®</sup> initiative



- **3-day on-site, classroom course**
  - Based on SMU SE Masters course
  - Customized to incorporate SSC-C SE process
  - 180 SSC-C engineers trained in FY05
  - Classes planned every 2 months
- **1-day *SE for Managers* course added**
  - To align management with SE Process

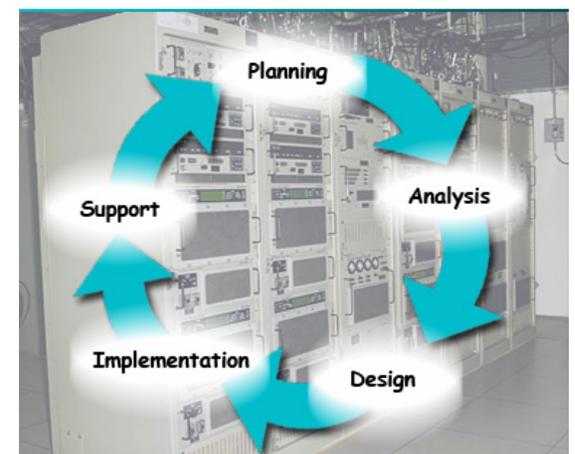
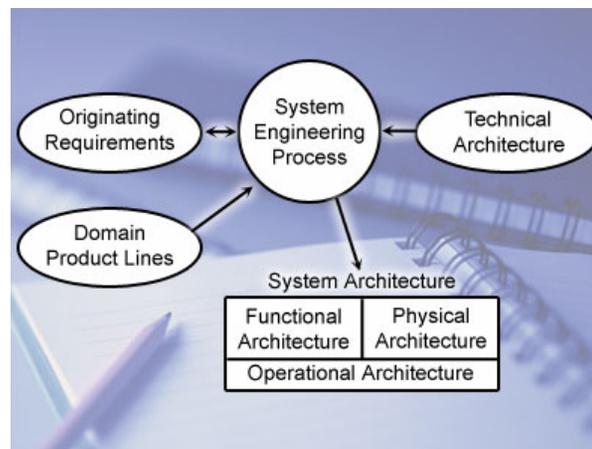
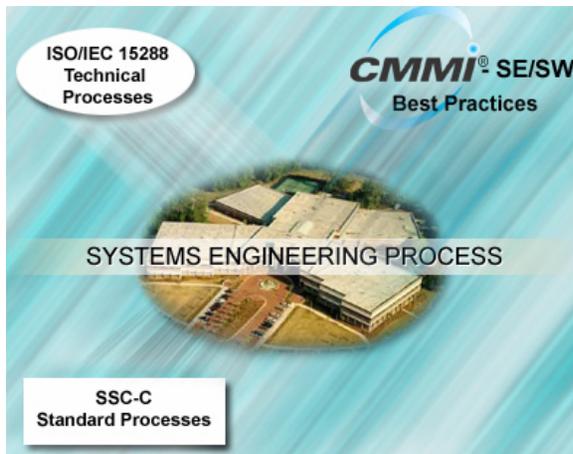


***“The course was very educational. It helped me relate my current project to the overall system it was a part of, and how it fits in with the big picture.”***

***“The course was well presented and accurately covered the Systems Engineering Design Process Fundamentals. Continued/additional training on this subject is critically needed for this command to continue to develop as a professional engineering organization.”***

Student Feedback

- **Introduction to Systems Engineering WBT**
  - 10-module web based training
  - Closely aligned to SSC-C SE Process, SE Fundamentals Course, ISO/IEC 15288 and IEEE standards
  - Includes hotlinks to referenced documentation
    - Process manuals, policies, standards

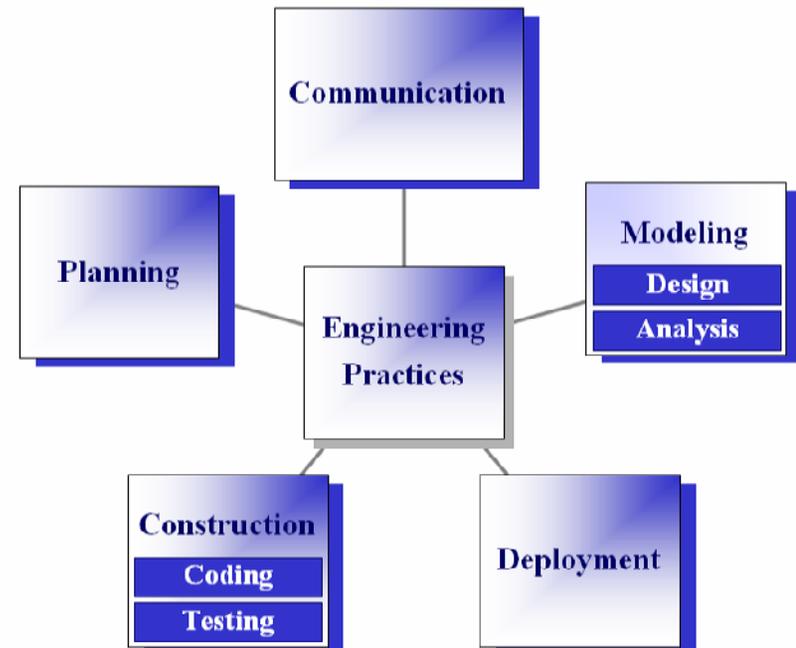




- **Similar format to the Systems Engineering Fundamentals**
  - 3 days, primarily lecture
  - Aligned with the SSC-C Software Development Process Manual

- **Course Outline**

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





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# DoD Architecture Framework (DoDAF)

- **Developing Executable Architectures Using the DoDAF and SE**
  - 3 day on-site course for Systems Architects and Systems Engineers
- **Intro to Architecture Primer**
  - Currently in design
  - To educate and promote value of system architecture to non-architects



# Development and Certification Opportunities

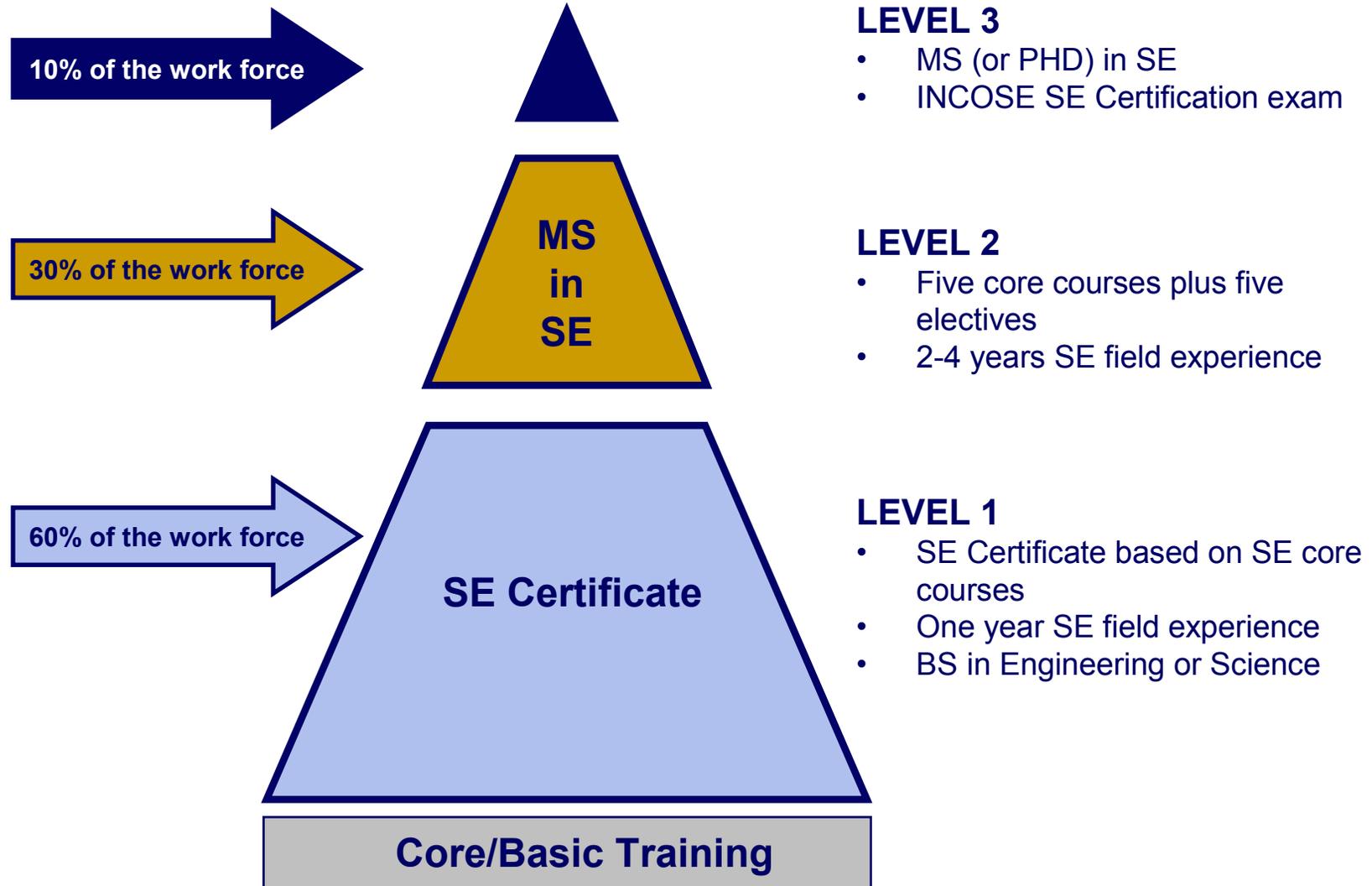
- SE Certification Hierarchy
- SE Masters and Certification Programs
- Certification in Other Disciplines



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# SE Certification Hierarchy





- **Available to SSC-C engineers through**
  - Southern Methodist University
  - University of Alabama-Huntsville
  - Other approved programs
- **Certified Systems Engineering Professional (CSEP)**
  - Through INCOSE
- **Defense Acquisition University (DAU)**
  - Systems Planning, Research, Development and Engineering—Systems Engineering
  - Certification Levels 1, 2, and 3



# 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

- Training Accomplishments
- Lessons Learned



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- **Intro to Process Improvement**

- Over 800 people trained
- Provided via WBT
- Now Mandatory for all employees

- **CMMI®**

- SEI Intro to CMMI®
- SSC-C Level 2 Processes
- 875 people trained

- **Project Management/Project Monitoring & Control**

- 625 people trained

- **Process-specific Workshops (CM, QA, REQ, M&A)**

- 375 people trained



*\* This accounts for some employees attending more than one course*



- **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 (IPTs) as champions 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



# Summary

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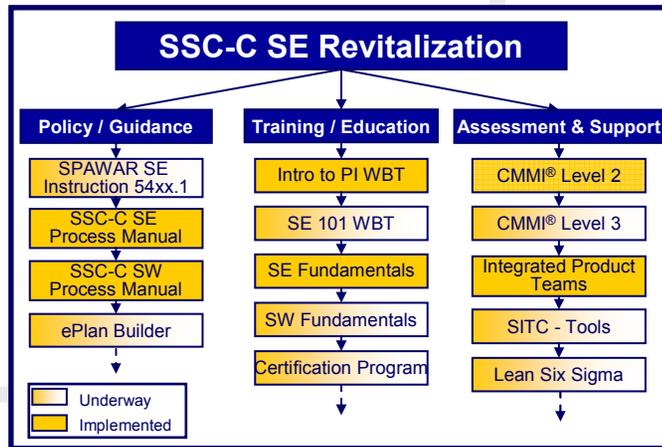
## Aggressive SE Program

### Industry Standards

- Systems Engineering (SE)
- Software Engineering (SW)

### Best Practices

- CMMI®
- ISO 9001
- Lean Six Sigma



## Training – 1,300 people\*

## Systems Engineering Fundamentals - 180

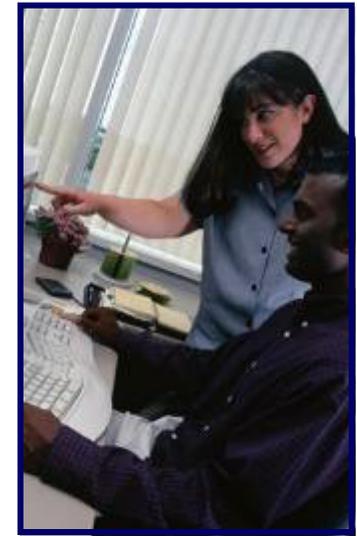
## Intro to SSC-C PI

- CMMI® Level 2 Processes

- CMMI® Level 3 Processes

- SE/SW Engineering Workshops

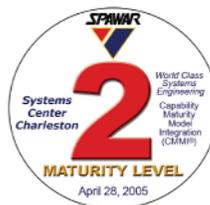
- Web-Based Training (WBT) for Process Improvement



\*includes industry partners

## Successes

- Command Achieved CMMI® Maturity Level 2 in April 2005
- 1st SPAWAR Systems Center to Achieve CMMI® Maturity Level 2



## Plans

- World Class Systems Engineering
- Support Command Balanced Scorecard
- April 2007 CMMI® Maturity Level 3





**Thank you !**

**Any Questions ?**

**Contact Information:**

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