

# Sound Systems Engineering using CMMI®

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A 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, there is a faint image of a soldier in a combat uniform and helmet, looking forward. The background also features some abstract, glowing lines and shapes.

**Net-Centric  
Enterprise**



## Presentation Outline

➤ Introduction

➤ Revitalization Effort using CMMI®

➤ Training

➤ Summary



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



**President**

**non-DoD**

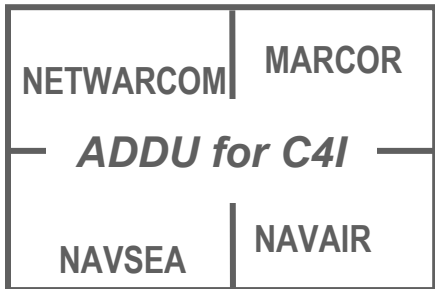
**Secretary of Defense**

**Secretary of the Navy**

**Other DoD**

**CNO**  
Fleet Support

**ASN (RDA)**  
Acquisition



**SPAWAR**  
San Diego, CA

**NAVSEA**  
Washington, DC

**NAVAIR**  
Patuxent River, MD

**NAVSUP**  
Washington, DC

**NAVFAC**  
Washington, DC

**SYSCEN**  
San Diego, CA

**SYSCEN**  
New Orleans, LA

**SYSCEN**  
Norfolk, VA

**SFA**  
Chantilly, VA

**SYSCEN**  
Charleston, SC





# C4ISR

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

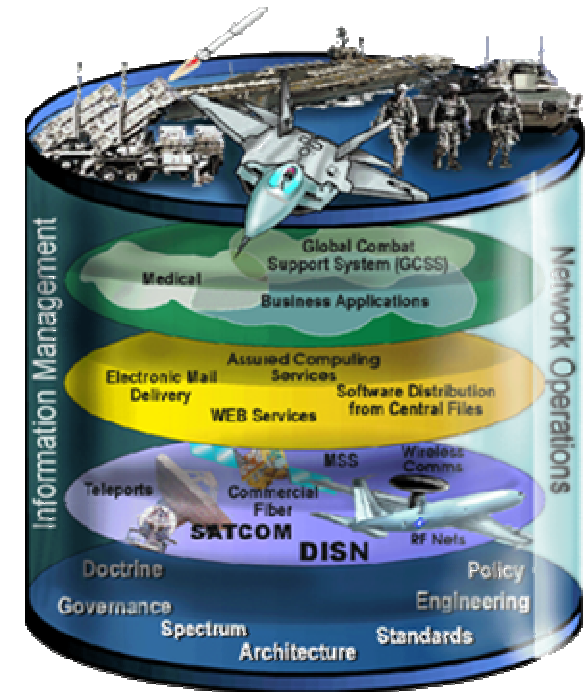
- *Modeling & Simulation*
- *Command & Control*
- *Navigation*
- *Physical & Computer Security*
- *Video Teleconferencing*
- *Information Assurance*
- *Sensors*
- *Communications*
- *Cryptologic & Intelligence*
- *Image Processing*
- *Meteorology*
- *Air Traffic Control*



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Charleston

## 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

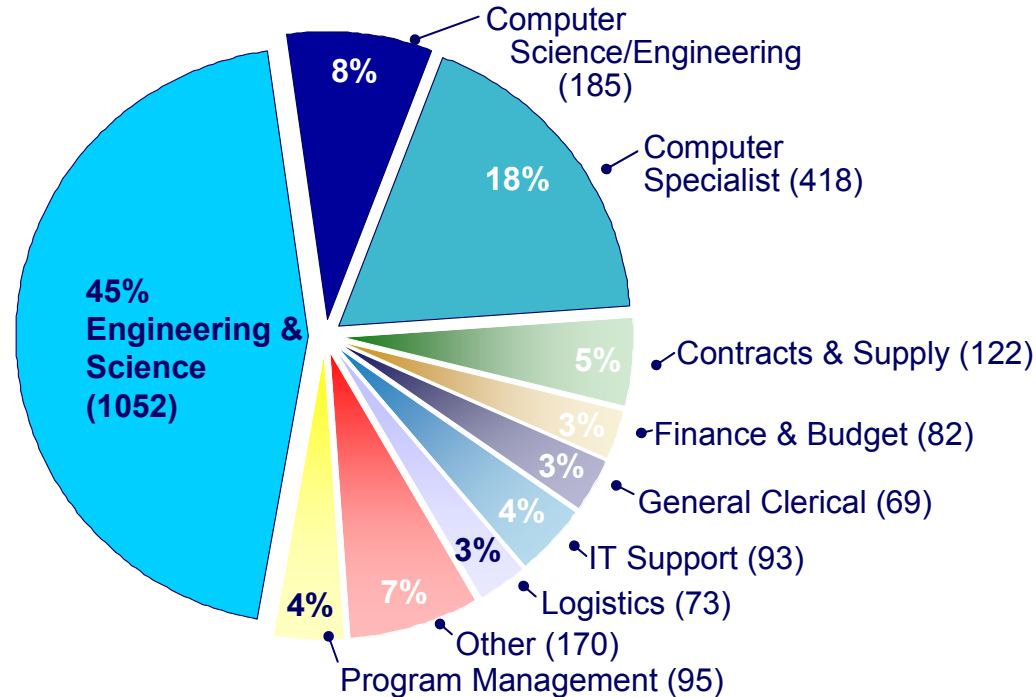




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## A Large Systems & Software Engineering Organization

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.



# SE Revitalization Effort using CMMI®

➤ **Vision**

➤ **Organization**

➤ **Plan**

➤ **Process**

➤ **Tool**





- **Vision**

- Develop and maintain a World Class Systems Engineering Organization

- **Approach**

- Achieve Command-wide operational consistency
- Based on ISO/IEC 15288 – systems engineering
- Based on ISO/IEC 12207 – software engineering
- Based on implementing CMMI® “Staged Representation”
- Measure using best practices of CMMI® “Continuous Representation”

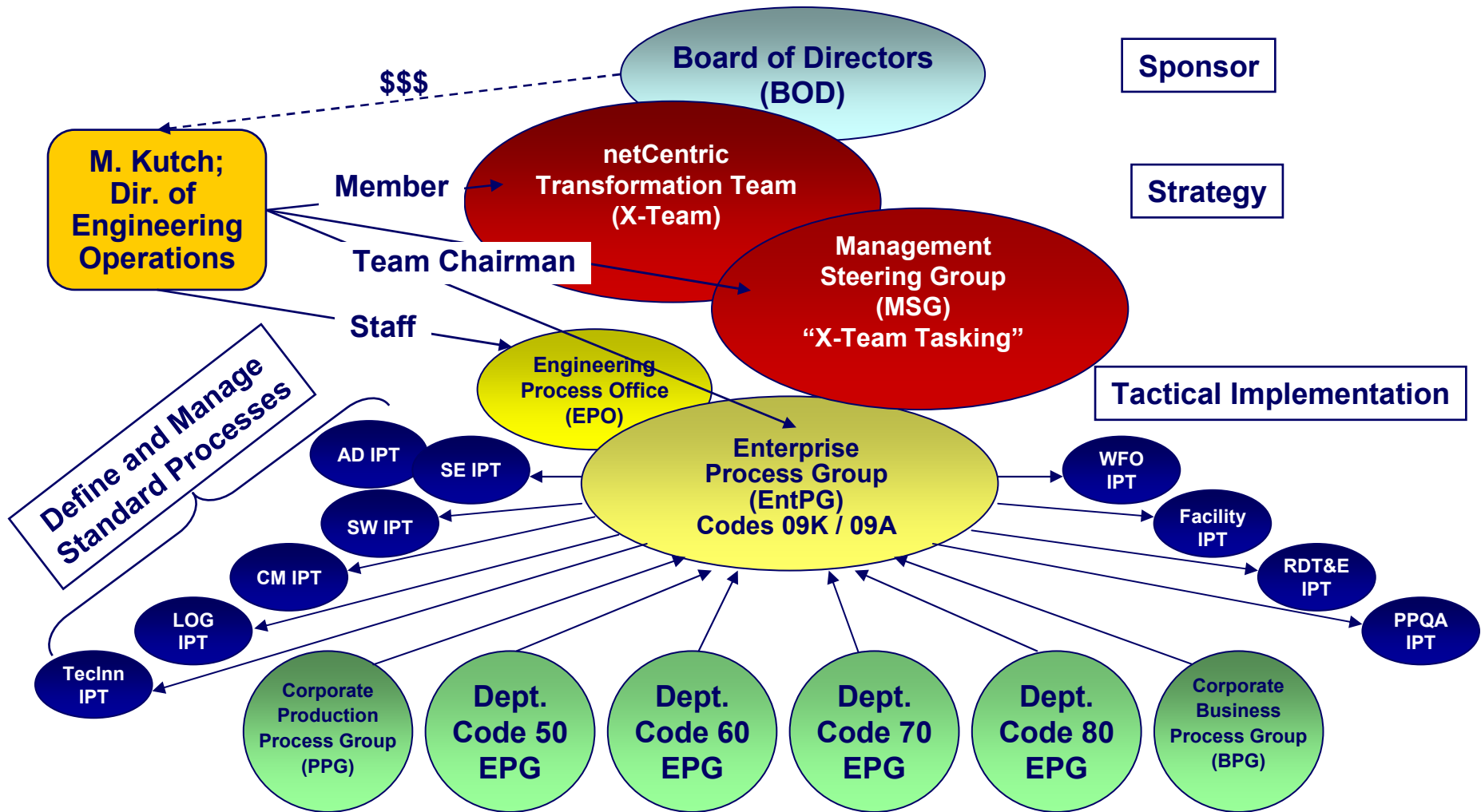
- **Benefits**

- 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

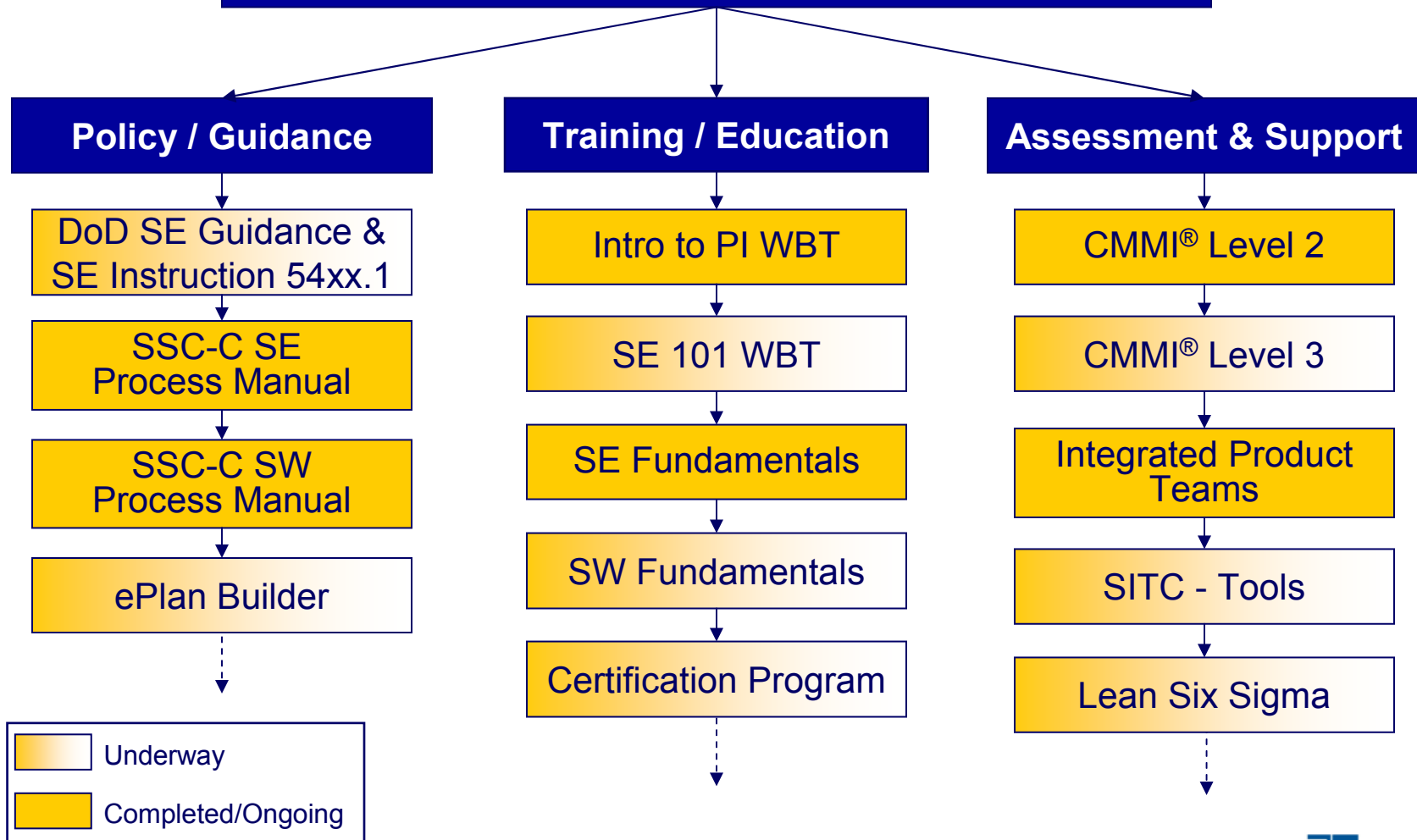


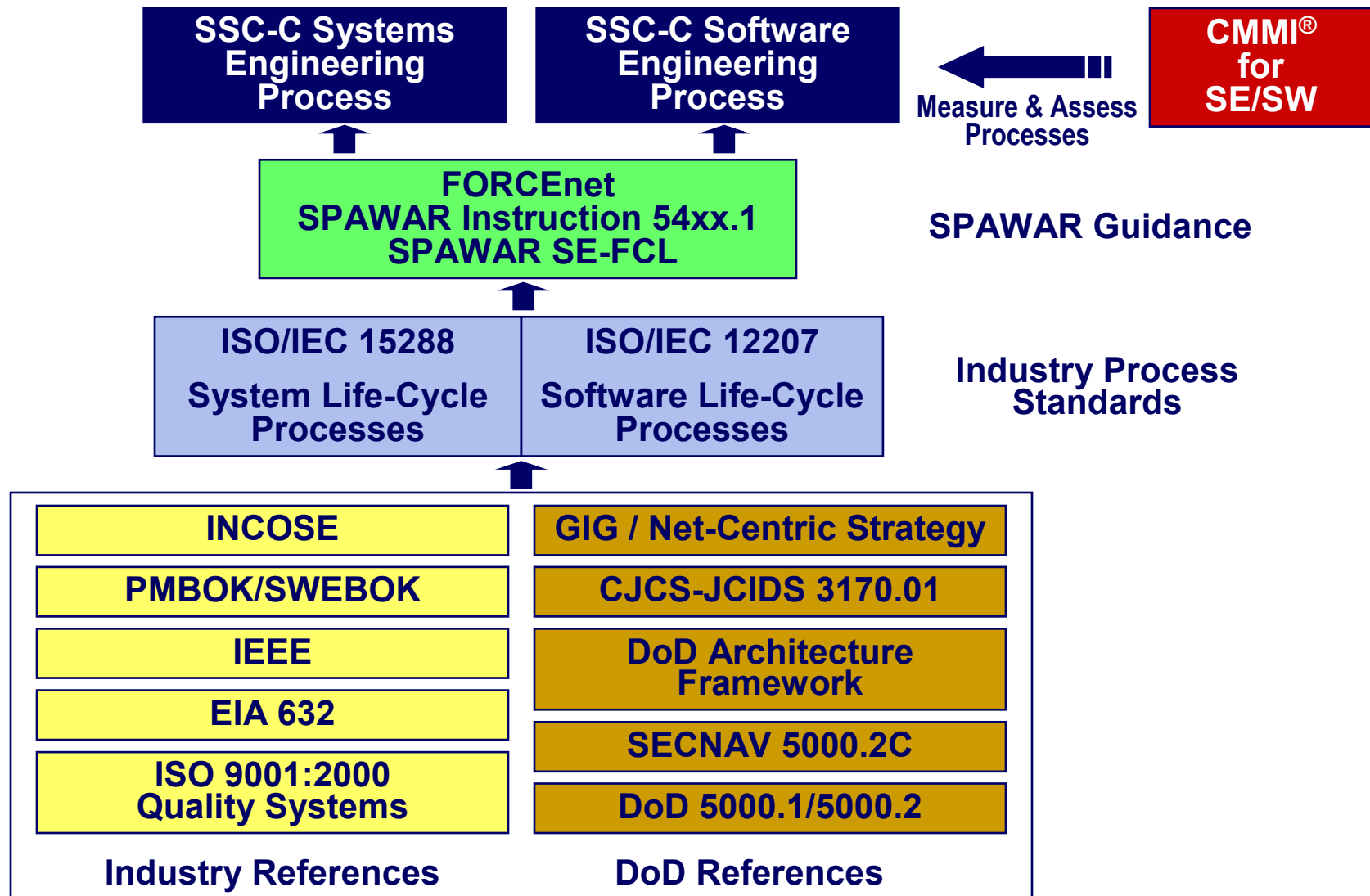
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# Organization for Implementation



## Elements of SSC-C SE Revitalization



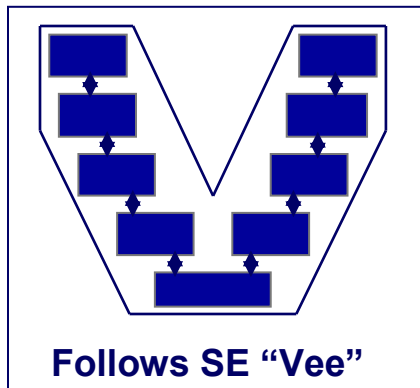
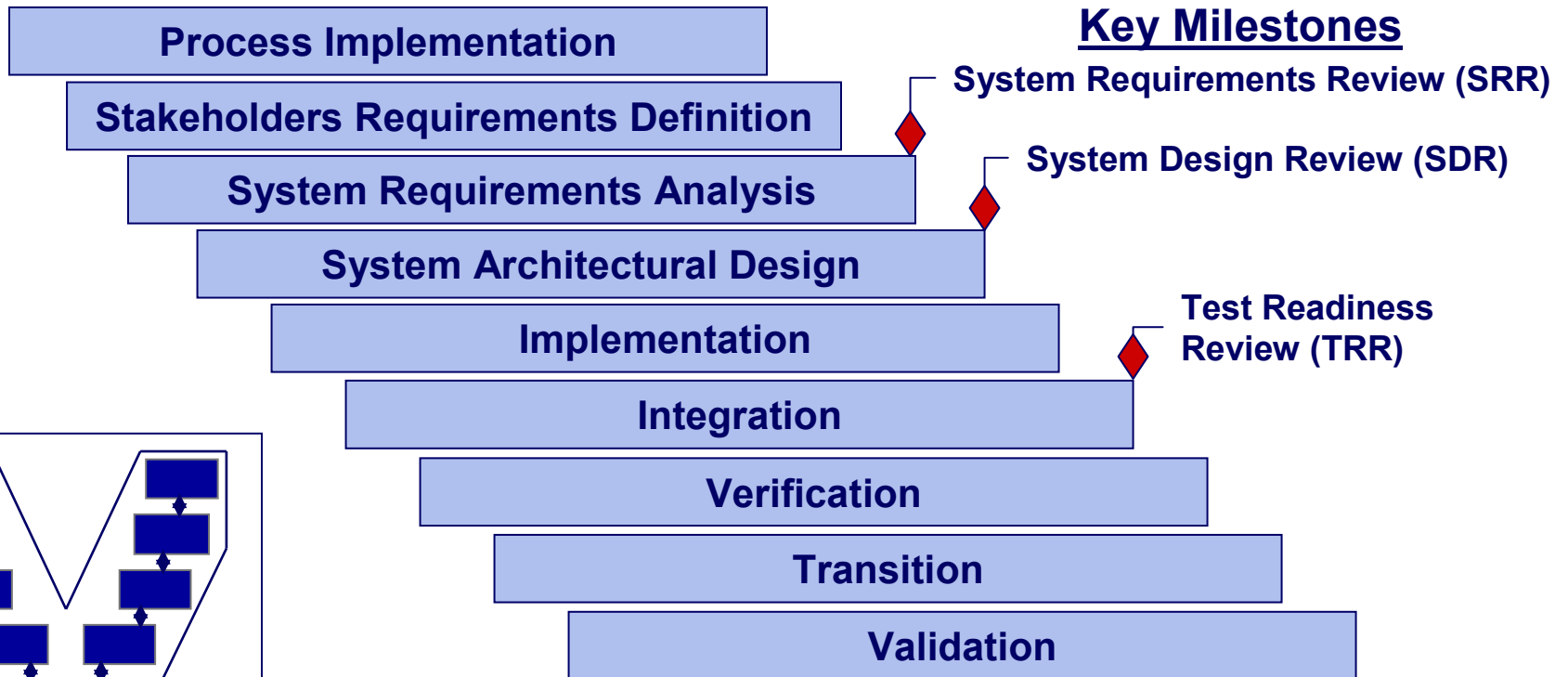




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# SSC-Charleston SE Process Steps

## Key Milestones



Each process step is defined by required inputs, controls, associated processes, and outputs.

Adapted from "SSC-C Systems Engineering Process Manual"



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Space and  
Naval Warfare  
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## ePlan Builder

Electronic CMMI® Compliant Documentation Application

Save Quit Help

Sponsored by the Director of Engineering Operations (O9K) - Michael Kutch

# ePlan Builder Tool

## • ePlan Builder tool

- An interactive, web-based application that leads the user through a structured interview process (like TurboTax) to generate a CMMI®-compliant plan
- Includes standard, consistent text
- Generates a complete Project Management Plan, Configuration Management Plan, Quality Assurance Plan, and Requirements Management Plan
- Future versions will build
  - Systems Engineering Plan
  - Measurement and Analysis Plan
  - Supplier Agreement Management Plan



- **Process Improvement and CMMI®**
- **Systems/Software Engineering Classroom**
- **Web Based Training (WBTs)**



- **Intro to Process Improvement**

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

- **CMMI®**

- SEI's Intro to CMMI® course onsite
- 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*



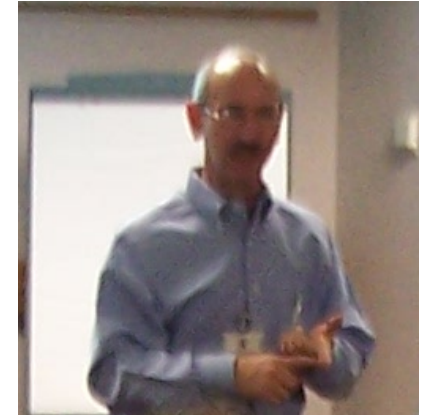




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# Systems Engineering Fundamentals Classes

- **3-day on-site, classroom course**
  - Based on SMU SE Masters course
  - Customized to incorporate SSC-C SE process
  - 180 SSC-C engineers trained
  - Classes planned every 2 months
- **1-day SE for Managers course added**
- **Intro to Software Engineering planned**



*“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




To offer Process Improvement training to more employees, we developed an on-line web based tutorial (PI-WBT) that allows students to take the course at their own pace and to receive a certificate and education credit upon course completion.

The CMMI® Model  
Introduction to CMMI® Page 13 of 14

What will the *CMMI® - SE/SW* do for SSC-C?

A CMMI® provides the essential elements of effective processes and an evolution path from ad hoc to mature processes.

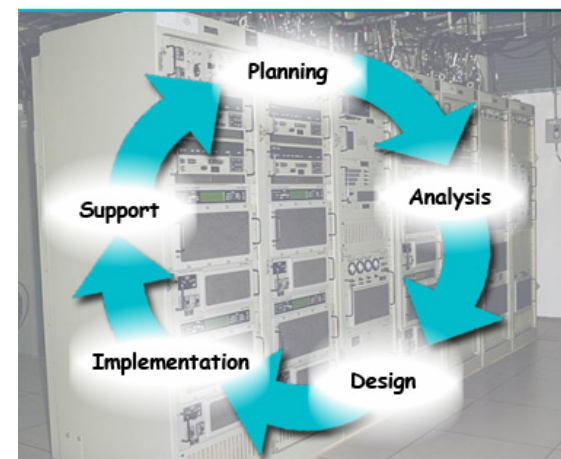
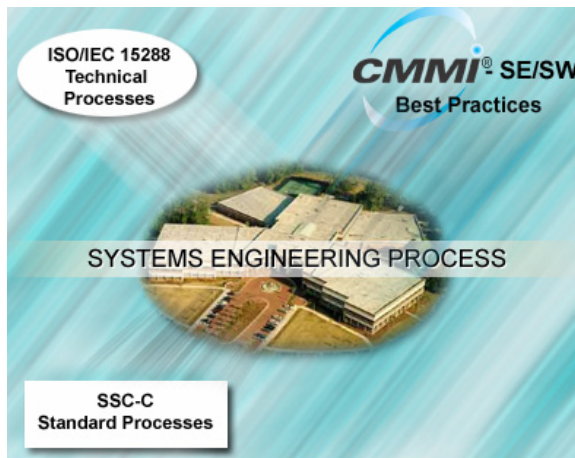
CMMI® - SE/SW will help SSC-C develop effective processes that will enable it to climb the ladder of success as the processes mature.



**AT**

Exit Feedback Audio Glossary Menu Back Next

- **Introduction to Systems Engineering**
  - 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





- **Accomplishments**
  
- **Results and Measures**
  
- **Lessons Learned**
  
- **Going Forward**



- **Process Focus**

- Defined Policies and Processes
- Aligned with DoD and SPAWAR guidance
- Aligned with industry standards and CMMI® model
- Built organization structured around processes and process improvement

- **Training is Critical**

- Providing Fundamentals of Engineering for new and old professionals
- Developed web-based training for “self-paced” and refresher training
- Defining a structured technical career development path for engineers

- **Tools for the Engineers**

- Developed *ePlan Builder* application to generate planning documents
- Developed templates, checklists, and web-based document repositories to link standards and DoD guidance to day-to-day tasks and processes

**Early and persistent Systems and Software Engineering applied to programs and projects**



- **Formal process improvement policy issued in 2003**
  - Use CMMI® to evaluate progress against best practices
- **Selected pilot projects**
  - Training of project teams
- **Informal Appraisals, Process Reviews, and Document Reviews to measure progress and identify gaps**
  - Class B/C appraisals of selected projects
  - Define/review project-specific plans and procedures
  - Ensure the processes and procedures were used
- **Project-level Formal SCAMPI<sup>SM</sup> Appraisals (Class A)**
  - Evaluated compliance with CMMI® Maturity Level 2 requirements
  - 8 projects appraised between June 2004 and February 2005
- **Command-wide appraisal in April, 2005**



- The first SPAWAR Systems Center to achieve CMMI® Maturity Level 2 at the command level





- **Senior Management support is critical to success**
- **Training**
  - Everyone needs to be engaged – “train the masses”
  - Specific training for process owners/subject matter experts
- **Utilize Teams (IPTs) as champions of specific processes**
  - Multi-department representation
  - Change agent mentality
  - Process focused charters
- **Resource Properly**
  - Implement with projects that want to improve, can benefit from efforts, and that recognize own weaknesses
  - EPO staff provided skilled coaching, resources, support, and tools
  - Project members learned by doing and maintaining
- **Goals and Publicity**
  - Keep goals to sizable bites (projects)
  - Publicize successes; Share best practices





# Summary

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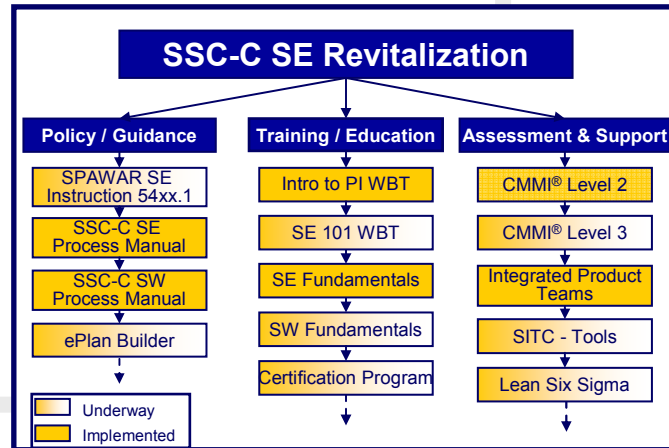
## Aggressive SE Program

## 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

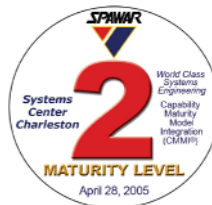
- CMMI® Level 2 Processes
- CMMI® Level 3 Processes
- SE/SW Engineering Workshops
- Web-Based Training (WBT) for Process Improvement



\*includes industry partners

## Successes

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



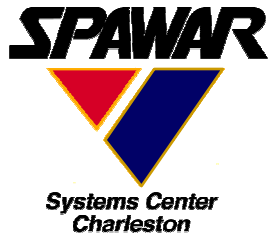
## Plans

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





- **Develop more “how to ...” guidance and tools**
  - ePlan Builder, an interactive web application, helps build required plans.
    - Currently builds PMP, QA, Configuration Mgmt, and Requirements Mgmt plan
    - Systems Engineering Plan, Measurement & Analysis Plan, and Supplier Agreement Management Plans under development
  - Institutionalize the SE/SW processes
    - Emphasize Formal Reviews
- **IPTs - expanding beyond CMMI® & Engineering areas**
  - Expecting more integration from teams
- **CMMI®**
  - SSC-Charleston standard process with Tailoring Guidelines for all projects
  - Projects progressing to ML3
  - Process Improvement tracked at department/project level using self assessment tool
  - 2 Balanced Scorecard measures directly related to CMMI®



**Thank you !**

**Any Questions ?**

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**Net-Centric  
Enterprise**