Systems Engineering Revitalization at SPAWAR Systems Center Charleston

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Presentation Outline

- Introduction
- Revitalization Effort
- Training
- Summary

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Introduction to SSC-Charleston

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

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Where We Fit

SPAWAR
Space and Naval Warfare Systems Command

President
non-DoD
Secretary of Defense
Other DoD
Secretary of the Navy
CNO
Fleet Support
ASN (RDA)
Acquisition

NETWARCOM | MARCOR
ADDU for C4I
NAVSEA | NAVAIR

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

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What We Do

C4ISR

Command

Control

Communications

Computers

Intelligence

Surveillance &

Reconnaissance

- *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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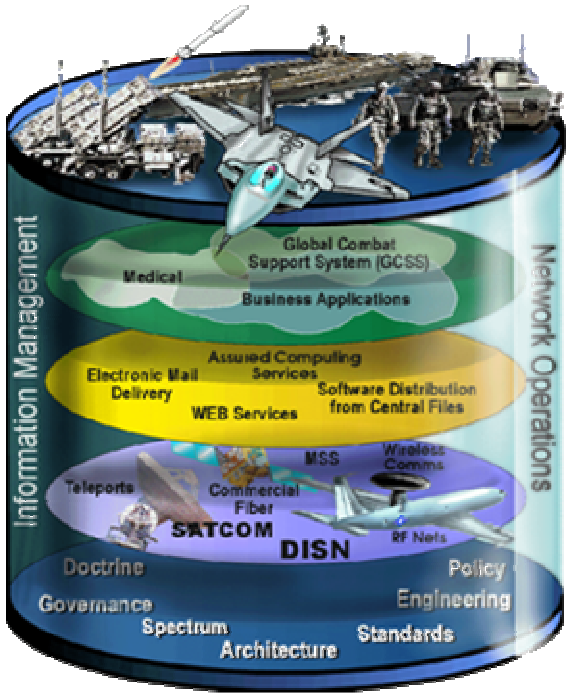
What We're Known For

- **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

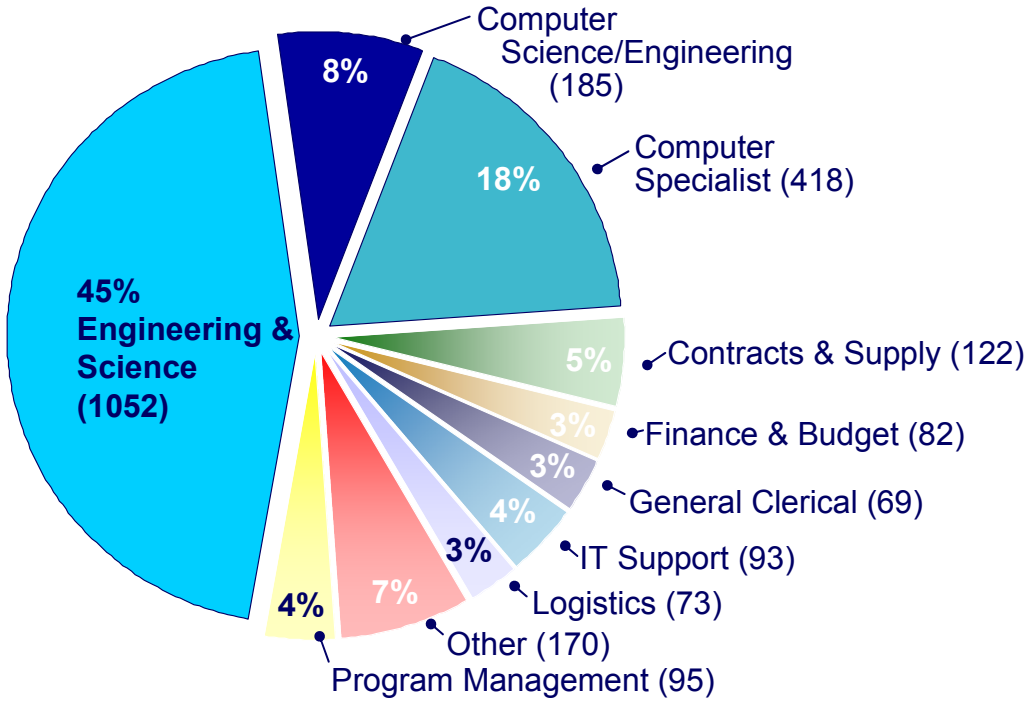


- **Rapid integrator and deployer of interoperable technologies** to the Navy, Federal Government, and Joint Warfighter
- **Developer and employer of life-cycle logistic support solutions** in a web-enabled portal environment

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.**

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SE Revitalization Effort

- Vision
- Organization
- Plan
- Process
- EPB Tool

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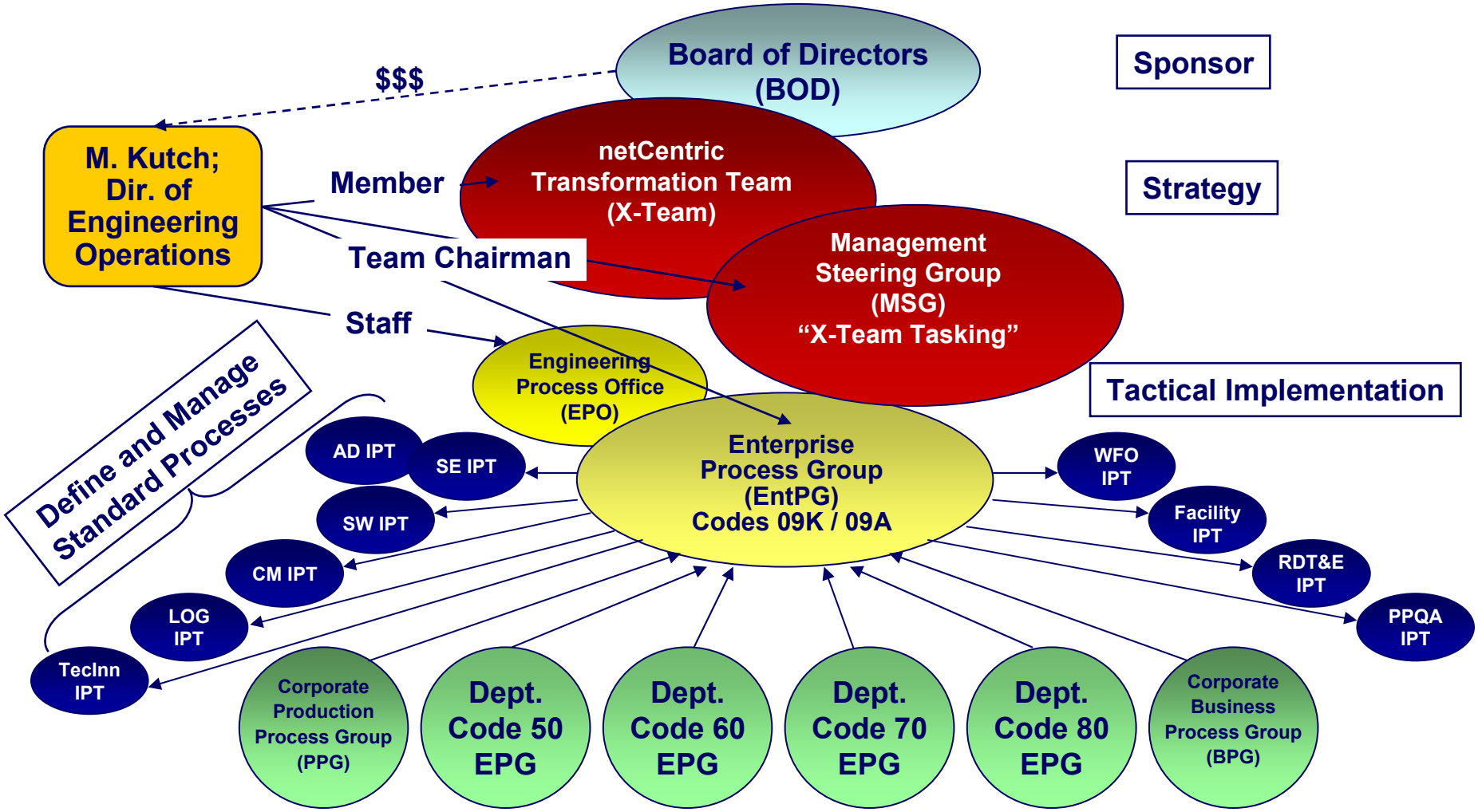
Vision

- **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

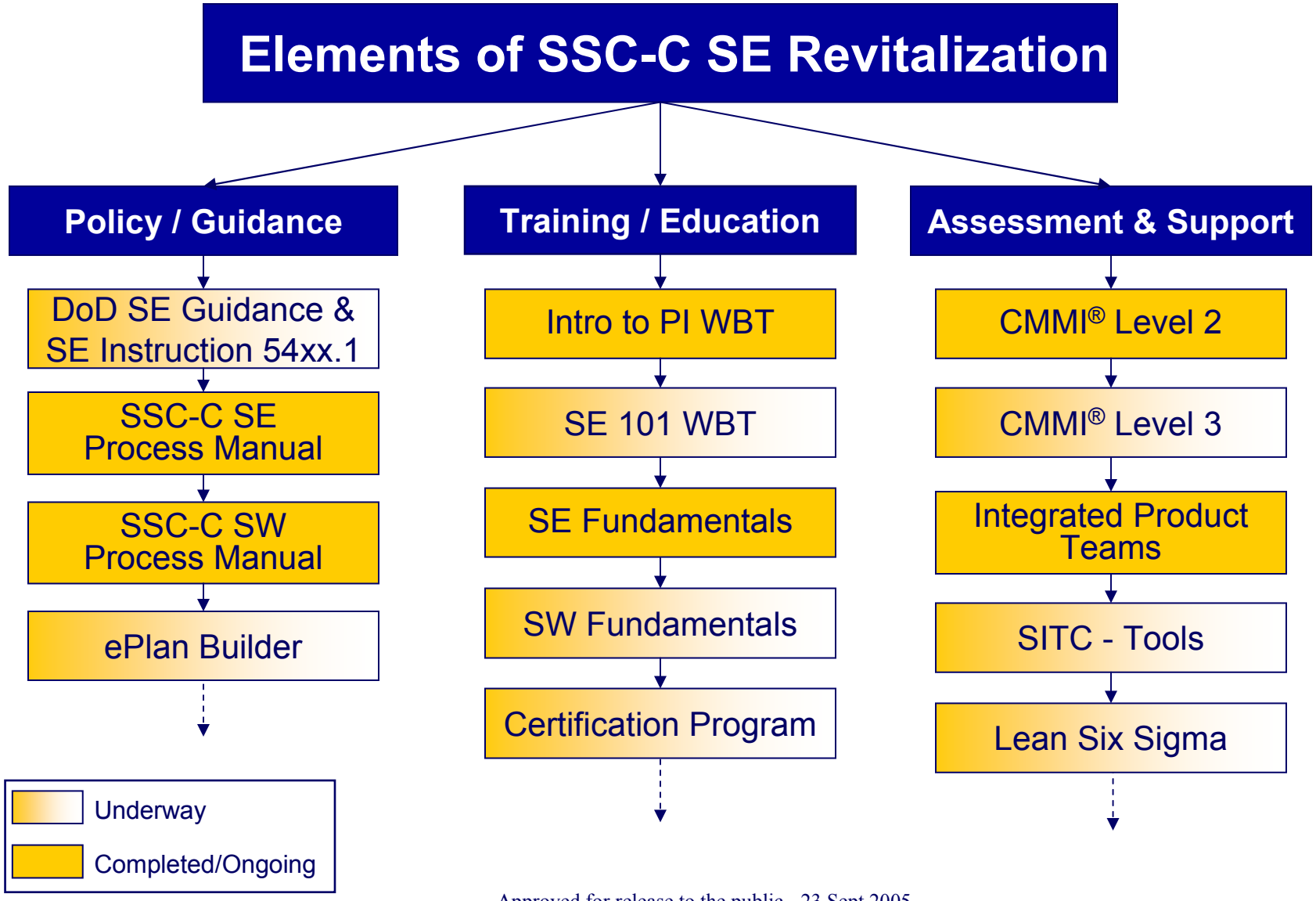
"Engineering is the key to our survival. Look to the future."

James Ward, Executive Director, SSC Charleston

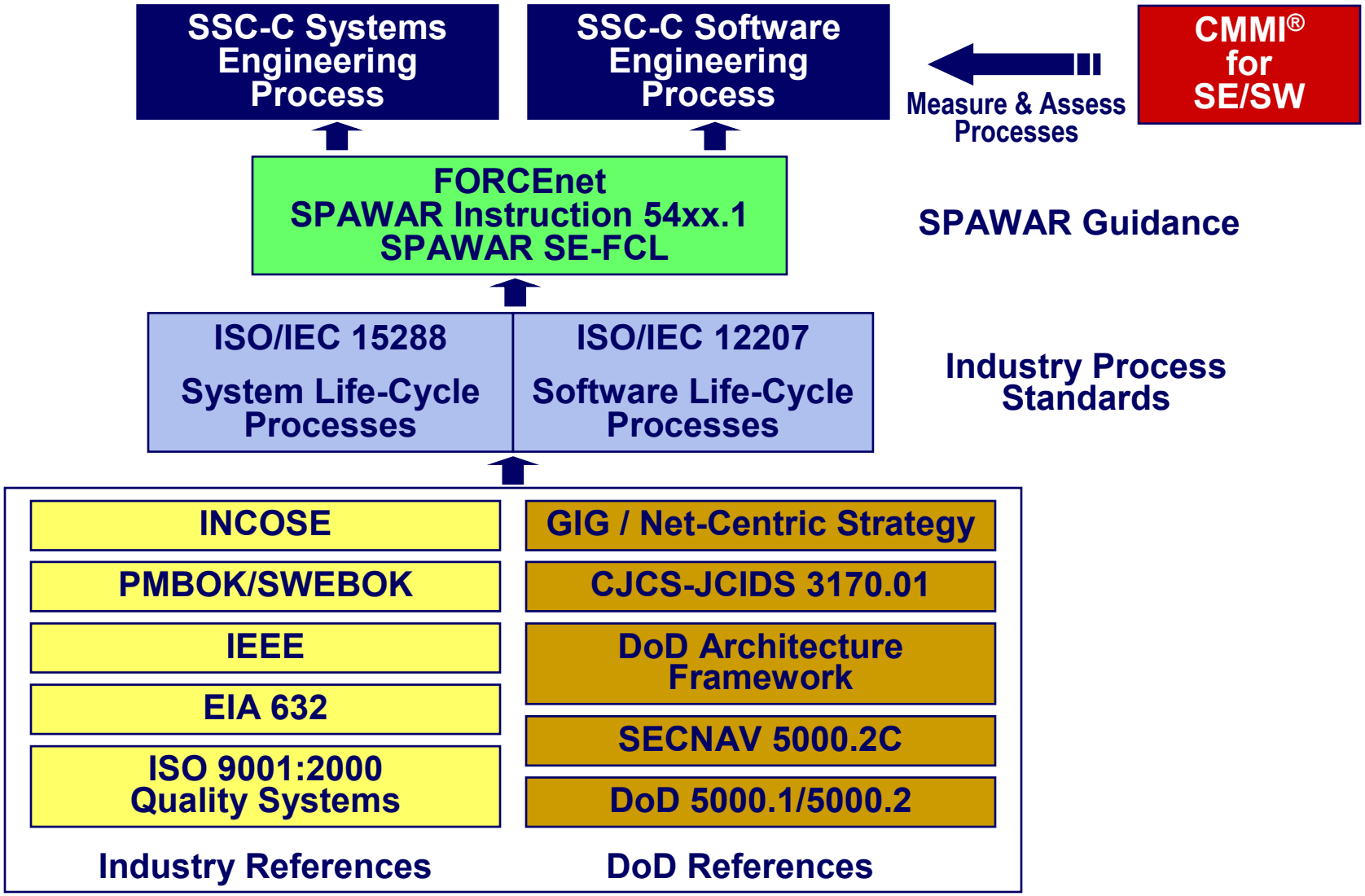
Organization for Implementation



SSC-C SE Revitalization Plan



Basis for SSC-C SE Process



SSC-Charleston SE Process Steps

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Process Implementation

Stakeholders Requirements Definition

System Requirements Analysis

System Architectural Design

Implementation

Integration

Verification

Transition

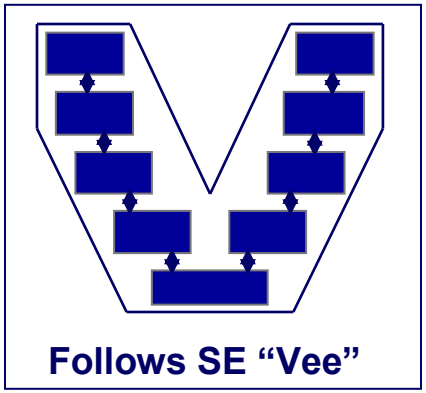
Validation

Key Milestones

System Requirements Review (SRR)

System Design Review (SDR)

Test Readiness Review (TRR)



Follows SE "Vee"

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

Adapted from "SSC-C Systems Engineering Process Manual"

ePlan Builder Tool

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- **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

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Training

- Systems/Software Engineering Classroom
- WBT
- Process Improvement and CMMI®

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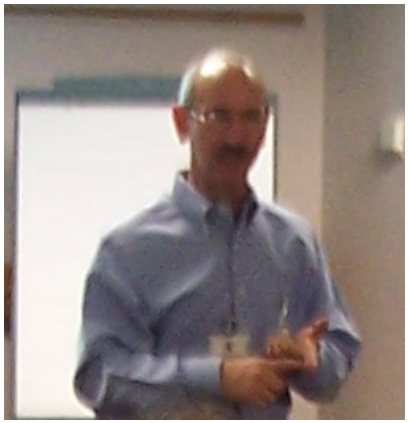
Systems Engineering Fundamentals Classes



- **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**

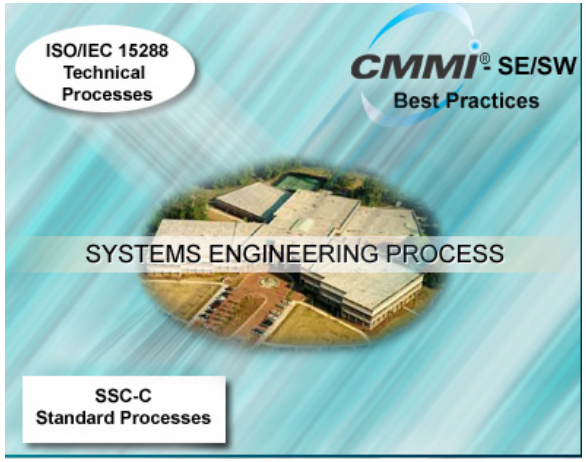
"The course was very educational. It helped me relate my current project to the overall system it was a part of, and how it fits in with the big picture."

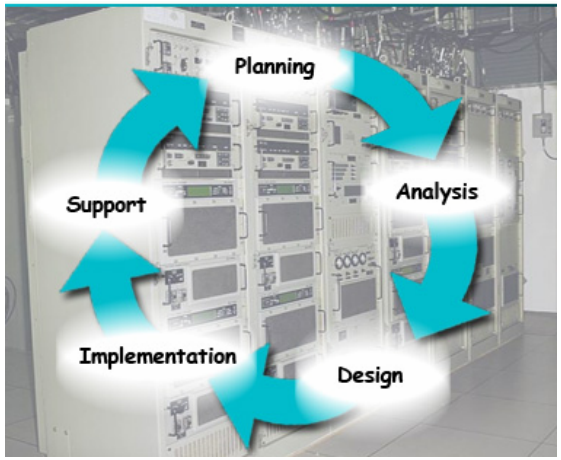
"The course was well presented and accurately covered the Systems Engineering Design Process Fundamentals. Continued/additional training on this subject is critically needed for this command to continue to develop as a professional engineering organization."

Student Feedback

SE 101 Web Based Training

- **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





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Process Improvement Training

- **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***

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Summary

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

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What We Have Accomplished

- **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

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Results and Measures

- **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 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**

Major Milestone – Maturity Level 2

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

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Lessons Learned

- **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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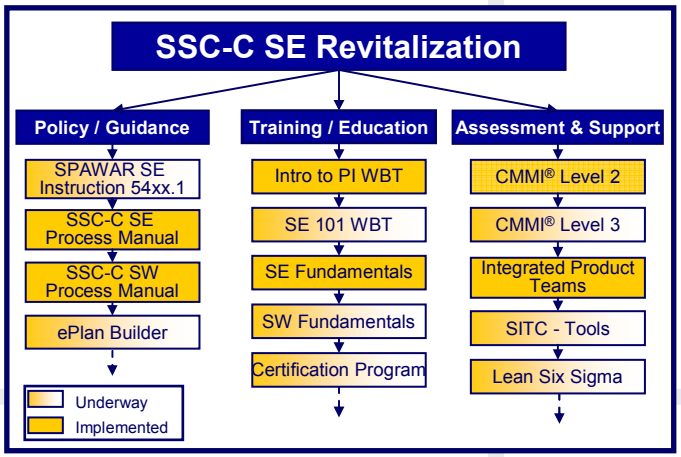
- **Aggressive SE Program**
- **Industry Standards**
  - Systems Engineering (SE)
  - Software Engineering (SW)
- **Best Practices**
  - CMMI®
  - ISO 9001
  - Lean Six Sigma



- **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

SPAWAR Systems Center Charleston 2 MATURITY LEVEL April 28, 2005

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

CMMI℠

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Going Forward

- **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®

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Thank you !

Any Questions ?

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