Software Acquisition Process Improvement
Topics

• Background
• Process Improvement Journey
• NAVAIR Acquisition Improvement Plan
NAVAIR Products & Capabilities

- AIR ASW / ASUW
- SEA BASED AIRCRAFT AND SYSTEMS
- MARITIME WEAPONS
- MARINE EXPEDITIONARY AVIATION SYSTEMS
- AIRCREW / MAINTENANCE TRAINING SYSTEMS

OUR CORE PROCESSES . . .
. . . WE EXECUTE (ON BEHALF OF THE USER)

- ACQUISITION MANAGEMENT
- REPAIR / MODIFICATION
- TEST AND EVALUATION
- IN-SERVICE ENGINEERING AND LOGISTICS SUPPORT
- TECHNOLOGY, RESEARCH & DEVELOPMENT, HARDWARE & SOFTWARE PRODUCTS

. . . MORE THAN AIRCRAFT AND WEAPONS, TOTAL SYSTEM CAPABILITY AND SUSTAINMENT
NAVAIR System Support Activities

- SUPPORT EQUIPMENT: 6%
- AVIONICS: 5%
- WEAPONS: 2%
- ROTARY WING AIRCRAFT: 8%
- MISSION PLANNING: 4%
- FIXED WING AIRCRAFT: 75%

- ARC-210, AYK-14, GPWS, GPS, TAMMAC, TCAS, CAINS, CSFIR, ALFS, AN/ALR-76,
- AIM-9X, HARM
- AH-1W, UH-1N, UH-3H, VH-3D, CH-53E, MH-53E, MH-60, SH-60, VH-60N, H-46
- Nav MPS, AV-8B MPS

65M SLOC Operational Software
31M SLOC Support Software

Represented Approximately 50% Of NAVAIR Software

Over $2B on Software Development and Related Activities Per Fiscal Year

System Environment

- JSF
- UAVs
- NCW
- Inter-System Operability

Aircraft IOC Year

KSLOC

0 3000 6000 9000 12000 15000 18000

F/A-18E/F 17101K
F/A-18C/D SMUG/RUG 14268K
AV-8B Radar 3748K
AV-8B Night Attack 1780K
A-7E SWIP 364K
AH-1 NTS 1000K
F/A-18C/D XN 6629K
AV-8B 764K
A-1 16K
F-14 80K
E-6B ICAP1 48K
A-4 (ARBS) 16K
F/A-18A/B 943K
F/A-18C/D 2130K
F/A-18 Night Attack 3054K
F-14B 416K
F-14B 364K
EA-6B ICAP2 BLK 86 779K
EA-6B ICAP2 BLK 82 395K
AV-8B 764K
A-1 16K
EA-6B ICAP2 BLK 86 779K
F/A-18C/D XN-8 6629K
F/A-18C/D SMUG/RUG 14268K
F/A-18E/F 17101K
Setting the Stage

- **Software Business Process Engineering Study**
  - The compelling reason to change

- **System Leadership Council**
  - The Enablers & Policy Makers

- **Software Leadership Team**
  - The Facilitators & Planners

- **Software Resource Center**
  - The Coaches & Doers

NAVAIR Software Strategic Plan
SW-CMM LEVEL RATINGS

SOFTWARE SUPPORT ACTIVITIES (29 TOTAL)

Nov '01 (approx) Nov '03

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Team Software Process

Used by organic maintenance and developer programs
  11 projects ongoing
  7 projects planned

Resulted in improved predictability of cost, schedule and quality

Four NAVAIR personnel have been trained as PSP instructors and TSP coaches
NMSS Collaboration

Objectives

• Support NAVAIR activities with the implementation of disciplined and rigorous software and system engineering practices.
  – to the acquisition of software intensive systems
  – To meet the requirements of Public Law 107-314, Section 804

• Enhance and accelerate technology transition to NAVAIR organic resources

• Assist in the continued development of current organic acquisition process improvement capabilities and expertise

• Positively impact NAVAIR’s ability to acquire near defect free software intensive systems on time, every time.
The Software Engineering Institute

- DoD R&D laboratory FFRDC sponsored by the Undersecretary of Defense for Acquisition, Technology, and Logistics

- Situated as a college level unit at Carnegie Mellon University, Pittsburgh, PA

- Mission is to provide leadership in software engineering and to transition new software engineering technology

- Encouraged to support industry in pre-competitive technology R&D and in technology transition activities
Best Practices Used

- Software Acquisition CMM
- Software Acquisition Planning
- Source Selection Technical Reviews
- Appraisals and Assessments (SCAMPI)
- Training
  - Executive Overviews
  - Model
  - Appraisal Methodology
- Measurement Programs
Best Practices Used -2

• PSP/TSP
• CMMI
• S/W Architecture
• Pre-RFP Strategies (Documentation, Acquisition Strategy, Technical Advisors to Source Selection)
The MITRE Corporation

• Operates three FFRDCs
  – Systems engineering and integration work for Department of Defense C3I.
  – Systems research and development work for the FAA and other civil aviation authorities.
  – Strategic, technical and program management advice to the IRS and Treasury Department.

• A not-for-profit corporation combining systems engineering and information technology to address issues of critical national importance.
Multi Mission Maritime Aircraft (MMA)

• Program early in the life cycle
• RFP development – included systems & software engineering verbiage
• SCAMPI appraisals of contractor process capability
• Introduced process-based philosophy in the acquisition
• Prepared government integrated program team for appraisals
• Future architecture focus anticipated
Software Technology Support Center (STSC)

- US Air Force at Ogden Air Logistics Center, Hill AFB
- Provides best software practice consulting services
  - CMMI
  - Software Acquisition
  - Assessments
  - Project Management
  - Test Engineering
  - Systems Engineering
  - Personal Software Process (PSP)
- An SEI Transition Partner
STSC NAVAIR Partnership

• China Lake, CA
  – AV-8B
    • PSP I/II for Engineers
    • CMM Snapshot
  – F-18
    • CMM Snapshot
    • Intro to CMMI

• Jacksonville, FL
  – PSP I/II for Engineers
  – PSP/TSP for Executives/Managers
STSC NAVAIR Partnership

- Orlando, FL
  - PSP/TSP for Executives/Managers

- Patuxent River, MD
  - P-3
    - Intro to PSP
    - PSP I/II for Engineers
    - PSP/TSP for Executives/Managers
    - TSP
STSC NAVAIR Partnership

- Pt. Mugu, CA
  - F-14
    - Intro to PSP
    - PSP I/II for Engineers
    - PSP/TSP for Executives/Managers
    - CMM snapshot

- San Diego, CA
  - PSP I/II for Engineers
  - PSP/TSP for Executives/Managers
Lessons Learned – Developer-focused SW Improvement Experiences

• Senior management support & involvement
  – Set policy, vision, strategies & goals
  – Identify measures & monitor performance
• Dedicated resources to execute the strategies
  – Educating project team leaders on benefits
  – Educating practitioners on methods
  – Seed funding for project team SW improvement initiatives
  – Improvement initiatives must be run like a project
Defense Authorization Act of Fiscal Year 2003, Section 804

• A new public law
  – Enacted by Congress December 2002
  – DoD guidance issued March 2003
    • Requires military departments and select defense agencies to establish software acquisition process improvement programs

• Focus is on improving how the DoD acquires software
Required Software Acquisition Improvement Process Areas

• DoD’s initial minimum set
  – Acquisition planning
  – Requirements development & management
  – Configuration management
  – Risk management
  – Project management & oversight
  – Test & evaluation
  – Integrated team management
  – Solicitation & source selection
  – Performance measurement (added by NAVAIR)

• Processes must be documented, performed and continuously improved
NAVAIR’s 804 Implementation

• **Phase 1 – Requirements** *(done 12/03)*
  A. Build an SW acquisition process improvement CoP
  B. Identify NAVAIR Instructions that map to 804
  C. Communicate 804 requirements
    • PEO(A) 11/17; PEO(W) 11/24; PEO 1.0 12/2; PEO(T) 12/5

• **Phase 2 – Gap Analysis & Planning** *(mostly by 4/04)*
  A. Revise NAVAIR Instructions as necessary
  B. Develop a NAVAIR Software Acquisition Process Improvement Program (SAPIP)
  C. Build or identify a support infrastructure

• **Phase 3 – Implementation**
  A. PMs execute to NAVAIR Instructions
NAVAIR Plan
(Software Acquisition Process Improvement Program – SAPIP)

- Owned by the Program Mgmt Competency
- Approved by the SLC (target March ’04)
- Implemented by Assistant PEOs
- Supported by the SRC & Competencies
- SAPIP status
  - Phase 1 of plan has been implemented
  - Outstanding tasks: Continue orientations, define compliance measurements, execute & track progress
Implementation Steps for NAVAIR PMs

• Gauge whether you comply with the updated NAVAIR Instructions

• Validate and document your acquisition processes
  – Processes include entry criteria, steps, exit criteria and measurements
  – Competencies are responsible for any additional how-to processes

• Develop and implement software acquisition process improvement plans and measurement programs
  [per NAVAIRINST 5234.2 & 5234.5]
Acquisition-focused SW Improvement Hypotheses

• Do what makes sense for your organization (Section 804 is not prescriptive)
  – No clear, singular improvement model for benchmarking; pick one that supports your business goals

• Need to emphasize and re-emphasize that Section 804 is about the acquirer

• Lessons learned from SW development improvement are directly applicable
Support for Software Acquisition Process Improvement

- NAVAIR’s Software Resource Center (SRC) will help acquisition programs to:
  - Identify their improvement goals and performance measures
  - Identify, document and baseline their current processes against best practices
  - Develop a measurement program and process improvement POA&M
  - Define their improvement program training and support needs
  - Find resources to help satisfy those needs
Acquisition Improvement Is Underway Within NAVAIR