NAVAIR

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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%

Operational Software:
- 65M SLOC

Support Software:
- 31M SLOC

Representing Approximately 50% Of NAVAIR Software

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

ARC-210, AYK-14, GPWS, GPS, TAMMAC, TCAS, CAINS, CSFIR, ALFS, AN/ALR-76, AIM-9X, HARM

CASS

Nav MPS, AV-8B MPS


AH-1W, UH-1N, UH-3H, VH-3D, CH-53E, MH-53E, MH-60, SH-60, VH-60N, H-46

CASS

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

65M SLOC Operational Software
31M SLOC Support Software

Represents Approximately 50% Of NAVAIR Software
System Environment

- JSF
- UAVs
- NCW
- Inter-System Operability

Aircraft IOC Year

KSLOC

F/A-18E/F 17101K
F/A-18C/D SMUG/RUG 14268K
F/A-18C/D XN-8 14268K
F/A-18 Night Attack 3054K
AV-8B Night Attack 1780K
AV-8B Radar 3748K
AH-1 NTS 1000K
AH-1 764K
A-6E 64K
F/A-18A/B 943K
F-14B 364K
F-14D 416K
F-14B 416K
EA-6B ICAP2 BLK 82 395K
F/A-18C/D 2130K
F-14B 364K
AV-8B 764K
F-14 80K
A-4 (ARBS) 16K
E-A6B ICAP1 48K
A-6E 64K
A-7E 16K
EA-6B ICAP2 BLK 86 779K
F/A-18C/D 2130K
F-14B 364K
F-14D 416K
F/A-18C/D XN-8 6629K
F/A-18C/D XN-8 6629K
AV-8B Radar 3748K
AH-1 764K
A-5 SWIP 364K
AV-8B 764K
AH-1 NTS 1000K

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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
SW-CMM LEVEL RATINGS
SOFTWARE SUPPORT ACTIVITIES (29 TOTAL)

100%
95%
90%
85%
80%
75%
70%
65%
60%
55%
50%

Nov '01(approx)          Nov '03

22 Others

1 + AV-8B

4 + AV-8B

3

2

1

1

Level 5

Level 4

Level 3

Level 2

Level 1
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
NAVAIR MITRE SEI STSC
Collaboration Integration

MOU Transition Partner

MITRE

NAVAIR

MOU

STSC

MOU Transition Partner

Carnegie Mellon Software Engineering Institute
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 projects
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