



P-8A Open Systems Contract Methodologies and Lessons Learned

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Outline

- P8A Poseidon
 - Program Summary
- OA Contract Strategy
 - Requirements
 - Contract Language
 - Award Fee
- Business Practices
 - OA Principles Implementation
- OA Ratings
 - OAAT
- Acquisition Strategy
 - Leverage OA Investment
- Summary





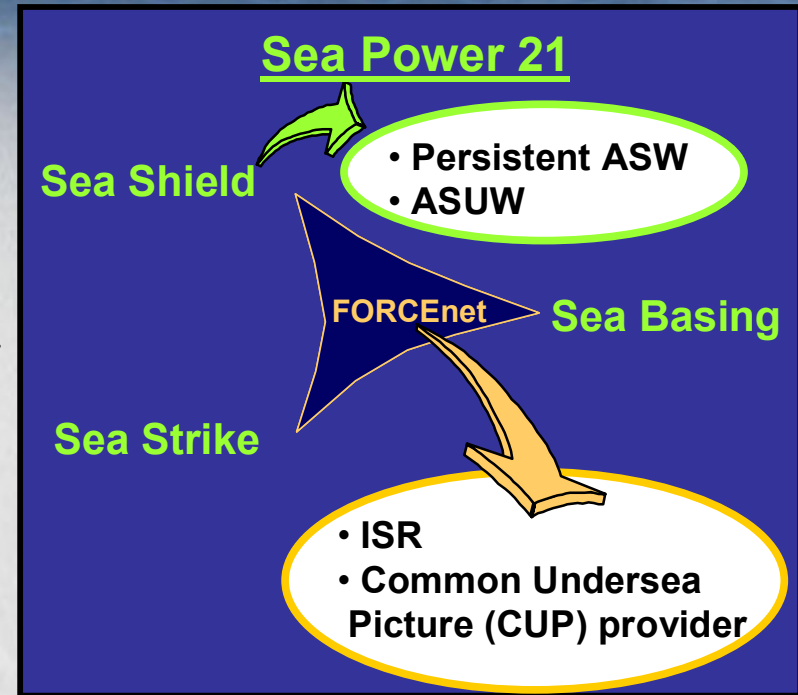
P-8A Poseidon

Capabilities

- ❑ Means to accomplish armed Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASuW), Intelligence Surveillance and Reconnaissance (ISR) in maritime and littoral areas above, on and below the surface of the ocean
- ❑ Collection, processing & dissemination of intelligence
- ❑ Critical element in network-centric warfare environment

Transformational System

- ❑ Commercial derivative aircraft
- ❑ **Innovative open systems architecture**
- ❑ FORCEnet Enabler
- ❑ Contractor Logistics Support
- ❑ Training System - provides combat readiness at an affordable cost
- ❑ UAV interface
- ❑ Digital “smart weapons” system



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Open Architecture Goals

- “Commonize” technical architectures
 - Common ‘Widely Available’ **Interface Standards**
 - HW: Ethernet, VME, ATCA
 - Enables Decoupling of Software to Hardware
 - SW: DDS, Java, Linux
 - Utilizes Commercial Mainstream Computing Products
 - Enables Timely & Affordable COTS Refresh and Technology Insertion
- Encourage Innovation and Maximize Competition/Collaboration
 - “Best of Breed” Applications
 - **Flexible & Adaptive**
- Interoperability
 - Focus on common applications (JMPS, GCCS-M)
 - Address IA/AT early in design
 - Participate in Communities of Interest

Reduced Cost & Schedule with Improved Performance





P-8A Open Systems Business Practices

- **Requirements**

- MOSA Requirements Language flowed directly to PBSS and SOO
- DoD OA Policy documents used to guide SOW development
- JTA/DISR & STANAG Compliance required
- COTS/NDI wherever possible

- **Incentives**

- 30% of \$261M award fee pool tied to technical criteria
- OA compliance is specific award fee criteria

- **Data Rights**

- Tailored to key interfaces for maximum cost benefit

- **Management Focus**

- OAAT baseline given to Boeing to manage OA architecture maturation

- **Supplier Management**

- Open competition per Boeing processes
- OA requirements flowed to key suppliers

- **Additional activities**

- Acoustic commonality – MOA between P-8 and P-3 Acoustics prime contractors (Boeing and Lockheed)
- Leveraging ARCI Process across the platform (flexible & adaptive)

Interface Specifications alone do not ensure full “Plug & Play” Operations





P-8A Open Systems Contract Approach

P-8A CAD Phase (Jan 2002-Dec 2003)

Avionics Architecture Description
CAD Statement of Objectives
CDRL Demonstration of OA Characteristics

OA Related Policy

- DoD 5000.1 (Broad Guidance)
- MOSA Guide for PM's (Detailed Guidance-RFP)

ORD/CDD

SDD RFP

PBSS

SOO

Seg Spec

SOW

Requirements

Contract

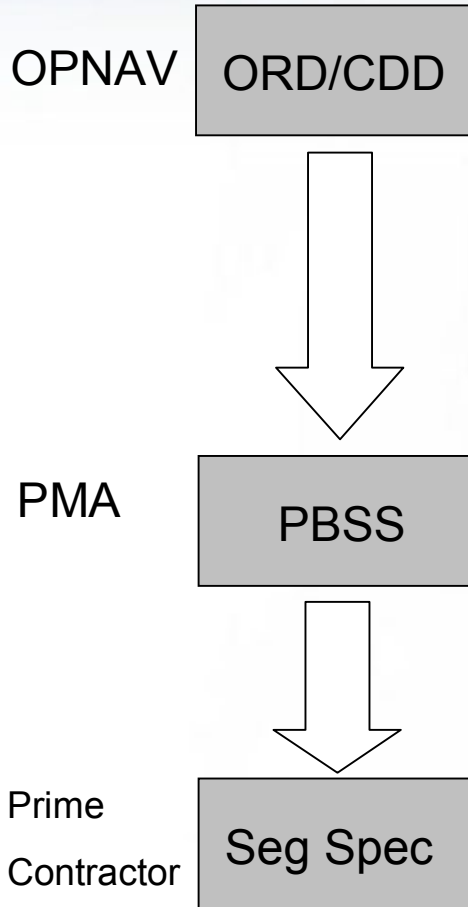
 Contractually Binding



Award
Fee Plan



P-8A Requirements Language



“The initial production block of P-8A will have an open system core architecture capable of incorporating future upgrades to sensors, processing, displays, communications, navigation, self-protection and stores management (Threshold). The P-8A hardware and software architecture will be sufficiently modular and scalable to readily and affordably allow for technology insertion and functionality improvement. P-8A will have adequate design weight margins to allow for avionics system growth. In addition, P-8A will provide growth provisions for increased power and environmental control capacities.”

[REQUID-4900] P-8A Mission System Open Systems Approach

[REQUID-4910] MS Architecture facilitating COTS/NDI use

[REQUID-4990] MS Architecture Attributes

[REQUID-5000] Openness

[REQUID-5020] Scalability and Evolvability

[REQUID-5030] P-8A Mission Systems Physical Integration/Fxn Encap

[REQUID-5060] Information Assurance and Protection

System specification requirements map directly to PBS requirements





P-8A Award Fee Plan Language

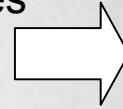
- P-8A System Development and Demonstration
 - \$4.4B Cost Plus Award Fee (2% base fee, 10% award fee)
 - \$261M Award Fee Pool
- Annual Assessment
 - Event Driven, tied to system reviews
 - Quarterly feedback to the prime
- Period 3 Specific Language (PDR to CDR Timeframe)
 - **“The extent to which the Contractor complies with the OSJTF Modular Open Systems Architecture (MOSA) and uses the [approved Navy OA assessment tools](#) to determine level of compliance.**
 - **OA includes the architecture to enable re-use, and commonality of software and hardware from other platforms and applications for use on the P-8A.”**



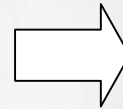


Requirements Verification

- Component Advanced Development
 - Requirements decomposition to system level (ORD to PBSS)
 - Initial design concept and prototype
 - Independent assessment of OA attributes (Carnegie Mellon SI)
 - Demonstration of Open Systems
 - Plug and Play Sensor
 - Additional Work Stations Added
 - Identical Source Code Run on Linux/Pentium and Sun/Solaris
- System Development and Demonstration
 - Allocation and decomposition of OA requirements to subsystem level
 - Verification methodology developed
 - Independent assessment of OA attributes (Carnegie Mellon SI)
 - System integration and demonstration
 - Govt conducted MOSA Assessment



Requirements mapped to design concept. OA attributes demonstrated in laboratory environment with design prototype



Design builds on CAD phase architecture. System development reflects lessons learned.



OAAAT Ratings

- P-8A Open Architecture

- Assess and respond

- OAAAT V1.0 validated by NAVAIR 4.5 Tech Authority May 2006
 - Manage commonality across PMA-290 platforms
 - Engage with Industry

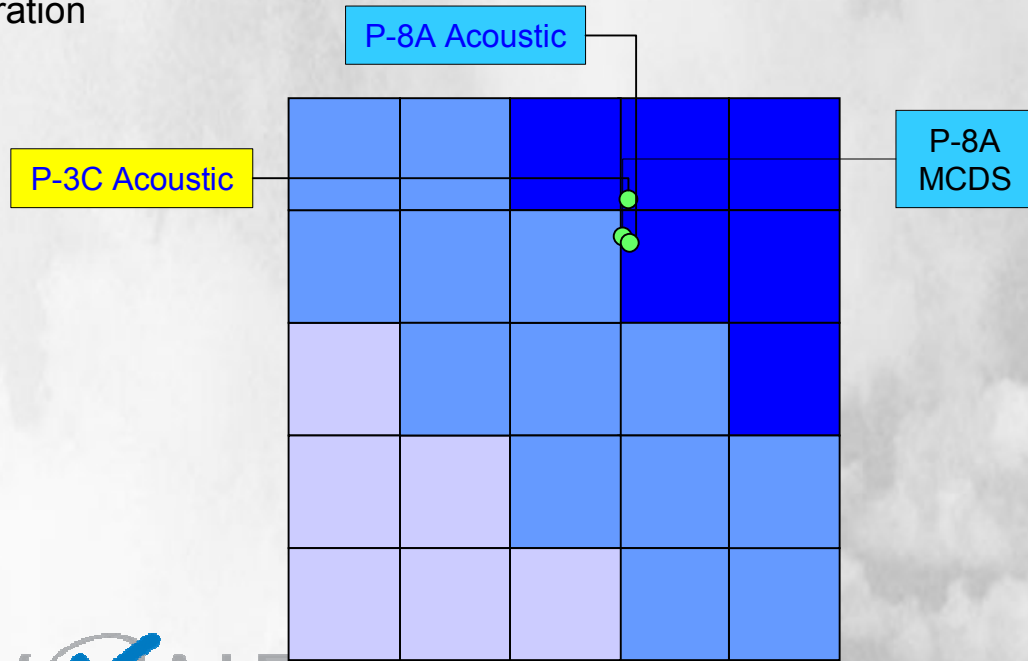
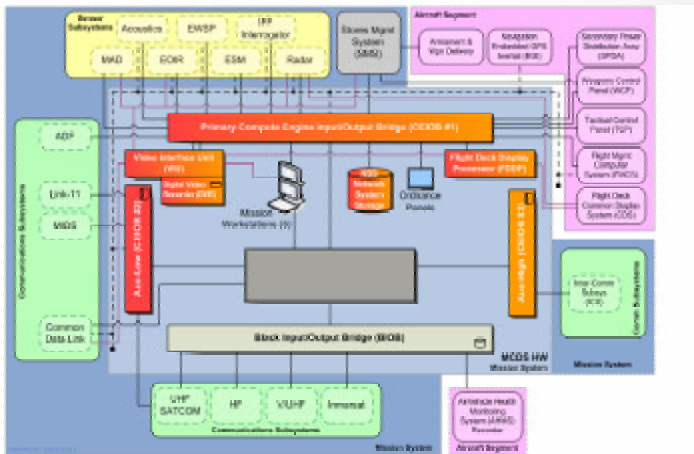
- Enabling Interoperability and Data Sharing

- Net-Ready KPP migration

- Managing near term capability improvements via ARCI process

- Focused approach to Open Architecture throughout life cycle

- Design allows “best of breed” integration





Principle Implementation

	SUCCESS
DECREASED TIME TO FIELD	<ul style="list-style-type: none"> • P-8A Uses common avionics where possible with commercial platform • Software re-use decreases development time
DECREASED COSTS	<ul style="list-style-type: none"> • P-8A re-uses 68% of mission software, over 2.5M SLOC • Leveraging existing proven software from critical mission areas
IMPROVED OPERATOR / SYSTEM PERFORMANCE	<ul style="list-style-type: none"> • Open system uses same software in system and trainers • HW/SW architecture can be tailored to operator mix and hardware baseline “on-the-fly”
IMPROVED INTEROPERABILITY AND DATA SHARING	<ul style="list-style-type: none"> • Formal Memorandum of Agreement between P-8A prime (Boeing) and P-3 APTR prime (Lockheed Martin) for Acoustic commonality. • DISR Compliance, STANAGs for coalition interoperability • NR-KPP Migration and Net-Centric Data Sharing
IMPROVED LIFECYCLE AFFORDABILITY	<ul style="list-style-type: none"> • Air ASW commonality approach allows for lower cost enhancements to capability. <u>Using ARCI like process across platforms is key.</u>
REDUCED RISK	<ul style="list-style-type: none"> • Commercial Standards Based HW/SW Connectivity • Integration risks minimized via open interfaces





Summary

- Acquisition Strategy Drives Contracting Approach
- Incentives for contractor needed up front
- Data rights contractual strategy is key for managing program developed software
- Assessment of compliance key to determining path forward (OAAT 1.1)

Acquisition Process must become as Flexible & Adaptive as Systems Being Developed





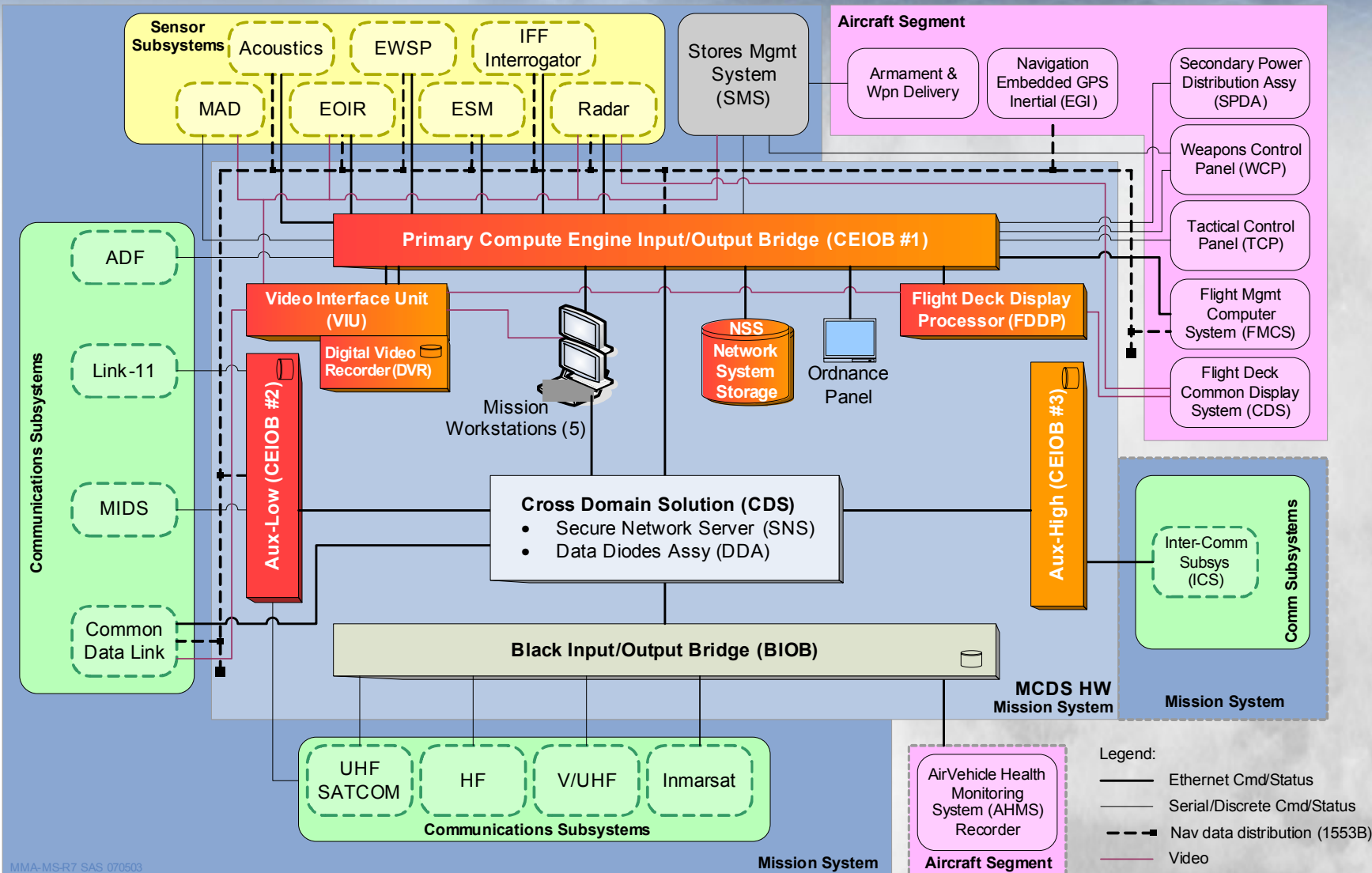
BACKUP



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P-8A Mission System Architecture & Interfaces



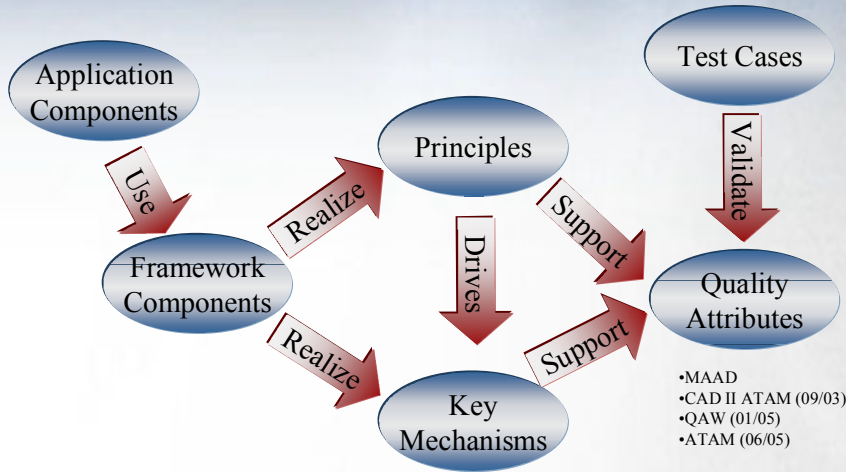
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Open System Quality Attributes



- Requirements

- Security
- Openness
- Modifiability
 - Scalability
 - Modularity
- Interoperability
- Availability
- Performance
- Hardware Independence

Problem: How does one validate the qualities of an open system?

Solution: Develop test scenarios that stress the system. Use the ATAM (Architecture Tradeoff Analysis Method) to determine key architecture properties. Focuses architecture development from the ground up. Sets the stage for formal validation during test (should be a slam dunk!)

