Naval Open Architecture

Overview on the Enterprise Initiative

1 May 2006

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Mike Rice
OA Technical Director
Open Architecture
PEO IWS 7.0B
Today’s presentation provides an overview on the Navy’s OA Enterprise initiative and required changes to implement OA

Overview on the OA Initiative

- Challenges facing Navy Leadership
- Establishment of the OA Enterprise Team (OAET)
- The OA Strategy
- The OA Transformation Roadmap
- OA Measures to Gauge Success
- Benefits of OA
Navy leadership is under continued pressure to control the rising costs of weapon systems and platforms...

“Among the greatest risks we face is the spiraling cost of procurement for modern military systems, and shipbuilding is no exception. Shipbuilding cost increases have grown beyond our ability to control as compared to decades prior.”

— Former CNO, ADM Clark, Statement Before the Senate Armed Services Committee, 10 February 2005

“The Committee is concerned over the affordability of the Navy’s future shipbuilding program. The Committee encourages the Navy to redouble its efforts to lower costs for ship classes on the drawing boards, to provide a more affordable plan for the future.”

- Report of the Committee on the DOD Appropriations Bill, 2006, 10 June 2005

“Cost increases incurred while developing new weapon systems mean DOD cannot produce as many of those weapons as intended nor can it be relied on to deliver to the warfighter when promised. We must either make tough decisions now to increase the chances for programs to be executable within fiscal realities or brace ourselves for more draconian decisions later driven by those fiscal realities.”

- DOD Acquisition Outcomes, A Case for Change, Statement of Katherine V. Schinasi, Managing Acquisition and Sourcing Management, GAO, 15 Nov 2005

…and meet the needs of the warfighter
In July 2005, incoming Chief of Naval Operations, ADM Mullen vowed to continue transforming the Navy

“In almost every conceivable way, we are not the same Navy we were five years ago. We don't think the same; we don't plan the same; we don’t operate the same or fight the same.

By adapting to new technology and new ways of doing business, the Navy is now more capable, more ready, more effective and more efficient. The only constant in our future is change...change will demand hard work and the willingness to adapt.

We must continue to sharpen the blade that is naval warfare, both at sea and ashore. Though we are clearly more ready today than we have ever been, we have much work yet to do and effort yet to expend to be ready for tomorrow. We must be able to transform ourselves and our thinking quickly in response to an ever-changing, ever-challenging and ever-more-joint environment. Much is riding on that ability.”

– Chief of Naval Operations, ADM Mullen, July 2005

Implementation of open architecture across the Navy, is and will remain, a key tenet of transformation...

**NAVAL OPEN ARCHITECTURE**

A multi-faceted strategy providing a framework for developing joint interoperable systems that adapt and exploit open-system design principles and architectures

**NAVAL OA CORE PRINCIPLES**

- Modular design and design disclosure
- Reusable application software
- Interoperable joint warfighting applications and secure information exchange
- Life cycle affordability
- Encouraging competition and collaboration

...that will help drive costs down while increasing capabilities
In August 2004, leadership established the Naval Open Architecture Enterprise Team to drive the overall OA strategy.

**ASN (RD&A)**

**OA LEAD COUNCIL**

- RDML Frick, PEO-IWS, Enterprise Lead
- RADM Venlet, Air Domain
- Dennis Bauman, C4I Domain
- RDML See, Space Domain
- RDML Hilarides, Submarine Domain

**OA ENTERPRISE TEAM**

- CAPT JIM SHANNON, CHAIRMAN OAET, PROGRAM MANAGER OA
  - Bill Johnson, Director of OA
  - Mike Rice, Technical Director of OA
  - LCDR Corsano, Deputy Director OA

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<tr>
<th>AIR LEAD</th>
<th>C4I LEAD</th>
<th>MARINE CORPS LEAD</th>
<th>SPACE LEAD</th>
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<td>Melinda Jensen</td>
<td>CDR Ailes</td>
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Each Domain is responsible for implementing OA!
In developing the OA strategy, it is important to understand where we are today...

Today’s Environment:

- **Business**
  - Continuously challenged with budgetary decisions
  - Inflexible acquisition strategies that “lock the Navy in”
  - Limited competition that impede innovation
  - Procure systems that are not affordable in production and modernization
  - Procure systems for similar capabilities across the enterprise
  - Limited software reuse across programs or domains
  - Limited access and sharing of data across programs or domains
  - Few enterprise processes to foster integration among programs and domains

- **Technical**
  - Incompatible systems that are not interoperable
  - Monolithic or closed systems that are not rapidly or economically upgradeable
  - Closed systems that cannot leverage advances in technology
  - Special use code and system modules that cannot be reused across the Navy
Future State Environment:

- **Business**
  - Enterprise-wide plans based on cost/capability analysis of programs that address capability, affordability and stabilization
  - Flexible acquisition strategies and contracts that enable the Navy to reuse software, easily upgrade systems and share data among the enterprise
  - Streamlined investments in similar capabilities
  - Increased competition to foster innovation and leverage tech refreshes
  - Established enterprise processes and governance to foster integration

- **Technical**
  - Layered and modular open architectures that address portability, maintainability, interoperability, upgradeability and long-term supportability
  - Modular, open designs consisting of components that are self-contained elements with well-defined interfaces
  - Maximum use of commercial standards and commodity COTS products
  - Continuously conform with Information Assurance (IA) requirements and monitor technology developments for IA improvements

The driving energy for OA is competition!
Our OA Roadmap is our plan for reaching our end-state

OA Transformation Roadmap

1. OA ENTERPRISE COORDINATION

OA Enterprise Coordination is the overarching structure needed to manage the program, keep activities aligned, and ensure specific projects stay on schedule.

2. CHANGE MANAGEMENT / COMMUNICATIONS

Change Management / Communications involves the culture adoption of OA principles and practices through stakeholder management, communications, and training.

3. OA PROGRAM MATURITY DEVELOPMENT

Program Maturity Development involves the process of baselining the OA maturity of systems and family of systems and determining plans of action.

4. OA INFRASTRUCTURE IMPLEMENTATION

OA Infrastructure Implementation entails the changes needed to institutionalize OA principles and practices across the enterprise.
Component 1 involves coordinating the transformation across the Naval Enterprise and with other services

1. **OA ENTERPRISE COORDINATION**

1.1 **Execute OA Strategy**
- Execute ASN (RD&A) OA vision
- Execute OPNAV OA requirements
- Execute OA EXCOMM Action Items
- Build FY06 Master Integrated Plan

1.2 **Support ASN (RD&A) / OA Lead Council**
- Support OA EXCOMM Meetings
- Submit Monthly OA Metrics/ Reports

1.3 **Manage OA Enterprise Team (OAET)**
- Conduct OAET Monthly Meetings
- Conduct Quarterly Program Reviews
- Manage OAET Integrated Workplan
- Manage FY 06 OA Budget
- Manage OAET Risk Plan

1.4 **Coordinate OA Initiative with FORCEnet**
- Attend FORCEnet EXCOMM Meetings
- Participate in C4I Virtual Syscom
- Align tasks, where applicable

1.5 **Coordinate Naval OA Initiative with Other Services**
- Coordinate with OSD, OSJTF
- Coordinate with Marine Corps
- Coordinate with Army
- Coordinate with Air Force
Component 2 includes managing change and communications with our stakeholders

2. CHANGE MANAGEMENT / COMMUNICATIONS

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<tr>
<th>FY06 ACTIVITIES</th>
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### 2.1 Manage OAET Stakeholder Plan
- Update Stakeholder Plan
- Conduct Assessments
- Develop Mitigating Action Plans
- Execute Action Plans

### 2.2 Manage Ongoing Communications
- OA Briefs
- OA Precepts
- [OA Quick Successes](#)
- [Acc.dau.mil/oa website](#)
- Correspondence
- Communications Plan

### 2.3 Manage Ongoing Outreach Efforts
- **OA Industry Days**
- **OA Symposiums**
- OA Road Shows
- Conferences
- Industry Consortiums

### 2.4 Execute OA Enterprise Education and Training Master Plan
- Develop / field curricula for NPS & DAU
- Develop Continuous Learning modules / Workforce Awareness programs
Component 3 entails assessing the openness of programs, updating programs of record, and testing alternatives.

### 3. OA PROGRAM MATURITY DEVELOPMENT

#### 3.1 Maintain analytical tools to assess programs

3.2 **Conduct OA Program Assessments**

3.3 **Adjudicate Results of OA Assessments**

3.4 **Determine Business and Technical Alternatives**

3.5 **Identify Enterprise Components for Re-Use**

3.6 **Prepare POM Issue Papers and/or Business Case(s)**
   - Costs / Benefits
   - Risk Assessment

3.7 **Update Program of Record**
   - Adjust funding to support plan

3.8 **Test OA Technical Alternatives** for Risk Reduction
   - Feasibility Testing
   - Developmental Testing
Component 4 requires changing the business and technical landscape to support the implementation of OA

### BUSINESS

4.1 Assess prime integrator vs. end-to-end developer roles

4.2 Develop enterprise OA contract language

4.3 Establish process for conducting data rights requirements analysis

4.4 Develop framework for OA contract incentives

4.5 Develop OA Award fee criteria

### TECHNICAL

4.6 Develop OA Enterprise Component Library
   - Inventory existing repositories
   - Develop ConOps and CM processes
   - Define data structures and technical detail
   - Identify OA Artifacts
   - Build, deploy and populate repository and toolset

4.7 Align Domain standards
4.8 Align standards to DISR
Successful implementation of OA requires sound performance measures to monitor and gauge success

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<thead>
<tr>
<th>OA Metric</th>
<th>OA metric illustrating a program’s current state of openness</th>
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<tr>
<td>Time to Field</td>
<td>Decreased time to field new warfighting capabilities to the fleet</td>
</tr>
<tr>
<td>Cost Avoidance</td>
<td>Cost avoidance from software re-use and use of COTS</td>
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<tr>
<td>Baseline Reduction</td>
<td>Reduction of warfare system baselines</td>
</tr>
<tr>
<td>Streamlined Investments</td>
<td>Streamlined investments for similar capabilities, system upgrades, test and evaluation</td>
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Implementation of OA will yield many benefits to the Navy as demonstrated by the ASW community

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<th>Benefits to the Fleet and Other Organizations</th>
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<tr>
<td><strong>Performance</strong></td>
</tr>
<tr>
<td>■ Continuous competition yields best of breed applications</td>
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<tr>
<td>■ Focus on warfighter priorities</td>
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<tr>
<td><strong>Schedule</strong></td>
</tr>
<tr>
<td>■ System integration of OA-compliant software happens quickly</td>
</tr>
<tr>
<td>■ Rapid update deliveries driven by use operational cycles</td>
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<tr>
<td><strong>Cost Avoidance Mechanisms</strong></td>
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<tr>
<td>■ Software – Develop once, use often, upgrade as required</td>
</tr>
<tr>
<td>■ Hardware – Use high-volume COTS products at optimum price points</td>
</tr>
<tr>
<td>■ Training systems use same tactical applications and COTS hardware</td>
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<tr>
<td><strong>Design for Maintenance-Free Operating Periods</strong></td>
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<tr>
<td>■ Install adequate processing power to support “fail-over” without maintenance</td>
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<tr>
<td>■ Schedule replacement with improved COTS vice maintaining old hardware</td>
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<tr>
<td>■ Reduce maintenance training required</td>
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<tr>
<td>■ Consolidate Development and Operational Testing for reused applications</td>
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<td><strong>Risk Reduction</strong></td>
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<tr>
<td>■ Field new applications only when mature</td>
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<tr>
<td>■ Do not force the last ounce of performance</td>
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<tr>
<td>■ Deploy less (but still better than existing) performance or wait until next update</td>
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In summary, OA will continue to be a key enabler in meeting the three priorities laid out by the CNO for FY06...

...and several related objectives
# The Open Architecture Enterprise Team Points of Contact

<table>
<thead>
<tr>
<th>ENTERPRISE</th>
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<tbody>
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1 May 2006
Naval OA requirements and program responsibilities are derived from three primary sources

5 August 2004 OA Policy Statement

23 December 2005 OPNAV Requirements

NAVAL OA Responsibilities and Requirements to execute against the strategy
OA Special Interest Area - https://acc.dau.mil/oa

Monthly average hits ~ 1500
## Symposia and Industry Day Events

### Naval OA Contract Symposium
- Held 29 September 05
- All day government event
- Focus: Contracting in OA
- 15 Speakers
- 125 Participants
- 60% response rate on survey

### Naval OA Industry Day
- Held 14 February 06
- Half day industry event
- Focus: Business Principles of OA
- 8 Speakers
- 280 Participants
- 69% response rate on survey
## Education and Training Master Plan

### Education and Training Continuum

<table>
<thead>
<tr>
<th>NPS / AFIT/ Civilian Universities</th>
<th>DAU</th>
<th>NAVY</th>
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<td>• High Impact</td>
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<tr>
<td>• Long time horizon</td>
<td></td>
<td></td>
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<tr>
<td>• Develops leaders of tomorrow</td>
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<tr>
<td>• Technical competencies</td>
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<tr>
<td>• Some business competency</td>
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<tr>
<td>• In-depth education in technical or business disciplines leading to a graduate degree</td>
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<tr>
<td>• Formal classroom training, either on campus or distance learning</td>
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### DAWIA Certification Training
- High Impact
- Long Time Horizon
- Qualification training for the Acquisition Workforce
- Principally business competencies
- Some technical competencies
- Broad training covering a variety of topics leading to career field certifications in specific disciplines
- Formal classroom training either on campus or distance learning

### Continuous Learning
- Medium Impact
- Short to medium time horizon
- Business or technical competencies
- Focused course work on specific topics
- Symposia and professional society meetings
- Instructor or web delivery

### Knowledge Sharing
- Medium to high impact
- Short time horizon
- Task based
- Web based
- Learning modules or best practices

### Workforce Awareness
- Low impact
- Short time horizon
- Business orientation
- Briefings and general orientation
- Instructor or web delivery

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1 May 2006
OA program assessments are underway to better understand how open our programs are today

- **Background**
  - EXCOMM II and EXCOMM IV tasked Program Managers to conduct program assessments to determine how open programs are today.
  - The OA Model and Tool were developed to support this action.
  - An assessment will produce an OA Metric and give managers a better understanding what they can do to increase the openness of their program.

![OA Metric](image)

![OA Assessment Report](image)
OA Experimentation efforts

23 December 05 OA Experimentation Requirement

The following slides provide a test overview

OA Experimentation Vision
- Develop rapid fielding and more affordable Warfighting capabilities
- The path to FORCEnet demands seamless integration
  - Reducing the risk of delivering non-Interoperable products

Experimentation Success Criteria
- Coordinate end-to-end force level system engineering experiments
  - Interoperability, Open Architecture
- Leverage existing open/collaborative engineering environments
  - Across systems and domains
- Foster team work
- Prototype new business and engineering processes
ENVIRONMENT

- Littoral waters off the coast of a rogue nation that has tried to purchase sensitive material and has severed diplomatic ties to the U.S.
- High background of normal commercial maritime and air traffic

Investing in Family of Systems System Engineering
Maritime Interdiction Experiment OV-1
“National Critical Contact of Interest”

**Family of Systems System Engineering**

**C4I**
- CDM expertise
- SOA capabilities

**SPACE**
- SATCOM link emulation
- Network overlay

**AIR (NAWC–PAX):**
- P-3, SH-60 most relevant platforms for surface surveillance
- E-2 most mature platform simulator

**NWDC:**
- Provides Scenario Sim Gen

**SUBSURFACE (NUWC–NPT):**
- Limited bandwidth platform
- Provides tactical ISR

**SURFACE (NSWC–DAHL):**
- CVN in simulation environment as defended asset
- Focus on strike group protection mission

**OA**
- Common Data Model
- Distributed Land-Based Test Network

**FORCEnet needs this type of process**
We have completed an initial OA Contract Handbook and accompanying implementation plan ...

**Tasking**

*The Enterprise Team shall define an OA Acquisition strategy and develop guidance…. The accompany guidance will then be utilized in future OA procurements tailored as necessary to incorporate domain specific requirements.*

- Naval OA Policy Statement 05, Aug 2004

**Draft Handbook**

**Implementation Plan**

- Build Awareness and Obtain Leadership Sponsorship
- Issue OA Contract Guidebook V 1.0
- Conduct Training on OA Guidebook
- Conduct Pilot in NAVSEA Contracts
- Institute Feedback Mechanisms “Build-Test-Build”
- Conduct Progress Evaluations

“Until contracts include OA language, incentives, and award fees under the new paradigm, things will not change” - Quote from Industry Day participant

... per ASN RD&A tasking to utilize guidance in procurements

1 May 2006
Goal: Establish the Enterprise Asset Repository to store the reusable components per EXCOMM action and OPNAV requirement

Focus:
- What should the configuration management processes be to modify or update a reusable component?
- What artifacts should be stored in the repository?
- What technology and tools are needed to develop and build the asset repository?
- Should the repository be virtual or physical?
- How will the repository link to domain repositories?
Navy Technical Standards Alignment

Air | Surface | Submarine | C4I / Space

(Common Standards Profiles)

Navy Standards Working Group

DoD Standards (DISR)

Commercial Computing Industry Standards
(OMG) (POSIX) (IEEE) (W3C) (OASIS) (IETF)

GIG & Net Centric Standards