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<th>AIR</th>
<th>C4I</th>
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<th>SUBS</th>
<th>SURFACE</th>
<th>MARINES</th>
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October 23, 2008
Agenda

- The Open Architecture Imperative
- Open Architecture Policy and Requirements
- Benefits of Open Architecture
- Open Architecture Business and Technical Practices
- Examples of Open Architecture Implementation across the Navy
- Importance of Acquiring and Exercising Intellectual Property Rights
- Conclusion
The Navy must build a fleet where our systems ... 

... are modular, interoperable, and affordable to upgrade
To accomplish this, ASN (RD&A) in 2003 commissioned a Red Team to assess the Navy’s plan to adopt Open Architecture

The Red Team Made 13 Recommendations to leadership:

1. Develop and promulgate a clear Navy policy
2. Develop a Navy-wide business strategy to support OA goals
3. Redirect the OA implementation by defining architectures for domains based on their unique needs
4. Assign one PEO to be accountable for managing OA in each domain
5. Investigate alternate strategies for budgeting and contracting for ships and their combat systems to maximize benefits of open architectures
6. Evaluate DDX, AEGIS, LCS, and CVN/large deck L-ships combat system requirements and analyze architecture/cost trades to exploit a common architecture for surface ship command and decision systems
7. Review all applicable programs to determine how OA is actually being implemented and what changes in the program of record are required
Red Team Recommendations (continued)

8. Reaffirm the role of PEO IWS in the Navy-wide OA Initiative
9. Modify and enforce the OA architecture definition and standards selection processes within and across communities
10. Implement and sustain a proactive education and information exchange program across the Industrial and Government communities
11. Modify testing and certification processes to exploit OA
12. Regarding JTM and its development by JSSEO:
   - Determine whether the technical approach and the transition strategy to Navy programs is appropriately risked
   - Determine whether the Navy programs have sufficient, coordinated off-ramps
13. Consider using the basic framework of these recommendations for Navy OA to address Joint interoperability and network centric warfare requirements

The Red Team included several technical recommendations
These recommendations acknowledge that many pieces of the acquisition puzzle are required to become “truly open”

Open Architecture

The confluence of business and technical practices yielding modular, interoperable systems that adhere to open standards with published interfaces.
So, leadership mandated **Open Architecture** implementation across the Naval Enterprise and provided some guidance.

1. Aug 2004 ASN RDA mandates open architecture

2. Dec 2005 OPNAV issues OA Requirements letter

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**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

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**Naval OA Policy**

**Naval OA Requirements**
From this guidance, the OA Enterprise Team (OAET) developed a Naval OA Strategy that includes goals, objectives, practices, and tools …

**OA STRATEGY**

**Naval OA Strategy**

"If you can imagine having a piece of software that is capable of changing its design, then you can imagine that. We’re not going to do that, and we need to start looking at a proactive approach to a more directed environment." - Rear Adm. C. Robert Papp, Jr., 10 May 2005

The OAET (OA Enterprise Team) developed a Naval OA Strategy that includes goals, objectives, practices, and tools to:

1. Change the Naval processes and business practices to "utilize open systems architectures in order to rapidly field affordable, interoperable systems."

2. Provide OA Systems Engineering leadership to field common, interoperable capabilities more rapidly at reduced costs.

3. Change the Naval and Marine Corps Cultures to Institutionalize OA Principles.

**OA GOALS**

1. Disclose design artifacts
2. Negotiate appropriate data rights
3. Foster enterprise collaboration
4. Reuse GOTS products
5. Institute Peer Reviews
6. Develop new business models
7. Incorporate OA in contracts

**OA PRACTICES**

1. Publish interfaces
2. Isolate proprietary components
3. Use widely adopted standards
4. Modularize systems

- DAU OA Training
- Outreach
- Government Symposia & Industry Days
- NPS Research

**TOOLS TO ASSIST**

- DAU OA Contract Guidebook
- DAU OA Assessment Tool
- Reuse Licensing Agreement
- SHARE Repository
- OA/FORCEnet Experiment
- DAU OA Training Module
- Industry Days
- DAU OA Website
... and found that implementing OA yields many benefits

<table>
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<tr>
<th>Benefits of Open Architecture</th>
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<tbody>
<tr>
<td><strong>Reduction in Time to Field</strong></td>
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<tr>
<td>Decreased development and acquisition cycle times to field new warfighting capabilities</td>
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<tr>
<td>Faster integration of open standards based systems</td>
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<tr>
<td><strong>Increased Performance</strong></td>
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<tr>
<td>Improved operator performance thru delivery of cutting edge technologies and increased bandwidth capabilities from spiral developments and technology insertions</td>
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<tr>
<td><strong>Improved Interoperability</strong></td>
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<tr>
<td>Use of common services (e.g. common time reference)</td>
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<tr>
<td>Use of common warfighting applications (e.g. track mgr)</td>
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<tr>
<td>Use of published interfaces to standardize collaboration</td>
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<tr>
<td><strong>More Competition</strong></td>
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<tr>
<td>Modular architectures enable competition at the component level</td>
</tr>
<tr>
<td>Sharing data rights allows third parties to compete</td>
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<tr>
<td><strong>Cost Avoidance</strong></td>
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<tr>
<td>Cost avoidance from software reuse and use of commodity COTS products at optimum prices</td>
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<tr>
<td>Reduced training and streamlined lifecycle support</td>
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Therefore, the Navy is changing its business and technical practices to take advantage of OA’s benefits.

<table>
<thead>
<tr>
<th>Business Practices</th>
<th>Technical Practices</th>
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<tr>
<td>Disclose design artifacts</td>
<td>Modularize systems</td>
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<tr>
<td>Negotiate appropriate data rights</td>
<td>Publish interfaces</td>
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<tr>
<td>Increase enterprise collaboration</td>
<td>Isolate proprietary components</td>
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<tr>
<td>Institute reviews of solutions</td>
<td>Use widely adopted standards</td>
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<tr>
<td>Develop new business models</td>
<td>Re-use software components</td>
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<tr>
<td>Change contracts</td>
<td>Build interoperable applications</td>
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<tr>
<td>Increase competition</td>
<td>Ensure secure data exchange</td>
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<tr>
<td>Design for lifecycle affordability</td>
<td>Implement common solutions</td>
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For example, PEO IWS is building a modular, common combat system architecture …

Aligning platform combat systems …

... to one open, objective architecture …

“I expect us to compete whenever possible. Competition provides us with options to seek the best solution for the fleet and the taxpayer. … I also expect us to foster an environment in which competition can be sustained over time. Competition once does not serve our interests.”

—VADM Paul E. Sullivan

... to achieve commonality across multiple ship classes where the business case supports it

... to help increase competition
PEO C4I is developing new business models …

Today

- Large acquisition programs delivering hardware and software
- Integration occurs at Fleet installations
- Limited code reuse
- Individual program DT/OT events
- Lack of platform baselines
- Limited competition

Tomorrow

- Smaller COI services programs; separation of hardware and software
- Integration occurs in E2E test lab
- Software repository and collaborative development model
- Distributed FDCE-like process
- Integrated platform C4I delivery
- Best of breed process

... to neck down and move towards common services
Another significant cultural change is that the Navy now understands the importance of exercising its intellectual property rights

- A key aspect to implementing OA is for the Government to exercise the intellectual property (IP) rights it acquires.

- Under the Federal Acquisition Regulations (FAR) and Defense Federal Acquisition Regulation Supplement (DFARS):
  - The Government gets Unlimited Rights in both Technical Data (TD) and Computer Software (CS) for noncommercial items developed exclusively at the Government’s expense.
  - For noncommercial items developed with mixed funding, the Government gets Government Purpose Rights (GPR) in TD and CS.

- If a contractor asserts more restrictive rights over a system/component’s IP and the Government fails to challenge such an assertion by exercising its rights, the contractor obtains the asserted rights.

- It is imperative that the Government assert and exercise the IP rights it acquires because it may lose those rights after a period of time.
For example, acquiring, asserting, and exercising IP rights enables Naval programs to disclose designs to foster collaboration ...

- Design artifacts from AEGIS, LCS, DDG 1000, SSDS, SIAP, IABM are available to qualified vendors in IWS’s SHARE repository.

- Project artifacts from CLIP, XCOP, and NITES-Next are available to qualified vendors in the C4I NESI collaboration site.

... and improve interoperability.
In conclusion, over the four year span of this enterprise transformation, lessons learned have emerged

OA Enterprise Transformation Requires...

- Clear vision and strategy
- Top leadership support & commitment
- Quick wins to get momentum
- Enterprise governance & ownership
- Identified Change Agents
- Consistent OA Communications
- Accountability at all levels
- Performance metrics
- Fleet driven requirements
- Industry / Academia Involvement
- Training / Research

- Operational Capability Roadmap
- Open / Scalable architectures
- Aligned architectures
- Access to design artifacts
- Published interfaces
- Enterprise collaboration
- Threat / data driven performance evaluation
- Tech refresh process

- Compliance checkpoints – six gate
- Consistent assessment approach
- Standardized contract language
- Knowledge of upcoming contracts
- Asset user licensing agreements
- Software asset repositories
- Changed acquisition bus model
- Viable sourcing alternatives
- Transparency -Third Party Reviews
- Streamlined acquisition processes