Service Oriented Architecture as a Tool of Navy METOC Transformation

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METOC Enterprise – What we do

• Mission
  – To provide an asymmetric war fighting advantage through the application of Oceanographic sciences.

• Enabling Asymmetric Advantage
  – A Navy strength... the ability to apply Oceanography to battle problems and challenges in order to leverage knowledge of the environment for an advantage

• Navy METOC... an information supply chain
  – The information supply chain is our enterprise.
Battlespace on Demand

Tier 3 – the Decision Layer
- Options / Courses of Action
- Sensor Employment
- Asset Allocation / Timing
- Quantify Risk

Tier 2 – the Sensor Performance Layer

Tier 1 – the observed and forecast Environment Layer

We must make better decisions faster than the adversary
SOA Transformations

• **Net-Centric Operations & Warfare = Process Transformation**
  - New collaboration, decision, information sharing processes

• **SOA = IT Transformation**
  - New architectural layer
  - New acquisition, development & integration processes
  - New technologies & skills
SOA is about integration... at the METOC edges... ABSTRACTION

Major Integration Points (external or internal):

Those data, logic, control, process capabilities that if exposed:

- would be useful to multiple users, at multiple locations, and/or in multiple contexts
- would support the composition of new capabilities across systems with heterogeneous implementation technologies
- would mitigate high changeability expectations between integration participants
Readiness for SOA

1. **It is relatively easy to develop and deploy a web service built around XML data representations**

2. **It is harder to build a web service that is discoverable, reusable, scalable, extensible for broader contexts**

3. **It is a significant technical and management challenge to develop and deploy a portfolio of reusable services; and to build capability from others’ portfolios of services… this is the essence of a Service Oriented Enterprise and underpins the concept of the GIG/Fn**
METOC SOA Strategy

- **Pick the right “pathfinder” projects**
  - Incrementally develop and apply skills
  - Manage Cost, Complexity & Risk (CCR)
  - Ensure “visible” warfighter value
  - Ensure ready “services” consumer

- **Prepare for the enterprise solution**
  - Modeling the METOC Enterprise Service Integration Layer (MESIL)
  - Concurrent development of enabling enterprise standards
    - Service taxonomy, service naming/description, SLA elements, etc.
  - Clarifying METOC ESB Strategy

- **Find efficiencies**
  - Outsource to GIG/Fn infrastructure (an important given)
  - Create effective alignment mechanisms – reduce redundancy/maximize reuse
  - Minimize costs for required “non-core” IT functionality
    - Internal infrastructure hardware and software
Foundational GI&S Data (Static Characterization)

- Space (Astrometry)
- Atmosphere Characterization
- Ocean Characterization
- Nav Data
- Imagery
- Terrain

Exposed COI Services & Spaces

GIG Enterprise Core Services

- Dynamic Force and Threat Information
- Dedicated Sensors
- Thru The Sensor Data
- On scene Processing
- Geo-temporal Tags

Virtual COEs offer added-value data brokerage & knowledge services using posted data from METOC Centers & other COIs:

- Joint Virtual METOC Database
- Domain Authority Assessment
- Mission-specific Environmental Alerts
- Visualization Services

DOD Centers

Use Agents • ASW Mission Alerts
• NSW Mission Agents
Data Strategy

• **SOA data services based**

• **Guided by DoD and Navy policies for managing data in a net-centric environment**
  
  – Make data visible, available and usable where needed and when needed to accelerate decision making
  
  – Tag data with metadata to assist with discovery
  
  – Post to shared spaces except where limited by security, policy or regulation
  
  – Promote interoperability by enabling many-to-many exchanges vice point-to-point
Data Strategy

Navy Battlespace on Demand Framework

Tier 3 – the Decision Layer
• Options / Courses of Action
• Search Patterns
• Asset Allocation / Timing
• Quantify Risk

Tier 2 – the Performance Layer

Tier 1 – the (forecast) Environment Layer

Initial and Boundary Conditions

“OGC”

“JMBL”

Naval Oceanography
Current Navy Implementation Details

**NAVO’s Naval METOC Data Services Framework (NMDSF)**
- 1 data service operational (JMBL-based)
  - 36 information elements available (forecast and OAML)
- Single access point to Navy METOC data holdings – FY 09

**FNMOC’s CAGIPS**
- 1 data service operational (JMBL-based)
  - 144 information elements (forecast)
- Legacy APIs exist

**OGC-based services**
- WMS for ASW performance surface to become operational – FY09
- WFS prototype in FY09 – should be operational – FY10

Several others emerging… e.g.
- bottom characteristics
- optimal routes
Net-Centric METOC Operations Timeline

1991

DoDD 8320.1

No Interoperability

1991 2008 2009 +

DoDD 8320.2

Net-centric Joint METOC

WMO Data Exchange Standards Adopted

Strategic Center Data Exchange

United States of America, Department of Defense

JM CDMA

JMBL

JM WSDL

JM Taxonomy/Ontology

DoD MDR Registration

Restructured JMB under Joint Staff

 JM CONOPS

JM JCD

UMCore, GML and OGC

FAA/NWS adopt JMBL

FAA’s NextGen

Major DoD Programs

JM Services Definition

JM Domain Authority

JM Capabilities Access Point

FAA’s NextGen