Open Systems Development Initiative (OSDI)
Open Systems Project Engineering Conference (OSPEC)
FY 98 Status Review
29 April - 1 May 1998
# Open Systems Development Initiative (OSDI)

**REPORT TYPE:** Briefing  
**DATES COVERED:** 29-04-1998 to 01-05-1998  
**AUTHOR(S):** Paul, John T.  
**PERFORMING ORGANIZATION NAME AND ADDRESS:** Naval Air Warfare Center Weapons Division  
**SPONSORING/MONITORING AGENCY NAME AND ADDRESS:** Open Systems Joint Task Force (OSJTF)  
**SPONSOR/MONITOR'S ACRONYM(S):**  
**DISTRIBUTION/AVAILABILITY STATEMENT:** APUBLIC RELEASE  
**ABSTRACT:** See Report.
Goals

- COTS technology
- Object Oriented S/W
- Hands-on expertise in a low risk environment
- In-house OS expertise
- Plug & Play capabilities
- Performance Characteristics
- Technology Transfer
- AV8B OSCAR
- F/A-18 AMC&D
- OTHERS

May 1, 1998
OSDI Relationships

PMA-209

PMA-257 : OSCAR

PMA-265 : AMC&D

Fibre Channel AE

Prime/Subs

COTS Vendors

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Architecture

- Operational Architecture - Description of the operational elements, assigned tasks, and information flows.

- Systems Architecture - Defines the physical connection, location and identification of key components, circuits, networks etc., and specifies system and component performance parameters.

- Technical Architecture - Identifies the services, interfaces, standards, and their relationships.
OSDI System Architecture

- Ethernet
- RS-232
- MIL-STD-1553
- RGB

Tornado 1.0.1 Host

RGB

Cockpit Displays

MIL-STD-1553

Avionics Sub-system Simulation (AV8-B SimC)

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OSDI Technical Architecture

Hardware Independent Software

Operational Flight Program

VxWorks Wind Kernel for PPC

Hardware Dependent Software

OpenGL Graphics Driver

MIL-STD-1553 Driver

VxWorks BSP for Tornado 1.0.1

Hardware

Graphics Card

Backplane

COTS PPC Card

COTS 1553 Card

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Standards & Conformance

Standards
- National Body
- Company Proprietary
- Non-Standard
- Implementation

Conformance
- Strict
- Conforming
- Conforming with extensions
- Non-conforming

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## Identify Interfaces

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<td>X(15) Avionics Infrastructure - Adv. Ballist.</td>
<td>.h (implementation)</td>
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Note: Header files are facades (a design pattern) that define critical software interfaces.
Benefits of KOSI Analysis

• Understand key interfaces & standards
• Non-conforming interfaces
• Standardization Vs. Optimization
• KOSI based product selection
• Valuable tool for system engineers

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Benefits of KOSI Analysis

- Promotes technology insertion for increased throughput and memory requirements
- Reduced time-to-market
- KOSI based system is scalable, portable, interoperable, & plug & play compatible
- System kept “open” indefinitely
Recommendation #1

- Every new open system procured for the DoD shall have KOSI analysis as a SOW requirement
- KOSI analysis shall be performed by a joint team of prime, subs and DoD
- KOSI analysis shall be controlled and changes tracked through the life of the system
OSDI Technical Architecture

Hardware Independent Software

- Operational Flight Program
- VxWorks Wind Kernel for PPC

Hardware Dependent Software

- OpenGL Graphics Driver
- MIL-STD-1553 Driver
- VxWorks BSP for Tornado 1.0.1

Hardware

- Graphics Card
- Backplane
- COTS PPC Card
- COTS 1553 Card

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Typical OS Technical Architecture

Open Systems API (OSAPI)

System Init/Reset Boot
BIT
I/O Bindings
Interrupts Timer 1553 VME Discretes
Extensions
Remote Procedure Passing Call
IPC
Operating System/Runtime Kernel
Program Language Support
Software Development Support
Hardware

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Generic API Services

- System Initialization & Boot Loader
- Built-In Test (BIT)
- Device Drivers
  - Interrupt
  - Timers
  - Backplane (VME)
  - Legacy I/O (1553)
  - High Speed I/O (Fibre Channel, PCI, SCI)
  - Discrete I/O
  - Bindings
- Operating system/Kernel
- Programming Language Runtime Support
- Software Development Interface
OSMC API - A Joint Venture

NAWCWPNS

Smith

GDIS

PMA-209

Boeing

Open Systems Mission Computer Application Programming Interface Specification

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Recommendation #2

- Joint Review of OSMC API
- Develop OSAPI Specification
- Encourage vendors to voluntarily embrace OSAPI
- Validate COTS product conformance to OSAPI
It Depends