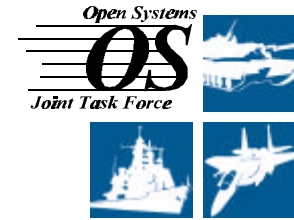


Raytheon



POSIX/AOS Delta Document
Open Systems Project Engineering Conference (OSPEC)
FY 98 Status Review
29 April - 1 May 1998

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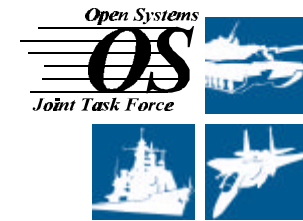
12. DISTRIBUTION/AVAILABILITY STATEMENT
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13. SUPPLEMENTARY NOTES

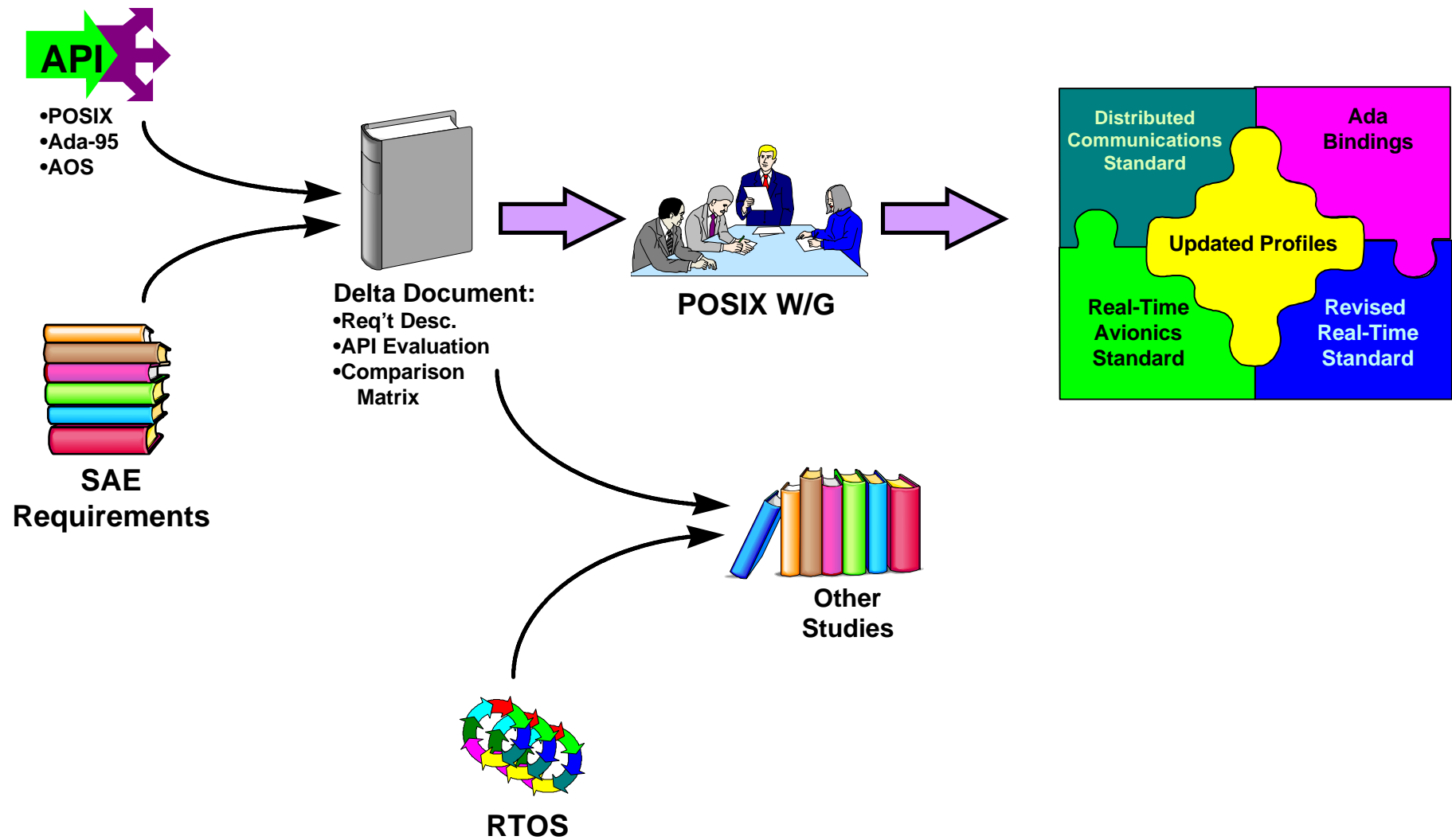
14. ABSTRACT
See Report.

15. SUBJECT TERMS

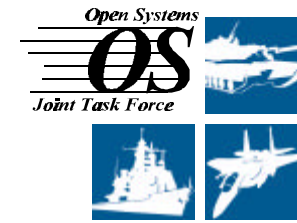
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b. ABSTRACT Unclassified			19b. TELEPHONE NUMBER
c. THIS PAGE Unclassified			International Area Code Area Code Telephone Number 703767-9007 DSN 427-9007



- **Background: JSF, OS-JTF, DISA (AJPO), and USAF Wright Lab funded Hughes to evaluate and determine the suitability of the POSIX and AOS APIs, and Ada 95 features for real-time embedded software**
 - **Areas of Interest: availability, performance, security, and supportability tradeoffs**
 - **Provide a Delta Document comparing POSIX, AOS and Ada 95 (1996 - 1997)**
 - **Received Funding to pursue implementation of the Delta Document Findings (1998)**
- **The Delta Document provides information needed to decide if POSIX is feasible in real-time military avionics?**



SAE-AS5 OS API WG Requirements



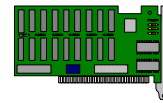
Synchronization



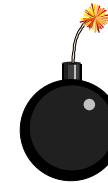
Data Security



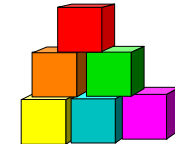
Timer Services



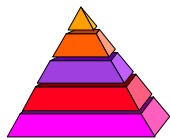
Special Devices



Fault Management



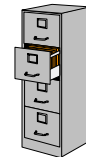
Non-Operational Support



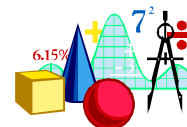
Program Support



Memory Management



File Management



Data Conversion



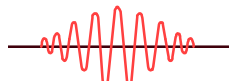
Built-In Test



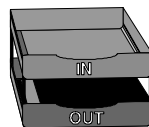
**Bootup/Initialization/
Shutdown**



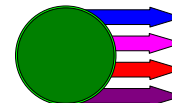
Task Control



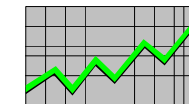
Communication



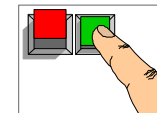
Input / Output



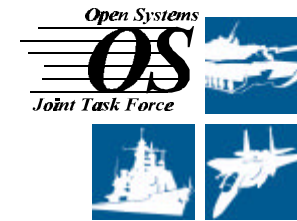
Configuration



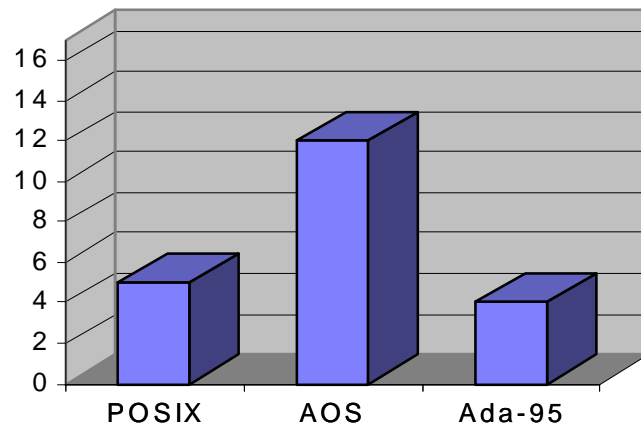
Instrumentation



Reinitialization



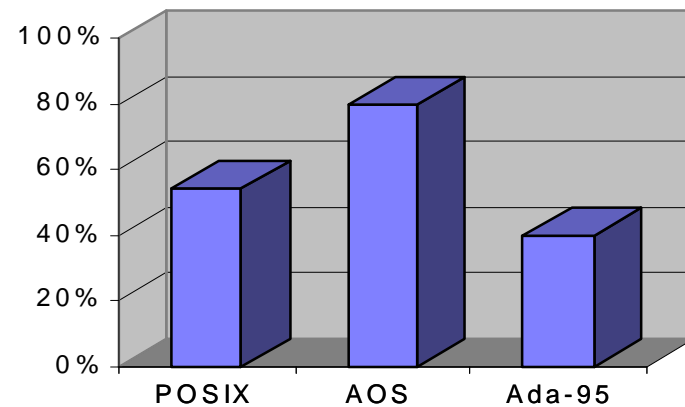
API Functionality



Functionality-

- 17 Functional Areas
- Based on fulfilling 75% of The Requirements in a Functional Area

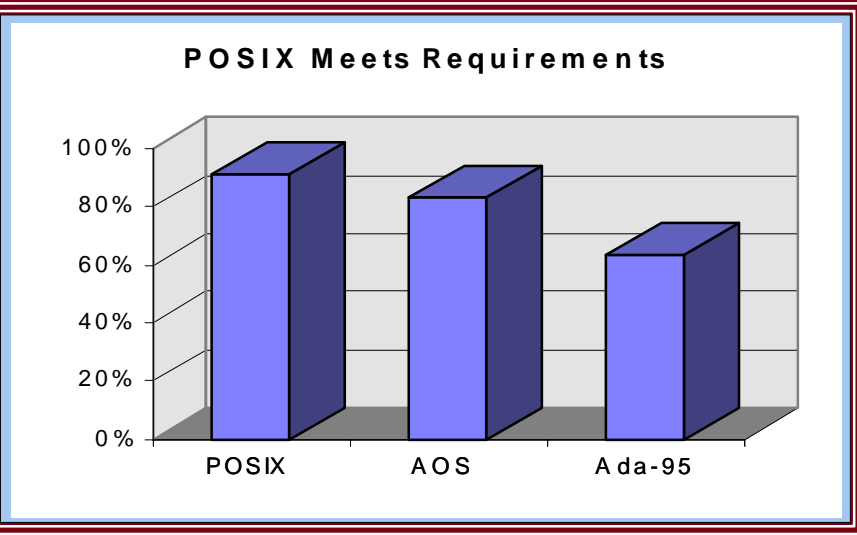
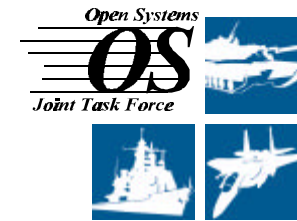
Requirements



Requirements-

- 277 Total Requirements
- 17 Functional Areas
- Failed, Unknown, and Not Applicable Req's not Counted As Fulfilled

Category 1: POSIX Meets The Requirements



Requirements:

- Synchronization
- Task Control
- Timer Services
- File Management

Number of Requirements:

- 60 Total Requirements

Findings:

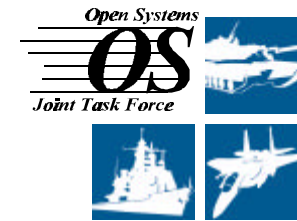
POSIX: Minor Modifications needed to:

- Synchronization
- Task control
- Timer Services
- File Management

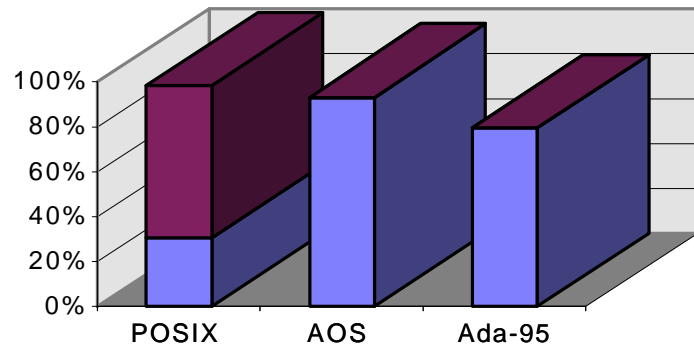
Recommendations:

- Present List of Minor Changes to POSIX Real-Time Working Group. Example: Semaphores as Notification Mechanism.
- Write PAR. Implement Changes into Real-Time Standard.
- Evaluate the Four POSIX Military Profiles For Avionics Feasibility.

Category 2: POSIX Nearly Meets Requirements



POSIX Nearly Meets Requirements



Requirements:

- Communication

Number of Requirements:

- 59 Total Requirements

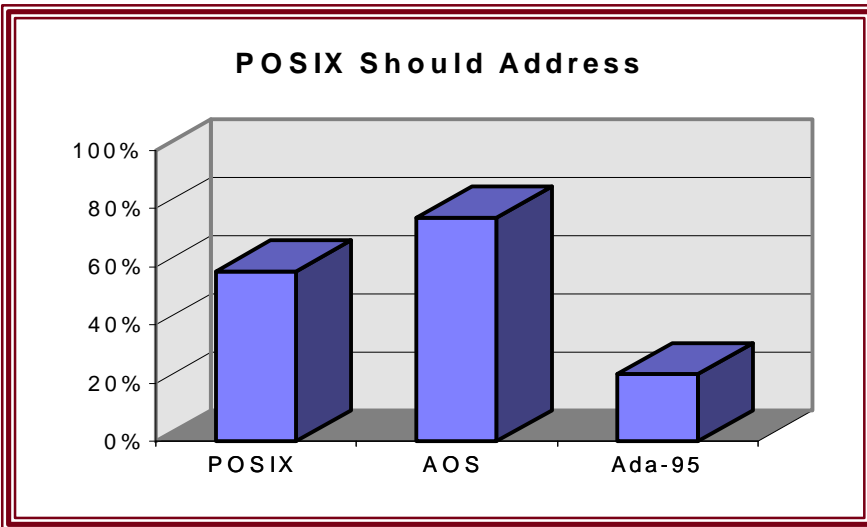
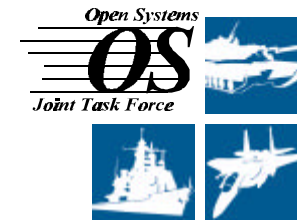
Findings:

- The POSIX Capability for the majority of Communication was Unknown at the Time of The Evaluation.
- NOTE: Need to review the POSIX Distributed Communication Standard

Recommendations:

- Compare Distributed Comm with Delta Document requirements
 - Recommend The Implementation of Ada Bindings of Any Relevant Requirements.

Category 3: POSIX Should Address



Requirements:

- > Program Support
- > Memory Mgmt
- > Data Conversion
- > Non-Operational Support
- > Data Security
- > Input Output
- > Fault Mgmt

Number of Requirements:

- 108 Total Requirements

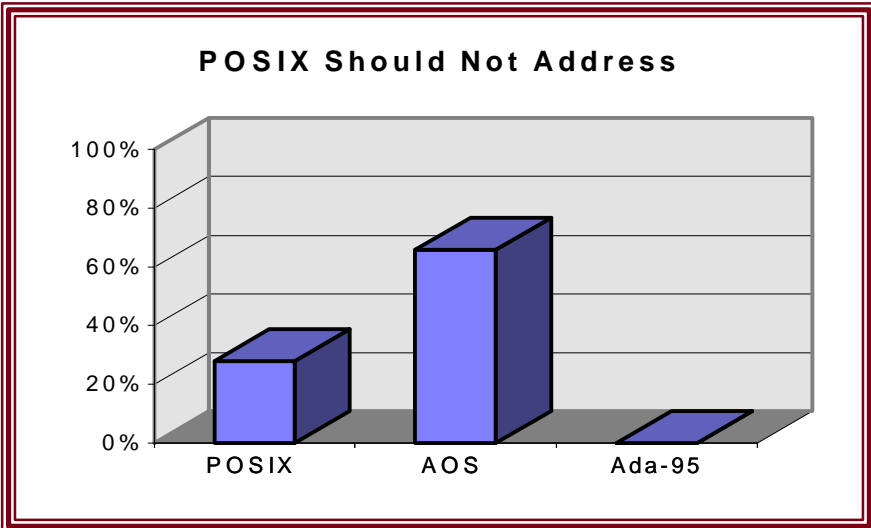
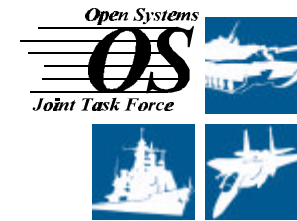
Findings:

- Significant Deficiencies Found in:
 - Program Support
 - Data Security
 - Memory Management
 - Input Output
 - Data Conversion
 - Fault Management
 - Non-Operational Support

Recommendation:

- Present The Missing Requirements to The Real-Time Working Group.
- Get a Consensus on The Needed Requirements & Implement
- Migrate Any Requirements That have not Been Agreed-on to Category 4.

Category 4: POSIX Should Not Address



Requirements:

- Special Devices > Configuration
- Built-In Test > Instrumentation
- Bootup / Initialization / Shutdown
- Reinitialization

Number of Requirements:

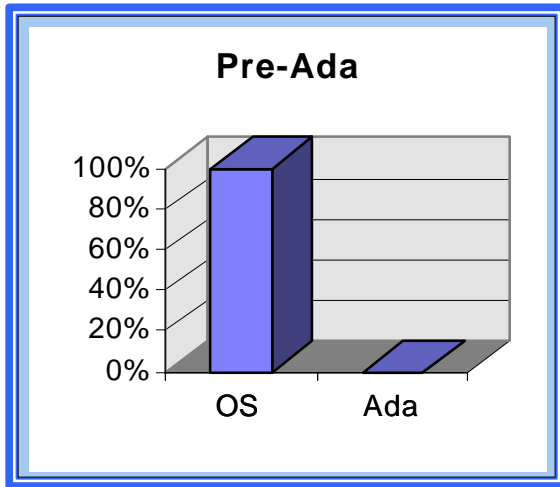
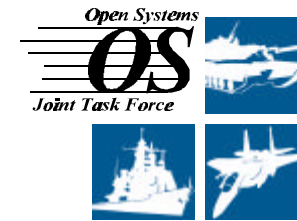
- 50 Total Requirements

Findings:

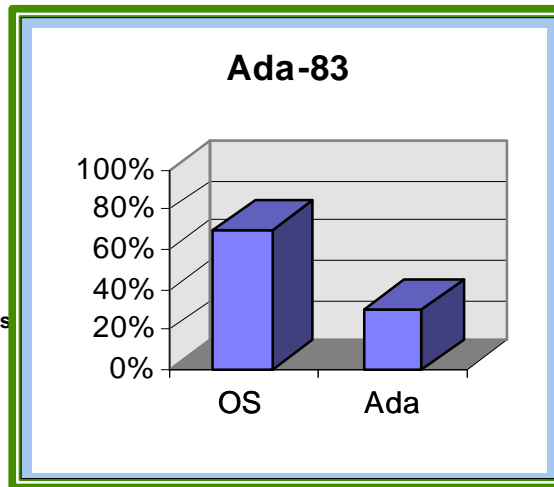
- Significant Deficiencies Found in:
 - Special Devices
 - Configuration
 - Built-In Test
 - Instrumentation
 - Bootup / Initialization / Shutdown
 - Reinitialization

Recommendation:

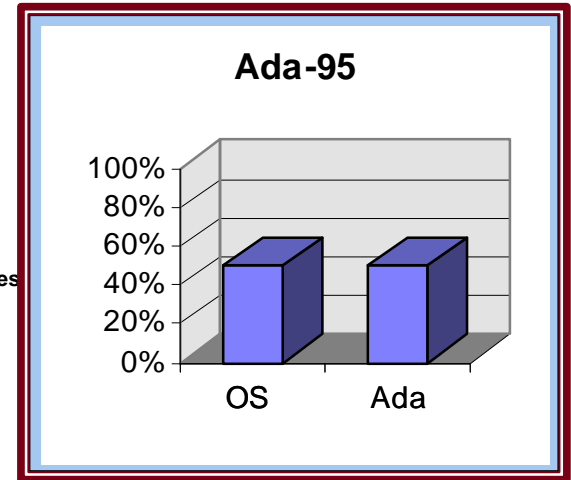
- Present The Missing Requirements to The Real-Time Working Group.
- Get a Consensus on The Requirements.
- Ask JSF OSA to Define an API for Avionics Specific Requirements.






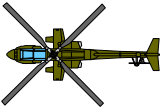

Ada 83
 Tasking
 Exceptions




Ada 95
 Semaphores
 Real-Time
 Services

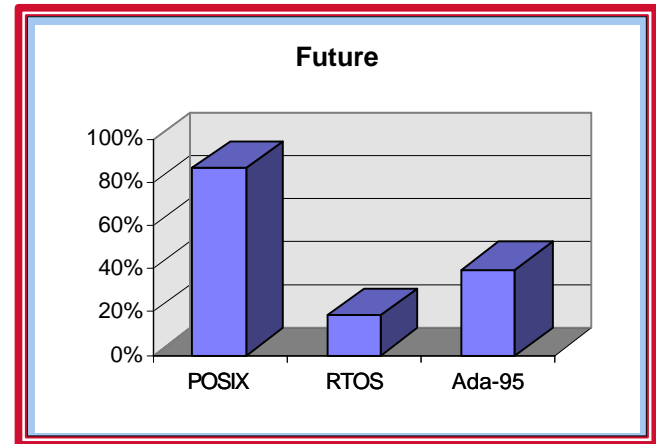
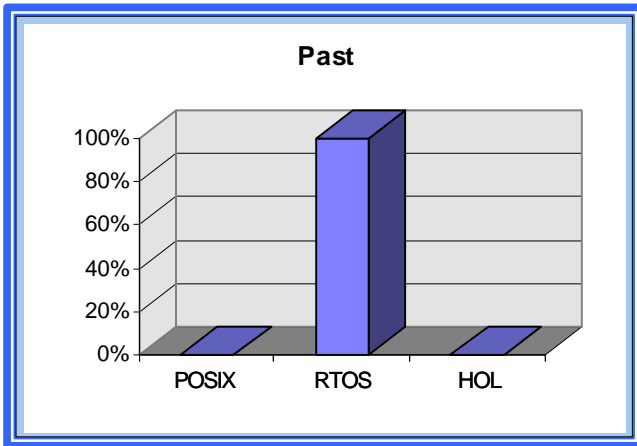


-  (F-14)
-  (F-15)
-  (F-18)
- Others** (B-2)

-  (Comanche)
-  (F-22)

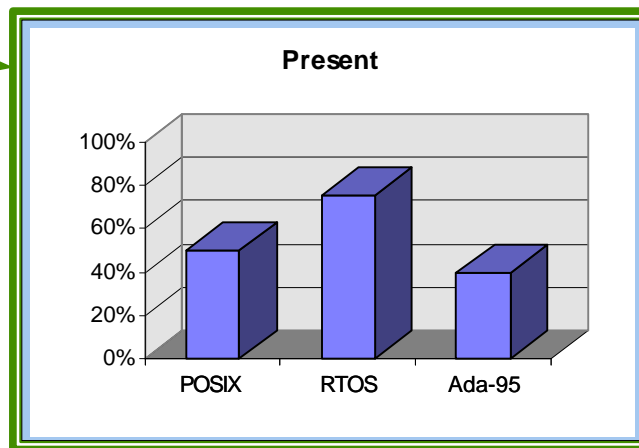
-  (JSF)

The Trend in Application Programming I/Fs (API)



Ada + POSIX

- Real-Time Functionality Lacking in OS, POSIX, and Ada
- Considerable Overlap in OS, POSIX, and Ada



Ada + POSIX

- High Order Functionality in Ada
- General OS Functionality in POSIX
- Hardware Specific Functionality in RTOS



- **Task 1: Support The OSJTF Test Suite Industry Wide Certification Program.**
 - » Beta Test
 - » Conformance Statement Questionnaire
- **Task 2: Support POSIX Real-Time Standard.**
 - » Bring Delta Doc findings to RT System Services WG
 - » Write PARs and participate in WG
- **Task 3: Update the Delta Document and provide to JSF.**
 - » Update Delta Doc to include RT Distributed Communication
 - » Provide to JSF for DII/COE RT consideration