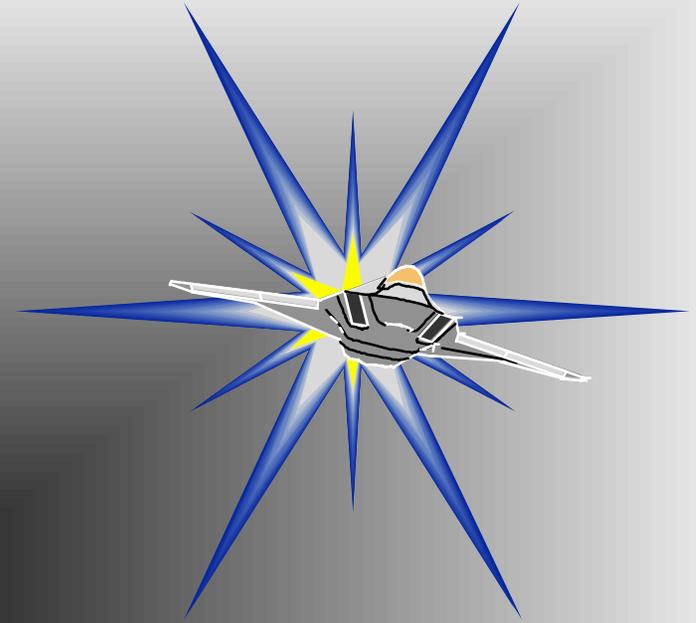


Open Systems Architecture - A Boeing Enterprise Perspective



Don C. Winter
Open Systems Architecture
Phantom Works

OPEN SYSTEMS

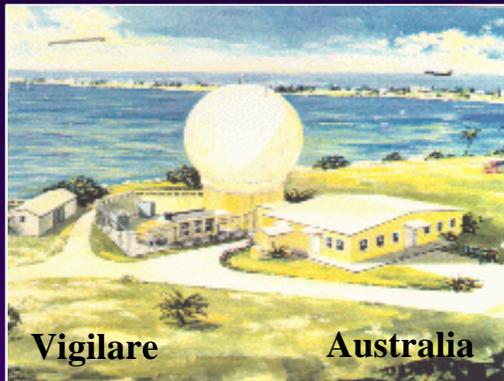


AWACS Air Force

ABL Air Force

Wedgetail Foreign

Nimrod UK



Vigilare Australia



F/A-18 Navy

F-15, C-17 Air Force

AV-8B, V-22 Marines

JSF Future

A "One Company" Affordability Strategy:

- Reduce Flyaway Cost by 50%
- Reduce Development & O&S Costs by 60%

Leveraging:

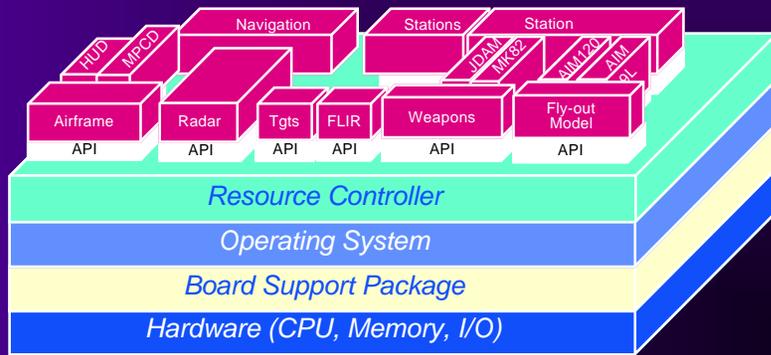
- Commercial Technology Insertion
- Enterprise Product Application
- Process Redesign & Acquisition Reform



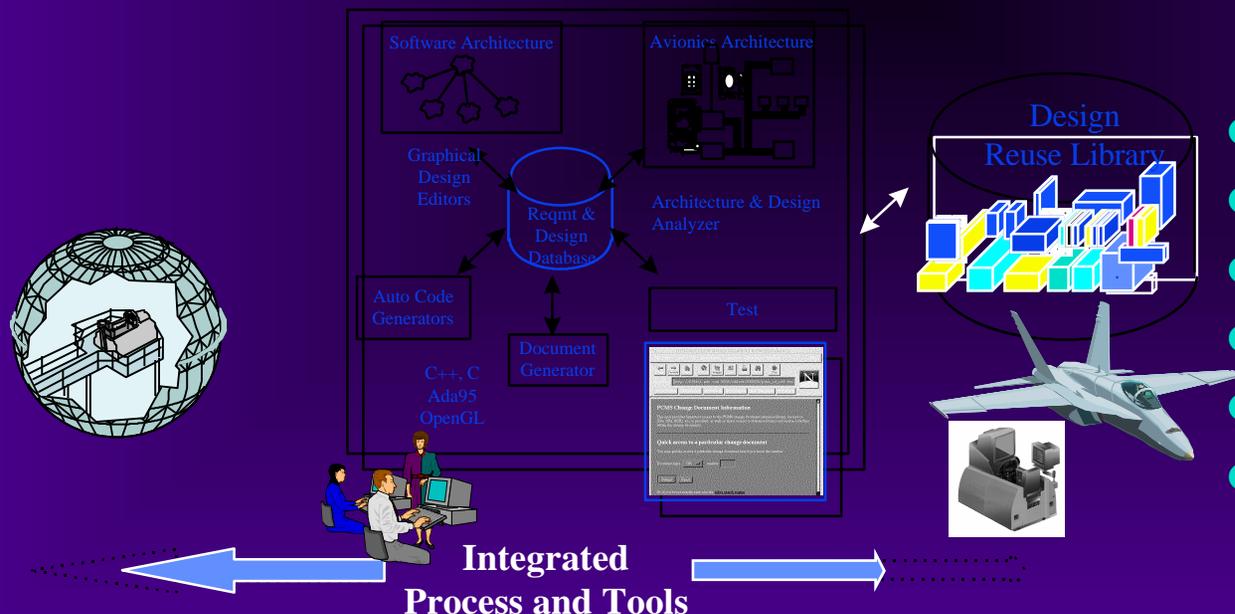
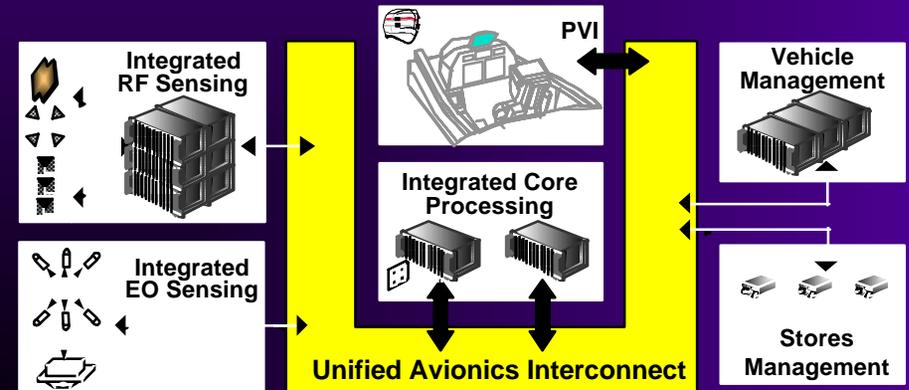
Open Systems Thrust Areas



Common Software Architecture



An Avionics Architecture Strategy



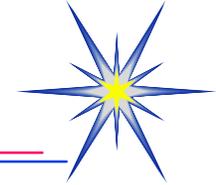
- Enterprise Roadmaps
- Leverage
- Affordability Redesign
- COTS Exploitation
- Strategic Application
- Product Transition

VISION - Affordability Leverage



**An Enterprise Avionics
Affordability Strategy**

The Aging Aircraft Avionics Issue



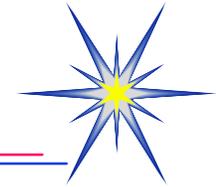
Extended Service Life Coupled with Declining Military Budgets and a Dwindling Supplier Base, Challenges the Effectiveness of Today's Front Line Weapon Systems

- **Parts Obsolescence - 1970/80 Hardware**
- **Unique Avionics Architectures**
 - ❑ Piecemeal Upgrades
 - ❑ Development Cost & Schedule
- **Software Upgrades**
 - ❑ Cost to Maintain
 - ❑ Cost to Upgrade
 - ❑ Verification/ Validation

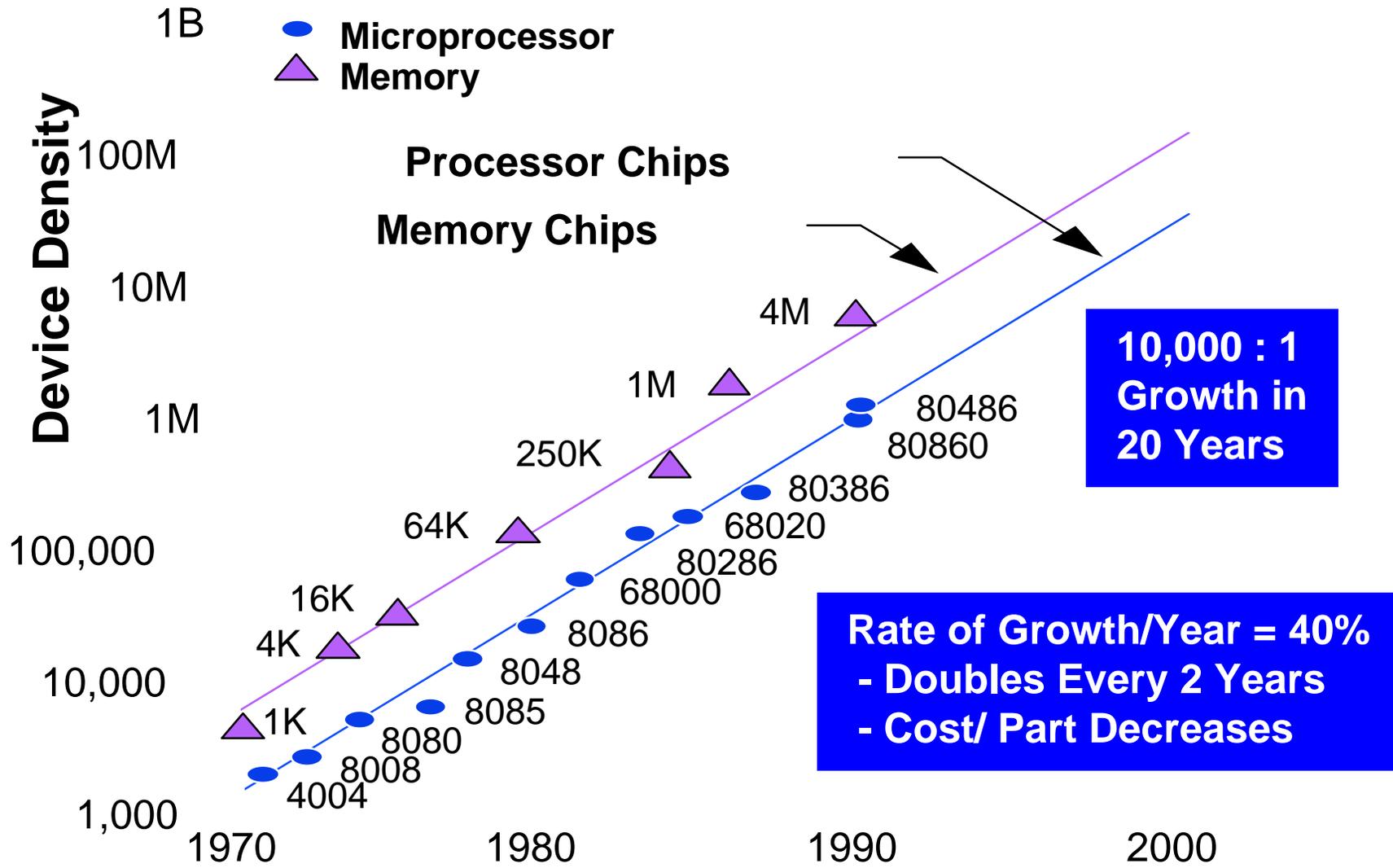


The Challenge: Provide Affordable & Rapid Options to Retaining The Effectiveness of Legacy Systems

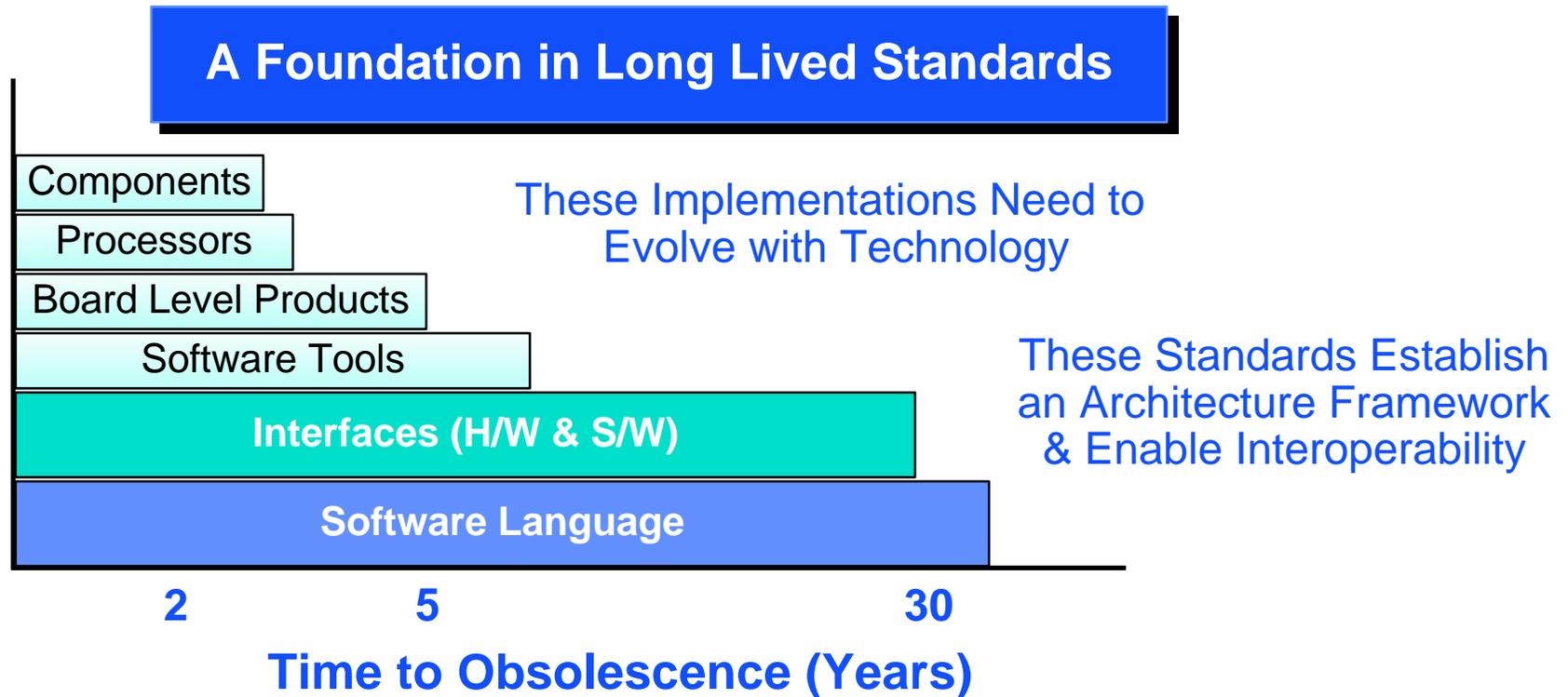
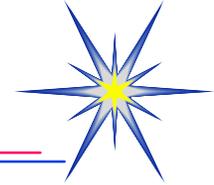
Technology Trends



Technology - The Growth Stock!



An Architectural Framework for Affordability



Source TI Presentation

Open Systems Charter



Define Boeing's Enterprise Strategy for:

- Avionics Systems Affordability
- Open Systems Architectures

And Then...

TRANSITION



Affordability Leadership



- 50% Reduction in Flyaway Costs
 - ❑ COTS Technology Insertion
 - ❑ Streamlined Affordability Processes
 - ❑ Acquisition Reform
 - ❑
- 60% Reduction in Development Costs
 - ❑ Common Building Blocks
 - ❑ Reuse in Hardware & Software Architecture
 - ❑ Leveraged Developments Across Platforms
 - ❑
- 60% Reduction in Operations & Support Costs
 - ❑ Two Level Maintenance of Hardware
 - ❑ Object Oriented Software Design
 - ❑ Improved Diagnostics & Open Architecture

Affordability

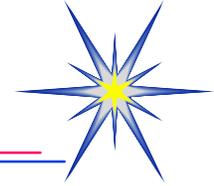
Open System Leadership



- Enterprise Transition Opportunities
 - Program Roadmaps
 - Leveraged Developments
 - Rapid Prototyping
 -
- An Extensible Open System Architecture
 - Module Level Architecture
 - Object Oriented Software Architecture
 - Unified High Bandwidth Networks
 - Commercial Technology Transition
 -
- Advanced Tools & Processes
 - Advanced Algorithms
 - Automatic Code Generation
 - Commercial Software Tools

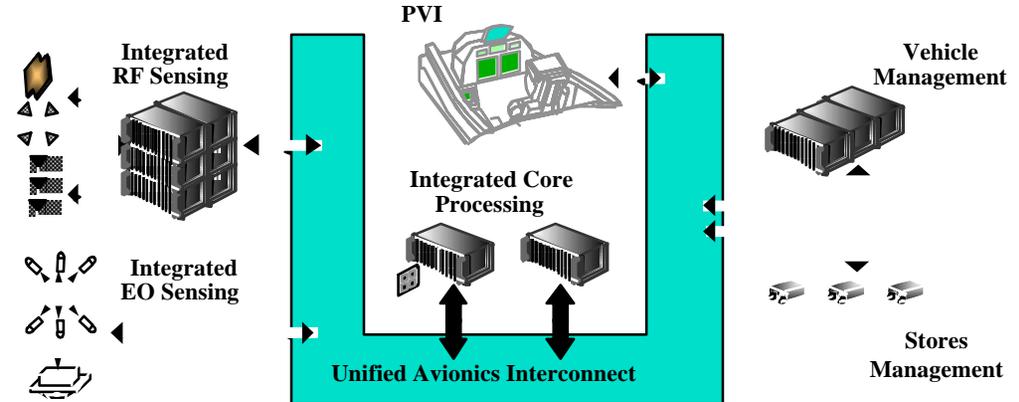
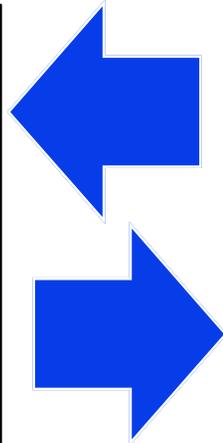
**Open Systems
Architecture**

Program Execution

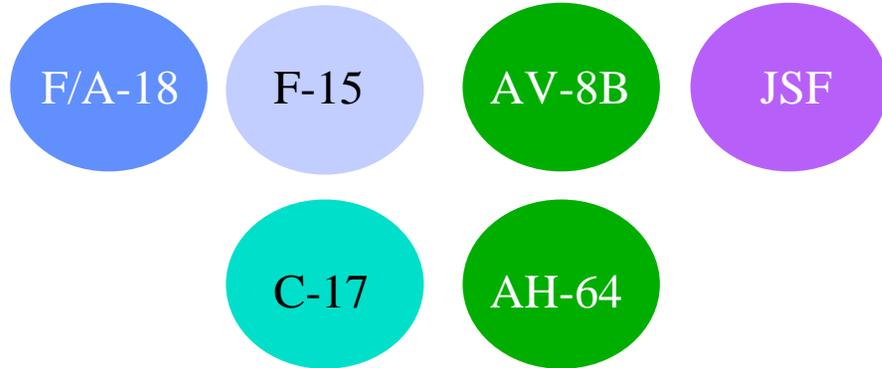


One Enterprise Open Systems Avionics Architecture

**BOLD STROKE
IPTs
Common Elements
Tools & Process**

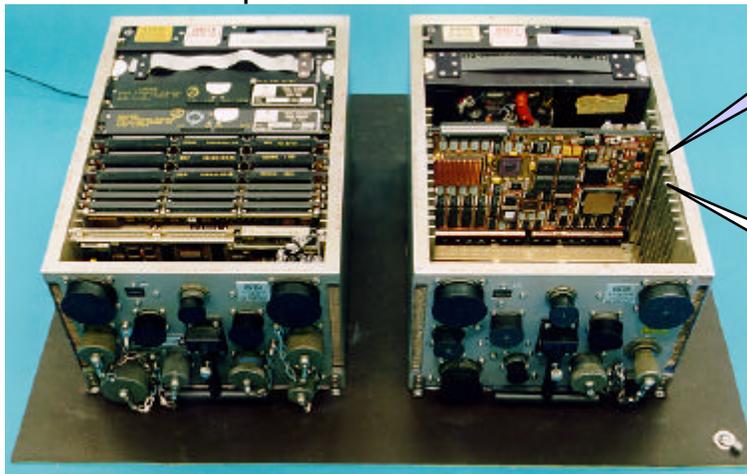
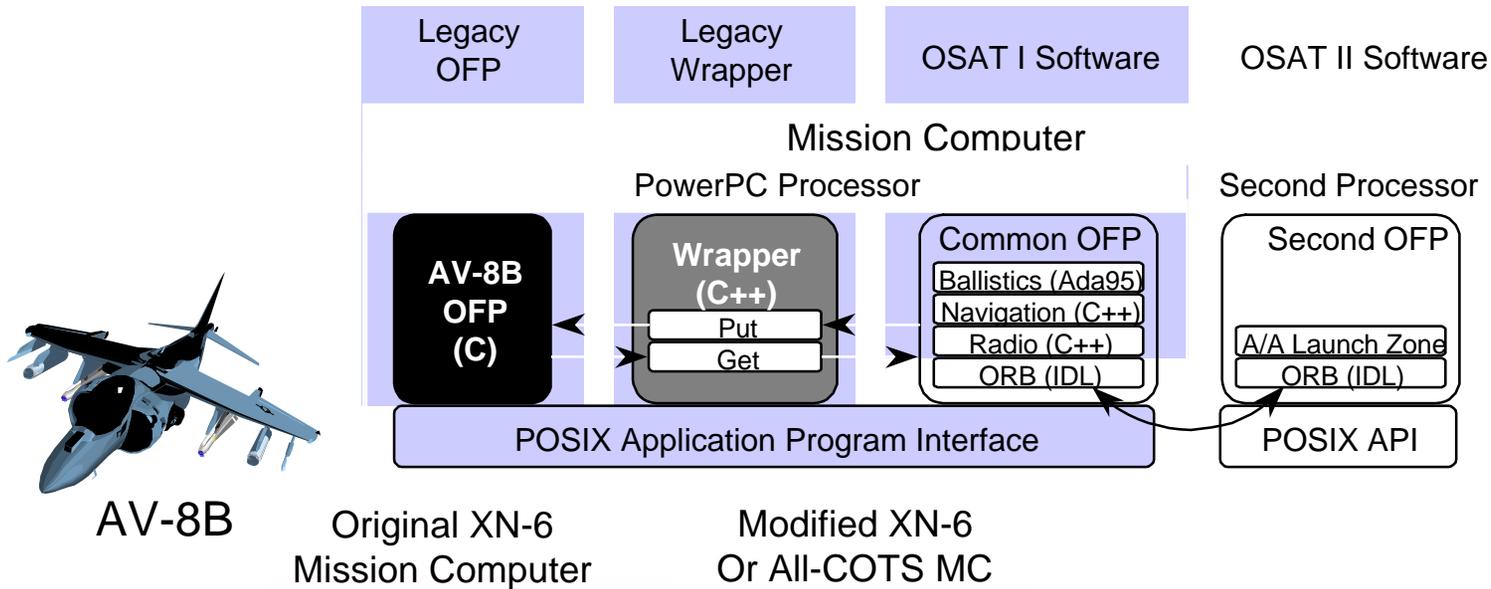
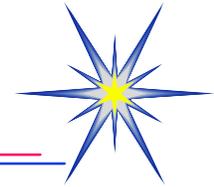


Leveraged Program Development



**Enterprise
Funded Development
Above & Beyond
Program Requirements**

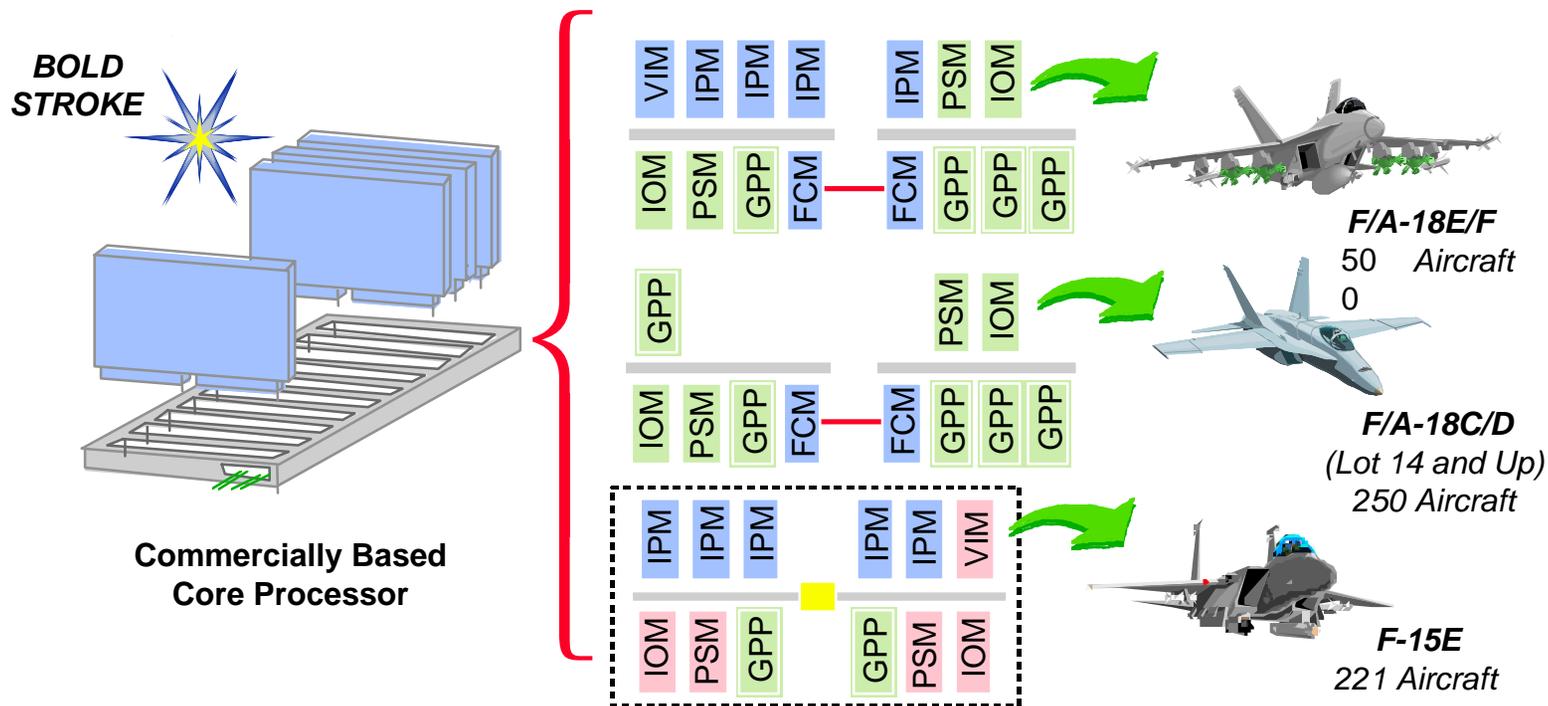
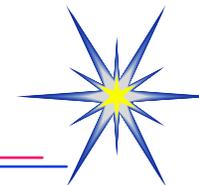
Risk Reduction Demos - Key to Transition Success



1 COTS Module With PowerPC Replaced 8 Original Modules

Add Second COTS Module For OSAT II

Reuse - A Key Open Systems Benefit



GPP = General Purpose Processor
IPM = Image Processor Module
FCM = Fibre Channel Module

IOM = Input / Output Module
VIM = Video Input Module
PSM = Power Supply Module

Legend

- Bold Stroke Module
- F-15 Module
- AV-8B OSCAR Module

A Fundamental Change in the Way We Design, Build, and Field Avionics Systems

● People

- ❑ True IPD Teams
- ❑ Realignment of Responsibilities
- ❑ Risk Sharing

AFFORDABILITY

- 50% Cost Reduction
- Substantial LCC Payoff
- Environment => Cost
- Contain Requirements



● Process

- ❑ Levels of F3I Mgmt
- ❑ New Business Practices
- ❑ System Level Solutions
- ❑ System Support Plan
- ❑ Test & Evaluation

● Technology

- ❑ Real Time Performance
- ❑ Packaging OTS
- ❑ Environment
- ❑ Technology Roll
- ❑ Future Forecast
- ❑ Military is Follower