



Handling Software Challenges

Glenn Willis, JSF Program Office (JPO)

*Systems and Software Technology Conference
18-21 June 2007 – Tampa Bay, FL*



Handling Software Challenges

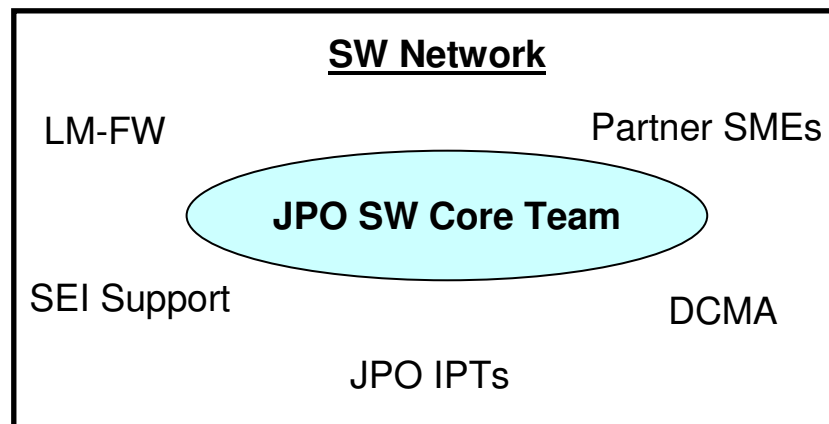
- **JPO Air System Software SDD Staffing**

- **Challenges:**

- JPO not staffed for Software post-contract award
 - Staffing level, available expertise, and reporting level

- **Actions Taken:**

- JPO stood up one person, later developed a small core team and larger Software Network





Handling Software Challenges



- **Interface Management**

- ***Challenges:***

- Sheer number of interfaces ... several orders of magnitude higher than legacy programs
 - Identification, definition, and implementation of interfaces

- ***Actions Taken:***

- Established cross-team interface control working groups
 - Use of a common automated tool across development teams
 - Instituted continuous process and tool improvement initiatives



Handling Software Challenges

- **OTS / Shareware Software Licenses**

- **Challenges:**

- Minimizing development costs and exploiting Open Architecture has led to extensive use of “Freeware” and COTS software
 - Freeware often embedded at low levels within programs, due to casual use in many software development sectors
 - License stipulations associated with many freeware programs

- **Actions Taken:**

- Prime introduced a proactive education program throughout Prime and supplier teams, backed by rigorous testing
 - **Pro-active** investigation of software to identify and characterize licensing issues
 - Prime working closely with JPO to resolve findings



Handling Software Challenges



- **Quality of Software Architecture**

- **Challenges:**

- System Specification included non-functional Architecture requirements to ensure long term, cost-effective sustainability
 - Absence of standards for these requirements and no method of assessing and verifying their compliance

- **Actions Taken:**

- The Prime, JPO, and Software Engineering Institute (SEI) jointly defined 9 quality attributes and method for assessment
 - *Security, Safety, Interoperability, Modifiability, Fault Tolerance, Scalability, Stability, Testability, and Performance*
 - Method executed, product benchmarks have been established
 - Supports JSF Milestone assessments and Open Architecture (OA)/Modular Open Systems Architecture (MOSA) data calls
 - This method, known as **QU**ality **A**ssessment of **S**ystem **A**rchitectures and their **R**equirements (QUASAR), can be applied to other programs



Handling Software Challenges



- **Software Safety Product Evidence**

- **Challenge:**

- The Program did not mandate any safety standards for software, leaving this to the Prime to define

- **Actions Taken:**

- Prime defined internal development standards categorized into Safety Evidence Assurance Levels (covered in subsequent brief)
 - JPO utilizing NAVAIR Software Safety Critical Guidelines to address software safety functional and non functional requirements.
 - Capturing software safety evidence to satisfy the Government's flight certification and flight clearance requirements

Approved for Public Release



***WORKING TO AFFORDABLY MEET THE
REQUIREMENTS OF THE WARFIGHTER***



JSF Panel

- **The presenters today are going to address some key issues that we've faced on the JSF program**
- **These are issues that every large scale development program should expect to face**
- **Large scale development is a hard business, there are many issues to consider and the scope is global**
- **Presenters are going to address state of the art solutions for many of these issues and illustrate some of the JSF successes in dealing with them**



JSF Presenters

- **Tracking Program Wide Software Progress**
- **Implementing F-35 System Architecture using UML**
- **Deploying C++ For Use In International Safety-Critical Applications**
- **Deploying Safety Critical Standards Internationally**
- **Providing Developmental Assurance**
- **Focused Software Quality Improvements**
- **JSF Software Sustainment**



Next Topic



Monday, June 18, 2007, track 2

- **2:40-3:25 – JSF Software Program**
 - *Overview and Status (Branyan/Willis)*
 - *Tracking Program Wide Software Progress (Evers/Willis)*

- **3:35-4:20 – System/Software Design**
 - *Implementing F-35 System Architecture using UML (Clauss)*
 - *Deploying C++ For Use In International Safety-Critical Applications (Carroll)*

- **4:20 – 4:35 – Break**

- **4:35 – 5:20 – JSF Software Safety Process**
 - *Deploying Safety Critical Standards Internationally (Eccles)*
 - *Providing Developmental Assurance (Bridges)*

- **5:30 – 6:15 – Software Quality Improvements /JSF Software Sustainment**
 - *Focused Software Quality Improvements (Robb)*
 - *F-35 Software Life-cycle Planning: Performance-Based Software Sustainment (Novak)*



Acronyms

Acronym	Definition
COTS	Commercial, Off-the-Shelf
DCMA	Defense Contract Management Agency
IPT	Integrated Product Team
JPO	JSF Program Office
JSF	Joint Strike Fighter
LM-FW	Lockheed Martin Aeronautics – Ft. Worth
MOSA	Modular Open Systems Architecture
NAVAIR	Naval Air Systems Command
OA	Open Architecture
OTS	Off the Shelf
QUASAR	QUality Assessment of System Architectures and their Requirements
SDD	Systems Design and Development
SEI	Software Engineering Institute
SME	Subject Matter Expert
UML	Universal Modeling Language