JAWS S3 Panel IV
Building the Analytical Bridge Between
the Warfighter and the Engineer

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Task: Build an analytical bridge between the warfighter and the engineer

- Byproduct: Create synergy (vice tension) between “requirements pull” and “tech push”

Framework: Simulation Based Acquisition

- Examples of ‘bridges’:
  - JSF
  - USAF C2

- Some bridge building tools:
  - AFRL Virtual Testbed
  - JMASS
SBA Operational Concept Illustration
(Digital Information Based Process)

Top Level System Requirements

Distributed Data Repository

Conceptual Development

Functional Design

Physical & Info System (HW/SW) Design

Cost, Schedule Program Mgmt

Distributed Simulation Framework

System Info Repository

Operations, Logistics & Training

T&E

Eng Development & Manufacturing

Extensive Re-use Across Phases and Across Acquisition Programs
Simulation Based Acquisition

- Revamp acquisition process to capitalize on the advances, advantages & potential of digital information technology

- Use shared access to distributed information to:
  - Closely link stakeholders in product development
  - Facilitate iterative, spiral development
  - Facilitate collaborative, concurrent processes, IPPD
  - Create synergy between requirements pull & technology push
Anticipated SBA Impact on Analytical Link

- Better, more consistent models
- More support for development of M&S tools
- Better access to data, authoritative information
- Better synthetic environments
- Earlier access to product information
- Better understanding & definition of requirements
- Better linkage of requirements to performance
- Better understanding of thresholds
- Easier to identify & focus on prime OT&E areas
SBA Analytical Linkage: Examples

- Joint Strike Fighter
- USAF Command & Control
SBA Analytical Linkage Example: JOINT STRIKE FIGHTER

- Delay locking in requirements
  - JSF has used ‘interim requirements’; no ORD until ‘00
- Evolve requirements with an integrated set of simulations
  - Campaign/mission modeling with constructive simulations (95-96)
  - Virtual simulations (w/man-in-the-loop)
  - Interactive digital simulations to evaluate specific functional requirements (97-99)
  - Virtual Strike Warfare Environment exercises (98)
- Provide early weapon system experience for warfighters for conceptual development
- Use SBA analytical construct for cost & operational performance trades, within warfighter CONOPS
SBA Analytical Linkage Example: AF Command & Control

• **ESC SBA initiative:**
  Link requirements M&S tools/data (used by C4ISR operators) with system design & build tools/data (used by C4ISR developers)

• **Intent:**
  – Provide single continuous, traceable flow of data from operational need to system capability
  – Integrate/map CINC C2 requirements with Service baseline system capability
  – Merges Joint C4ISR Architecture & Planning System (JCAPS) and proven model-based system engineering process (Model Reference Technology)
SBA for C2 at ESC: Model Reference Technology

- **MRT Architecture Specification Tool (MAST)**
- **Requirements Analysis Tools**
- **Capacity Planning Tools**
- **Design Simulation Tools**
- **Reverse Engineering Tools**
- **Project Management Tools**
- **Data Base Management Tools**

**Sub Schemas:**
- Activity/Data Model Tools
- Test Tools
- Visualization Tools
Integrated Operational/Systems Architecture Threads
SBA Analytical Tools: Examples

- AFRL Collaborative Enterprise Environment
- JMASS
AFRL Collaborative Environment
Virtual Testbed

AFRL Locations

“The Network is the Simulator”
SBA Analysis Tool: JMASS

Set of tools and services that allow user to build, configure and execute engineering and engagement level simulations

Now a Joint Program
The Essence of JMASS

- **Model Standards**
  - SEI Software Structural Model for Reuse
  - Model Application Programming Interface

- **Simulation Support Environment**
  - Simulation Engine
  - Communications Architecture
  - Visual Development Tools
  - Analysis Tools
  - COTS & Legacy Tool Interface

- **Model Library & Repository**
  - Local Model and Data Library
  - Remote Model Repository
  - Contains DIA-validated threat models

*Yield is common, reusable, interoperable, validated models*
Summary

- Simulation Based Acquisition provides framework to analytically link warfighter to developer, other stakeholders
- SBA approach will emphasize and improve analytical tools, product models, visualization
- SBA will enhance access to critical authoritative information needed for warfighter and developer tradeoff decisions
- Programs are already embracing the SBA construct