Enterprise Integration Using Simulation Based Acquisition

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Objectives

- **The Challenge**
  - **Multi-Sensor Command and Control Constellation**
- **Architectures**
- **Simulation Based Acquisition**
- **Enterprise Integration Case Study**
  - **Link-16 Analysis and Engineering**
- **Joint Synthetic Battlespace**
- **Conclusion**

The Challenge: System Interoperability & Integration

"Integrated and responsive ISR capabilities operating in a collaborative enterprise assuming delivery of timely, relevant information for the NCA and Joint / Combined forces"

Challenge is Getting there!

DoD ISR Vision 21 Operational Concept

Space Net

CONUS Net

Coalition Net

Theater Net

Optical Fiber

Fiber Point of Presence

Joint/Combined F

Source: Intelligence, Surveillance, and Reconnaissance Integrated Capstone Strategic Plan, ASD(C3I), 3 Nov 00

The Multi-Sensor C2 Constellation Approach

SBR

MC2A

Global Hawk

MC2A

Predator

AOC

DCGS

MC2 Constellation

Shooters

- **Simulation Enhanced Acquisition**
- **Technology Enablers**
- **Legacy Systems Transition**

- **Industry Involvement Pivotal**
  - **System of Systems Integrator**
  - **Teaming Required**

Key Enabler for the Global Strike Task Force Concept

Operational Attributes for MC2A

- **Air Force**
  - **MT3C**
  - **BMTC (Cobra Judy)**
  - **DCGS**
  - **MP-RTIP**
  - **Other**
- **National**

- **Other Service**
  - **Army (ACS, FCS)**
  - **Navy (AEA, MMA)**
  - **CG (Deep Water)**
  - **Other**
- **Joint**
- **Coalition**

The challenge is to:
- **Define / refine the operational "trade space"**
- **Deliver a set of "enterprise solutions"**

"Building it right"
--Enterprise Integration Begins at the Architecture View

Operational Architecture
—Warfighter View

Node Approach:
- Ops Framework
- Single Manager
- Capability Based

Systems Architecture—
C2ISR Architect's View

Manage the C2 Enterprise through the nodes.
- Each SPO is responsible for managing their node--AWACS, JSTARS, AOC, etc..
- Integrated Command & Control SPO manages node integration for interoperability.

What is SBA?

- **A <u>process</u> that enables effective systems integration:**
    - **Enterprise Management**
    - **Developmental Planning**
    - **Capabilities/Effects Based Requirements Development**
- **An initiative within AFMC to provide with integrated simulations, information technologies and processes to:**
    - **Place the acquisition activity in the warfighter environment**
    - **Reduce cost & time developing & sustaining systems**
    - **Support life cycle product improvement**
    - **Enable information sharing**
    - **Enhance product quality**

A Better Product to the Warfighter – Faster!

How Should SBA Be Applied?

- ■ **Throughout Each System's Life Cycle**
  - ▪ **Warfighter/Developer Collaboration—Better Requirements**
  - ▪ **Improved Insight to Operational Trades—Supporting CAIV**
  - ▪ **Consistent Environment for Design & Test—Reducing Risk**
- ■ **Across All Systems**
  - ▪ **Real System Interfaces—Ensuring Interoperability**
  - ▪ **Family of Systems Considerations—Prioritized Upgrades**

ATD/ACTDs

Sensor Craft

UCAV

Multi-Theater Targeting & Tracking Capability

Multi-Sensor C2 Aircraft

A - Concept Development	B - System Development	C - Production/ Deployment	Support

Continuous communication with users

Early & continuous testing

MNS | ORD | Proc/Ops & Maint

BLOCK II

BLOCK III

REQUIREMENTS

JSF

Global Hawk

AOC

JSTARS

F15E

U2

AWACS

RJ

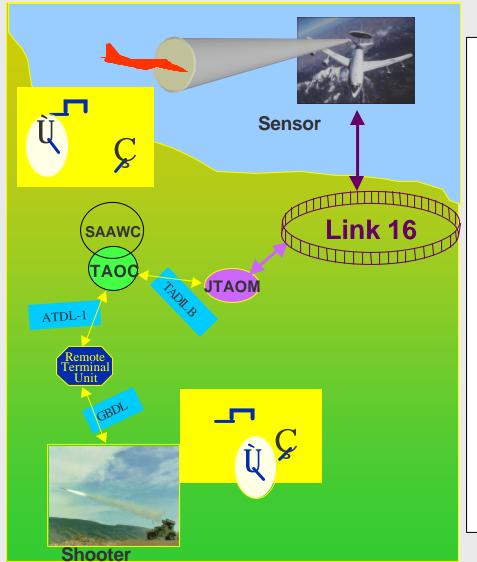**CONOPS/Requirements**   **System Design/Integration**   **DT/OT**   **P3I Upgrades- Sustainment**

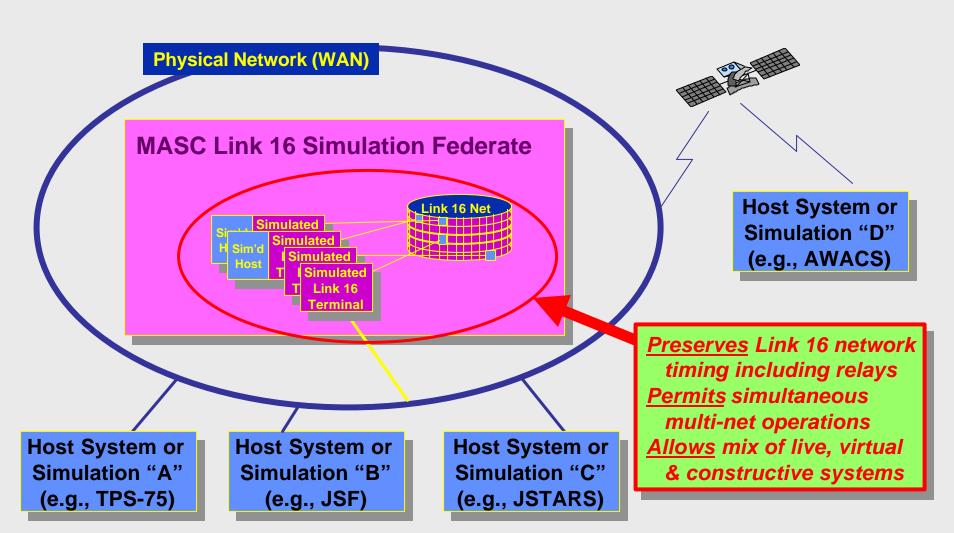# Air Picture on Link 16 -- Today's Reality

- **Erratic tracking**
- **Dual/multiple track designations**
- **Misidentifications**
- **Track ID conflicts**
- **Frequent track # changes**
- **Frequent track # swaps**
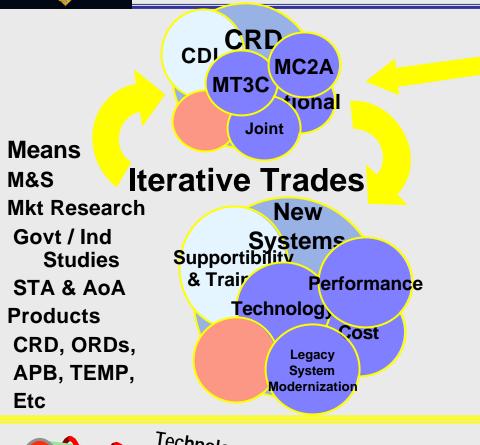- **Reliance on voice deconfliction**
- **Operator overload**

JSF Link 16 M&S Architecture
(Remote Host-to-Terminal Interface)

Physical Network (WAN)

MASC Link 16 Simulation Federate

Link 16 Net

Sim'd Host
Simulated
Simulated
Simulated
Simulated Link 16 Terminal

Host System or Simulation "D" (e.g., AWACS)

Host System or Simulation "A" (e.g., TPS-75)

Host System or Simulation "B" (e.g., JSF)

Host System or Simulation "C" (e.g., JSTARS)

__Preserves__ Link 16 network timing including relays
__Permits__ simultaneous multi-net operations
__Allows__ mix of live, virtual & constructive systems

Enterprise Integration How to Proceed

CRD

CDL
MT3C
MC2A
tional
Joint

Iterative Trades

Means
M&S
Mkt Research
Govt / Ind Studies
STA & AoA
Products
CRD, ORDs, APB, TEMP, Etc

New Systems
Supportibility & Train
Technology
Performance
Cost
Legacy System Modernization

MNS

US Air Force

CONOPs

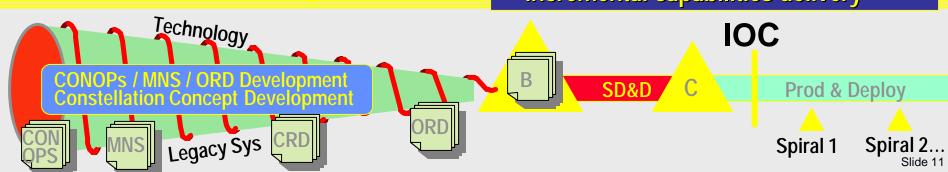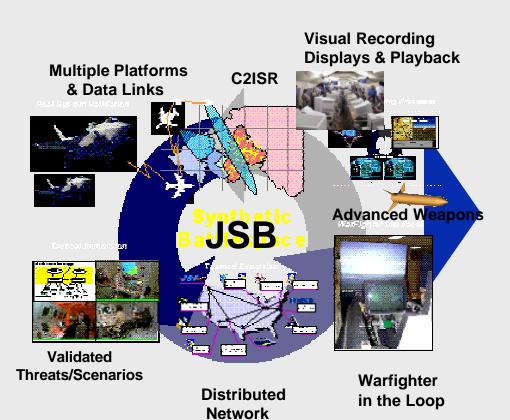US Air Force

Enterprise Acquisition
- Warfighter needs initiated w/CONOPs
- Provide integrated system of systems
- Driven by req'd operational effects
- Requirements refined iteratively
- Non-traditional acquisition strategy
- Flexible DoD 5000 framework
- Incremental capabilities delivery

Technology

IOC

CONOPs / MNS / ORD Development
Constellation Concept Development

CON OPS
MNS
Legacy Sys
CRD
ORD

B
SD&D
C
Prod & Deploy

Spiral 1
Spiral 2…

Joint Synthetic Battlespace
A Key Element of SBA

Multiple Platforms & Data Links

C2ISR

Visual Recording Displays & Playback

Synthetic Battlespace

JSB

Advanced Weapons

Validated Threats/Scenarios

Distributed Network

Warfighter in the Loop

WHY?

Tactical and Analytical Realism

- **WarFighter/Developer Collaboration**
- **Real System Interfaces (HWIL/SWIL)**
- **Improved Insight to Operational Trades**
- **Demonstrate Large Scale Exercises**
- **Interoperability Testing**
- **Family of Systems approach to System Effectiveness**
- **True Industry/Government Partnership**
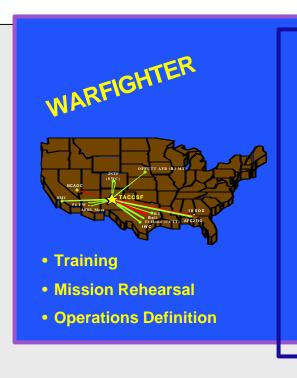
Levels Playing Field Across the Industry-Government Enterprise

Joint Synthetic Battlespace
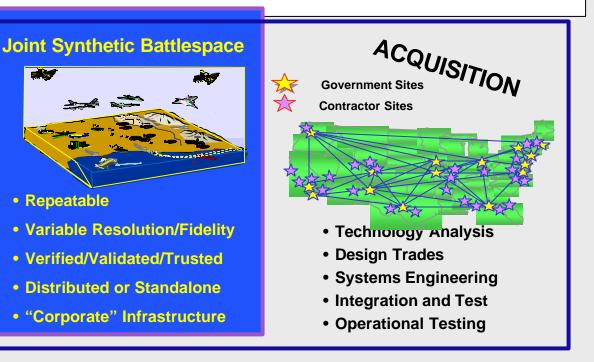## Enabling Tool for System Acquisition

- ■ **Immerses the Acquirer in the Warfighter's Environment**

    Quicker Fielding – Avoid Redesign/Mistakes

    Cost Avoidance – Total Systems Savings

    Improved Product – Better Design/Operator Interfaces

WARFIGHTER

Joint Synthetic Battlespace

ACQUISITION

★ Government Sites
★ Contractor Sites

- • **Training**
- • **Mission Rehearsal**
- • **Operations Definition**

- • **Repeatable**
- • **Variable Resolution/Fidelity**
- • **Verified/Validated/Trusted**
- • **Distributed or Standalone**
- • **"Corporate" Infrastructure**

- • **Technology Analysis**
- • **Design Trades**
- • **Systems Engineering**
- • **Integration and Test**
- • **Operational Testing**

Conclusion

- **The Challenge: Managing A Complex System of Systems and ensuring their Interoperability and Integration**

- **The Solution: Enterprise Integration using Principles of Simulation Based Acquisition**
  - **With a firm foundation of the Architectural Perspective grounded in M&S**

**Enterprise Integration:
Achievable Now & Necessary for the Future**