Joint Cruise Missile Defense Joint Test and Evaluation

JCMD JT&E

JCMD JIADS
Modeling and Simulation
“Operation Open Passage”

JCMD JT&E Purpose and Objectives

Purpose:

Characterize the current and near-term effectiveness of a typical JIADS in countering the cruise missile threat

Objectives:

- Provide a timely definitive assessment of CMD capability
  - **Assess current and evolving TTP and CONOPS**
  - **Provide recommendations for improvements**
- Develop a joint test methodology for cruise missile defense
  - **Leverage existing, operationally realistic exercises**
  - **Establish simulation capability for assessing CMD**

JCMD Focus


E3 AWACS


E-2 HAWKEYE


F-14


F-18


F-16


F-15


CRC/TPS-75

JIADS


TAOC/TPS-59

Land Attack Cruise Missile

THREAT

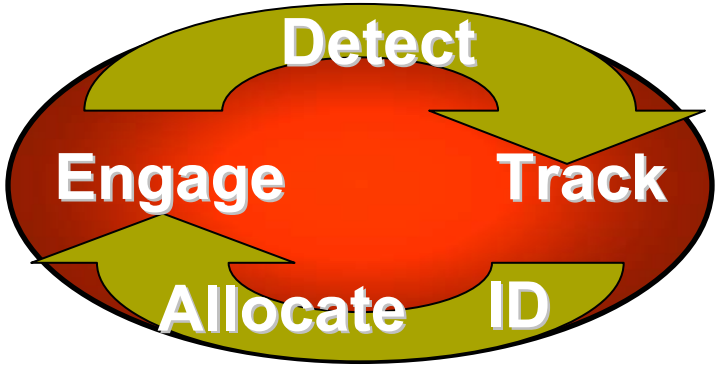

SENTINEL


AEGIS


AVENGER


PATRIOT


LINEBACKER

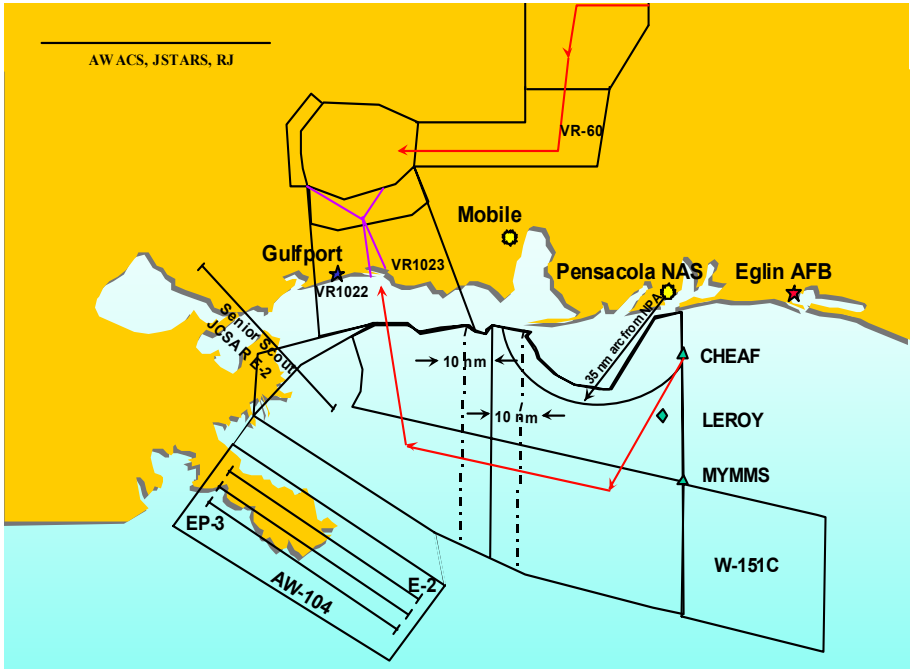


Evaluation Approach

Integrates Field and Simulation Testing

Field Test (FT)

Mini Test	ASCIET	Mar 00
FT-1	JCIET	Apr 02
FT-2	CJTFEX 04-2	Jun 04



ASCIET All Services Combat Identification Evaluation Team

JCIET Joint Combat Identification Evaluation Team

CJTFEX Combined Joint Task Force Exercise

Simulation Test (ST)

ST-1	VWC	Sep 2002*
ST-2	VWC	Mar 2004**

* Included 2 distributed sites

** Included 8 distributed sites

VWC Virtual Warfare Center

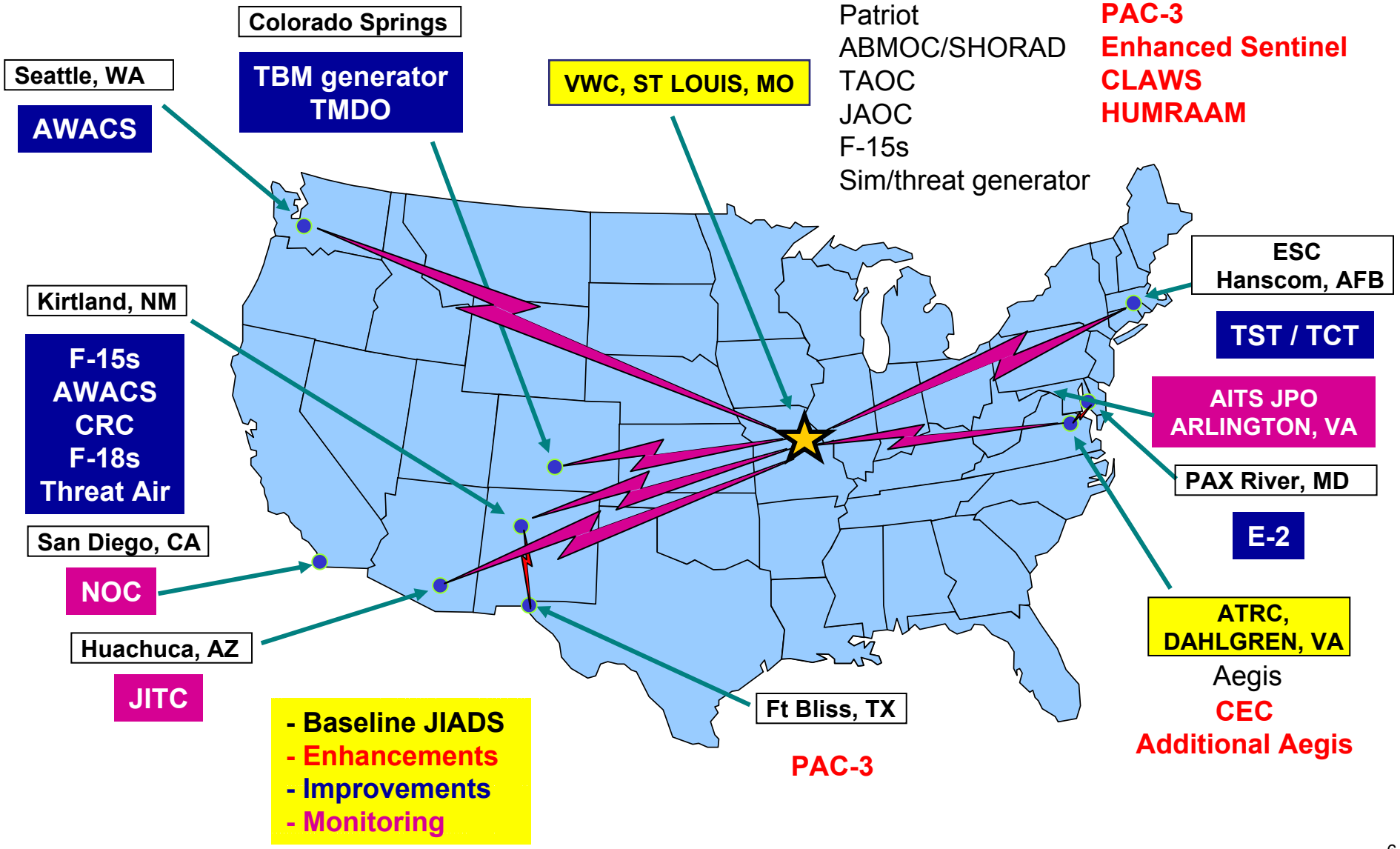
M&S Objectives

Expand JIADS CMD assessment beyond field test environment

- **Evaluate impacts to JIADS CMD effectiveness**
  - Changes to threat density and composition
  - Changes to CONOPS and TTP
  - Alternative JIADS configurations

- **Provide methodology and infrastructure to assess effectiveness of future JIADS systems/procedures against cruise missiles, TBMs, and other airborne threats**
  - Variable threats
  - O-Plan based scenario
  - Comprehensive blue force structure

ST-2 JDEP/NDEP Architecture



Simulation Test-2
Operation Open Passage II

JCMD prepared for ST as a joint military operation

- Focus was on the continued evaluation of JIADS CMD capability
- ST event implemented an Operator-in-the-Loop distributed simulated JIADS
- Qualified operators from the operational community manned the individual Service systems and staffed the BM positions
- JCMD conducted a series of air defense planning conferences leading to Operation Open Passage
- Encompassed CMD mission tasks from defense design through prosecution of the CM threat

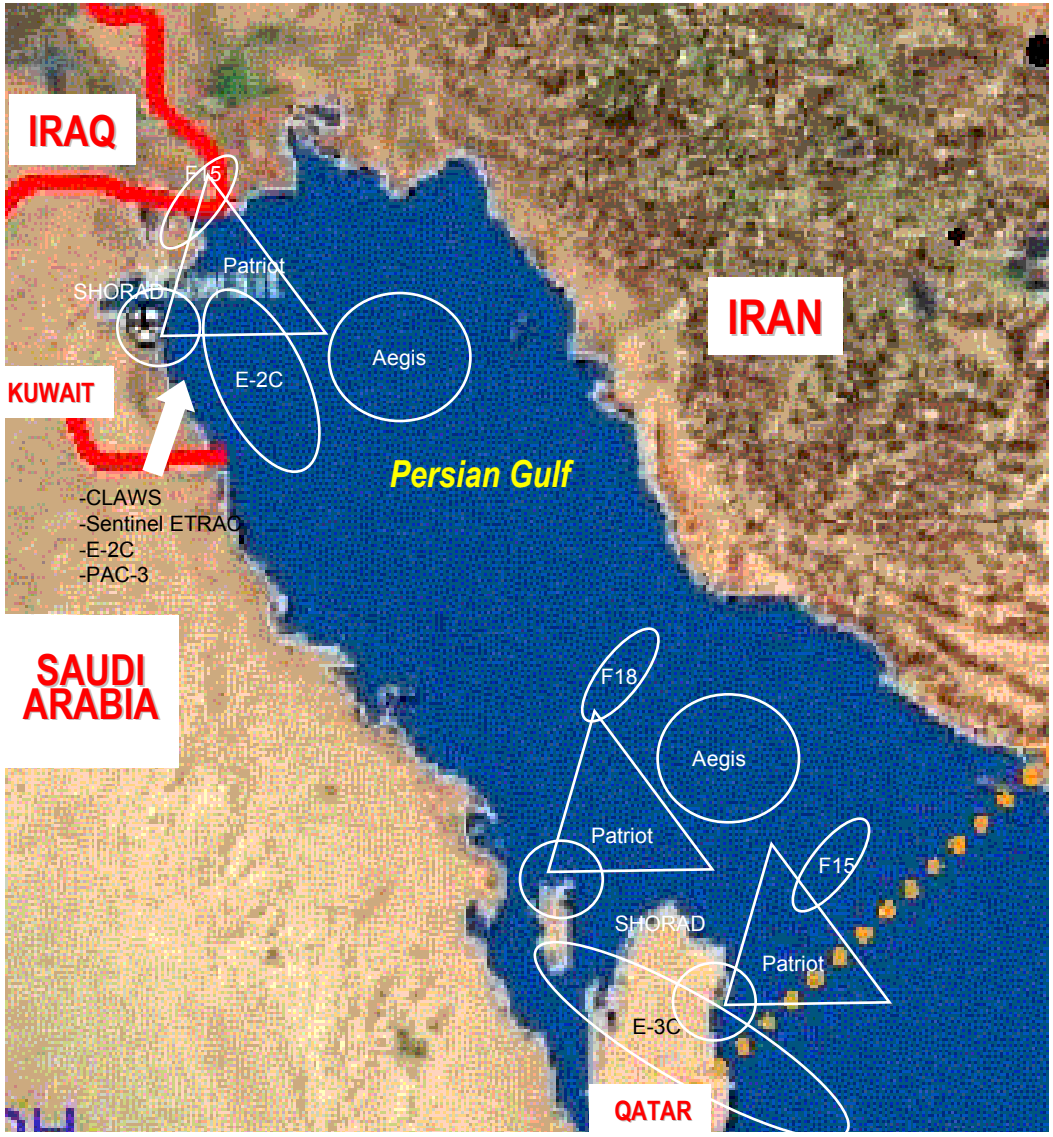
Implemented Area Air Defense Plan, asset locations, C2 Relationships/ Duties, Engagement Procedures, MEZ / FEZ / JEZ, ACMs, required reports, Air Tasking Order / Airspace Control Order, SPINS, OPTASKLINK

Planning Conferences

- **3 Conferences Planned for each ST**
  - Initial ~ 1 year prior
  - Mid ~ 6-8 months prior
  - Final ~ 2-3 months prior

- **Purpose**
  - Mission Analysis and Defense design
  - CONOPS and TTP definitions
  - Detailed operator input for simulation planning
  - Simulation Validation
  - Integration testing

ST-2 Scenario



- Bahrain area similar to ST-1
- JIADS enhancements in Kuwait area

RED THREAT

Red missile boats (ASCMs only)

Red fighters

- MIG-29
- SU-24
- F-4E
- F-5/F-7

Red SAMs

Small scale Red helo attacks

Semi-coordinated attacks

BLUE ASSETS

Blue strike fighters / RTF aircraft

Blue CMs

(Tomahawks) possible

Blue UAVs will play

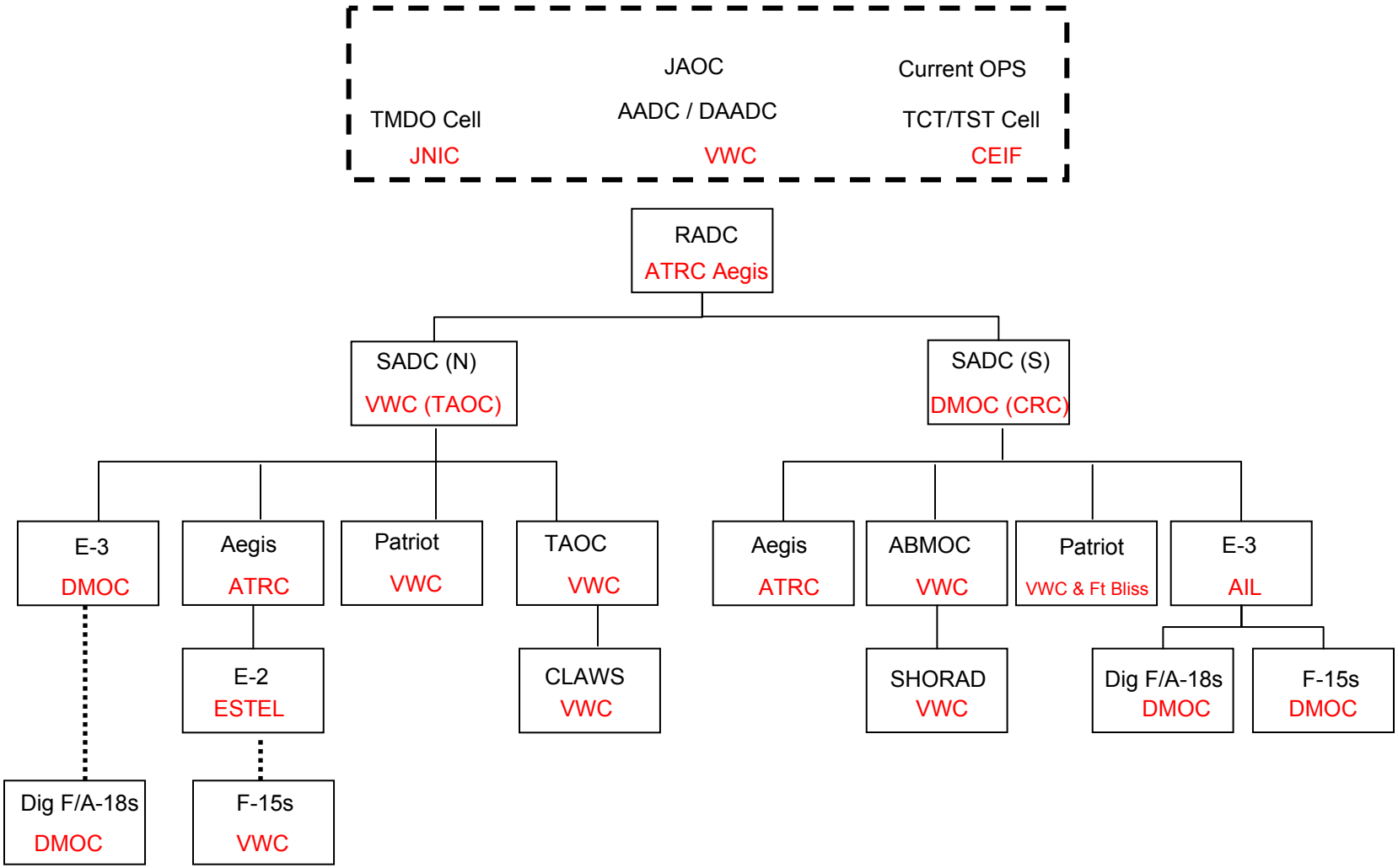
Additional Blue ships,

e.g., minesweepers & frigates

Other neutral ships,

e.g., cargo & oil tankers

ST-2 C2 Architecture



JIADS Simulation Features

- Typical U.S. sensors, shooters, BMC2 systems comprising a JIADS with Link-16 connectivity implemented via Simple-J
- Robust OPFOR providing integrated air and missile defense environment
- 16 Digital Voice Channels
- 300 km lane with 300 high-fidelity air bodies, 2 AORs
- Out of window visuals
- Terrain masking
- White Cell comms at sites to enhance realism - Coordinated Use of Electronic Support, Digi Blue Fighter Coordination, Intel injects, Navy Queries and Warning
- Mission briefs/debriefs via VTC – Events of Interest captured for coordinated After Action Review
- Exportable JIADS and system-level data recording and playback

Testing and Training Venues

- **A live venue does not currently exist that allows LACM testing and training against an operationally representative JIADS**
  - Complex system of systems – net centric operations
  - Air and Missile Defense Joint Tactical Task testing, training, and experimentation
- **Simulation events can complement live venues to overcome some deficiencies**
  - ST-2 provided 1055 cruise missile sorties without real-world airspace restrictions
  - Simulation events using Operator-in-the-Loop and Hardware-in-the-Loop are effective venues for testing and training the joint Battle Management TTPs and CONOPS required to achieve interoperability

For More Information
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JCMD Lessons Learned (1 of 9)

- **Administrative issues were more painful than the technical problems**
  - 8 Operator Nodes, 2 Monitoring Nodes
    - **Security Accreditation Packages**
      - Network Drawings
      - PL 1 vs PL 2
      - LINUX waiver
      - ATC/ATO
      - DAA/DSS Approval
    - **MOA**
    - **POA&M**
    - **Test Plans**
    - **Configuration Management**
- **Administrative issues are crucial to program success**
  - Require early and continuous monitoring
  - May warrant dedicated sub working group for security

JCMD Lessons Learned (2 of 9)

- **JCMD timeline caused network "reverse engineering"**
  - Success of ST-1 generated interest from Services and sites to participate in ST-2
  - Funding not available for expanded architecture causing uncertainty of nodes, configurations, and participants
  - Resulted in some site integration issues being worked during test periods
- **Would not have been successful without the hard work and dedication of everyone**
  - JITC, IATS JPO, NOC
  - Participant sites – VWC, ATRC, DMOC, JNIC, ESTEL, CEIF, AIL, Ft Bliss

JCMD Lessons Learned (3 of 9)

- **Operational testing/training in a distributed Joint simulation environment drives the requirement for high fidelity VTC capability**
  - Mission debriefings, events of interest, and after action reviews (AARs) provide critical test data
  - JCMD current configuration includes equipment available at the various nodes – not a formally planned and procured capability
  - Hardware and software incompatibilities
- **Workaround is not ideal, but should suffice**
  - JCMD will push .avi files to remote sites
  - Sites will replay files on local computers and start and stop on verbal direction from JCMD during AARs
  - Sites will follow JCMD-defined VTC procedures to ensure orderly discussion and coordination
  - JCMD records all VTC sessions for replay and analysis

JCMD Lessons Learned (4 of 9)

- Proof of concept for portable JDEP node - Ft Bliss Warfighting Center
  - Provided required capability
  - Accomplished very quickly
  - Less expensive than full JDEP installation, but for single or short term event participation
- JITC/AITS JPO success story
- This capability greatly benefits the JCMD JT&E

JCMD Lessons Learned (5 of 9)

- **Communication**
  - Network integration and troubleshooting requires good 2-way communication
    - **Not 5, 7, 9-way communication**
    - **Test manager must clearly communicate issues and priorities**
    - **JITC/IATS JPO must respond with status and work plan**
  - JITC and JPO sent personnel to VWC during JCMD critical events which benefited all organization
    - **Allowed engineers to understand an operational test and training environment**
    - **Allowed JCMD easier access to technical expertise**

JCMD Lessons Learned (6 of 9)

- **JDEP Education**
  - The smarter the test organization, the smaller the frustration level
    - **JCMD and nodes felt some integration issues took much too long**
      - VLANS, IPs, NSAPs, ASTi programming
      - STU phone access
        - » All sites did not initially provide, which hindered problem resolution
    - **Various equipment issues**
      - Number of MAC addresses allowed, routers, switches, encryption, Verizon P-3 card, power supply, Sphere phone hub failures, loopback problem, FASTLANE battery
  - Greater understanding in the planning phase would allow test organization to mitigate some areas of risk

JCMD Lessons Learned (7 of 9)

- **Application Level Integration**
  - TIMs critical to understand capabilities and limitations
  - Stable network required before the simulation integration issues can be addressed
  - Integration in a different environment and scenario allowed discovery of simulation problems and subsequent fixes
    - **High fidelity vs Robustness**
    - **Operator face validation**
    - **Entity flight path and position/orientation data**
  - DIS
    - **Enumerations**
    - **Kill and detonate PDUs**
    - **Signal and emitter PDUs**
  - Bandwidth and Latency

JCMD Lessons Learned (8 of 9)

- **DIS vs HLA**
  - JCMD made the right decision to implement the OITL simulated JIADS in a DIS environment
    - **Test milestones could not be changed to provide longer timeline**
    - **No funding (or time) for legacy simulation conversions**
    - **Gateway implementation of HLA too risky compared to amount of simulation integration issues**
    - **RTIs could not support real time operation for number of bodies and update rates in a high threat air environment**
  - JITC initiated a parallel study with JCMD ST-2
    - **Model ST-2 environment to determine HLA implementation impact**
    - **JCMD provided updated data to JITC at the FPC**

JCMD Lessons Learned (9 of 9)

- **Network Capabilities Roadmap**
  - Large number of networks/architectures and number is increasing
    - **Is there oversight and a roadmap?**
    - **Will networks be interoperable?**
    - **Where does a user go to gain understanding of current capability?**
    - **Are networks being designed to fill gaps in current capability?**
    - **Redundancy may be necessary for scheduling requirements, but is this conscious planning underway?**
  - No clear picture emerging from a user perspective

Node Status as of 1700 (Central)

16 Jan 04

Site	VTC	Sphere	Conf Sphere	DIS	Simple J	ASTi	CEC
VWC	X	X	X	X	X	X	N/A
ATRC	X	X	X	X	X	X	X
ESTEL	X	X	X	X	X	X	X
JNIC	X	X	X	X	N/A	X	N/A
DMOC	X	X	X	X	X	X	N/A
AIL	X	X	X	X	X	X	N/A
CEIF	X	X	X	X	X	X	N/A
Ft Bliss	X	X	X	X	X	X	N/A
JITC	X	X	X	N/A	N/A	X	N/A
Navy NOC	N/A	X	X	N/A	N/A	N/A	N/A

Key

X Validated

↑ Operational – not validated

↓ Down

N/A Not Applicable