Joint Mission Environment Test Capability (JMETC)
Improving Distributed Test Capabilities

NDIA Annual T&E Conference

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Program Manager
March 16, 2011
Agenda

• TRMC
• Distributed Testing
• What is JMETC?
• JMETC Testing Successes
• JMETC Sites
• JMETC Customers and Events
• JMETC Users Group
• Summary
Relationship within TRMC
Synergy through Aligned Investment

Quadrennial Defense Review
Strategic Planning Guidance

DoD Strategic Plan
for T&E Resources

Service T&E/S&T
Working Groups

Service T&E Needs and
Solutions Process

TRMC Joint
Investment Programs

Risk mitigation needs
Technology shortfalls

Risk mitigation solutions
Advanced development

Requirements
Capabilities

6.3

Service Improvement
& Modernization/
Programs

Acquisition Programs /
Advanced Concept
Technology Demonstrations

T&E Multi-Service /
Agency Capabilities

DoD Corporate
Distributed Test
Capability

6.4

6.5
What is Distributed Testing?

A process, preferably persistent and continuous, for linking various geographically separated Live, Virtual, and Constructive sites and capabilities together in a distributed environment, for use across the acquisition life cycle, to support and conduct the Test and Evaluation (T&E) of a system or systems-of-systems.

GOAL: Near Real-Time Test-Fix-Test
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A new way of thinking for many in the Test and Evaluation enterprise
Distributed Testing Impacts

• Distributed Testing has already demonstrated:
  • Time savings, risk reduction, cost savings
  • Efficiencies across the development and T&E process
    • Early identification of issues
    • Move data—not people
    • Near real-time Test-Fix-Test

• Distributed Testing, when fully implemented also:
  • Provides for agile, persistent T&E
  • Supports early integration of DT and OT
  • Gives SME’s an “Intensive Lab” and connective relationship with other entities in the systems-of-systems environment that they wouldn’t have otherwise.
Why Consider Distributed Test?

• Do you have data exchange requirements within your system or within a system-of-systems (SoS)?

• Do you have a requirement to address SoS interoperability issues early in the acquisition process?

• Do you have adequate numbers of systems under test for live testing?

• Do you have adequate numbers of “supporting cast” (supporting systems, C4ISR assets, etc.) for live testing?

• Do you have adequate threat types, fidelity and density in realistic numbers at realistic ranges for live testing?
When Is Distributed Test Appropriate?

- **Examples Where Appropriate**
  - Interoperability testing
    - C4 Interoperability with higher, lower, and adjacent Joint force organizations
  - Data exchange in early DT testing
    - Interaction between sub-systems (latency may be a consideration)
    - Interaction between systems in a realistic environment
      - Provide the most realistic environment possible from concept exploration through Follow-On T&E
  - When it is too costly to bring all the player systems together on a single range
  - Gain or increase operational relevance
    - Virtual and Constructive capabilities to supplement live systems (e.g., red forces, white forces, terrain, immobile test assets)

- **Examples Where Inappropriate**
  - System performance tests that do not include other systems/subsystems
  - Reliability testing

Reduces Cost, Risk, and Time
Distributed Testing Challenges

Not unique to JMETC, but we are working:

• Classification
  – Multi-level security issue to peer to networks of higher classification levels
  – Solution
    • Short Term: Create separate enclaves for each level
      – Time and dollars issue to operate at higher levels of classification
    • Long Term: Develop an enterprise solution
      – Current CTEIP Project

• DOD Information Assurance Certification and Accreditation Process
  – Information Assurance Requirements for higher levels of classification
    • Time and dollars issue
  – DIACAP Tiger Team
    • Common lexicon and reciprocal acceptance
    • RDT&E Community won a mechanism for their voice to be heard by the policy makers
      • TRMC is now a non-voting member of the DIACAP Technical Advisory Group (TAG), where next-generation policy is being developed
The JMETC Mission

JMETC provides the *persistent and robust infrastructure (network, integration software, tools, reuse repository)* and *technical expertise* to integrate live, virtual, and constructive systems for test and evaluation in a Joint Systems-of-Systems environment.
What is JMETC?

- DoD enterprise approach for linking distributed facilities currently being used by over 60 test facilities
- A core, reusable, and easily reconfigurable infrastructure
- Consists of the following products:
  - Persistent connectivity
  - Middleware
  - Standard interface definitions and software algorithms
  - Distributed test support tools
  - Data management solutions
  - Reuse repository
- Provides customer support team for JMETC products and distributed Live, Virtual & Constructive DT and OT
JMETC Enabled
Distributed Testing

Joint Operational Scenarios

Systems Under Test

Integrated Test Resources

Virtual Prototype
- TENA Standard Interface Definitions
- TENA Common Middleware

Hardware in the Loop Lab
- TENA Standard Interface Definitions
- TENA Common Middleware

Installed Systems Test Facility
- TENA Standard Interface Definitions
- TENA Common Middleware

Range
- TENA Standard Interface Definitions
- TENA Common Middleware

Environment Generator
- TENA Standard Interface Definitions
- TENA Common Middleware

Threat Systems
- TENA Standard Interface Definitions
- TENA Common Middleware

JMETC Network on SDREN

Reuse Repository

Distributed Test Support Tools

Data Management Solutions

JMETC Infrastructure
JMETC Connectivity

- Functional Sites: 60
- New Sites Planned: 9
- Connection Points to Other Networks: 4

- Dedicated, trusted connectivity on SDREN (part of the GIG)
- Encrypted for Secret – System High
- DISA-registered IP address space
- Active monitoring of network performance
- Capable of supporting multiple simultaneous test events
**JMETC Allows You to “Test Early and Test Often” Across the Acquisition Life Cycle**

- **Pre-Systems Acquisition**
  - Concept & Tech Development
  - Component Advanced Development
  - Concept Exploration
- **Systems Acquisition**
  - System Integration
  - LRIP
  - Full-Rate Production & Deployment
- **Sustainment**
  - Operations & Support

**OC**

- Outline Distributed Testing requirements in the TEMP
- A
- B
- C

**Enables early verification that systems work stand alone and in a Joint Environment**

**Helps find problems early in acquisition – when they are less costly to fix**

**Support to Acquisition Programs with the expertise to integrate distributed test facilities**

**JMETC enables testing across the acquisition life cycle**

**JMETC can potentially reduce test time and cost**

**By Providing**

- Readily-available, persistent connectivity with standing network security agreements
- Common integration software for linking sites
- Accredited test tools for distributed testing
## FY10 JMETC Events

<table>
<thead>
<tr>
<th>Customer</th>
<th>Event</th>
<th>Record Event Dates*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Force</td>
<td>JEFX 10-1/Spirit Ice (B2 Data Link Test)</td>
<td>October – November 2009</td>
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<tr>
<td>Navy</td>
<td>BAMS LVC DE</td>
<td>October – December 2009</td>
</tr>
<tr>
<td>Air Force</td>
<td>Battlefield Airborne Comm. Node (BACN) JUON (DT/OT)</td>
<td>November 2009 to September 2010</td>
</tr>
<tr>
<td>Air Force</td>
<td>Agile Fire 10-2</td>
<td>January 2010</td>
</tr>
<tr>
<td>Air Force</td>
<td>JEFX 10-2/3</td>
<td>February/April 2010</td>
</tr>
<tr>
<td>Joint</td>
<td>Joint Surface Warfare JCTD</td>
<td>February to September 2010</td>
</tr>
<tr>
<td>JS J8/JIAMDO</td>
<td>Joint Sensor Integration</td>
<td>April to September 2010</td>
</tr>
<tr>
<td>Air Force</td>
<td>B1-B Fully Integrated Data Link Testing</td>
<td>April 2010</td>
</tr>
<tr>
<td>JFCOM J84/89 (TEST WEEK)</td>
<td>JCAS Distributed Test</td>
<td>June 2010</td>
</tr>
<tr>
<td>JIAMDO (Navy Lead)</td>
<td>Correlation/Decorrelation Interoperability Test (C/DIT) Integration Events (Continuous)</td>
<td>July to September 2010</td>
</tr>
<tr>
<td>Army (Lead)</td>
<td>UAS in the National Airspace</td>
<td>July to September 2010</td>
</tr>
<tr>
<td>Air Force</td>
<td>Agile Fire 10-3</td>
<td>August 2010</td>
</tr>
<tr>
<td>Joint</td>
<td>JITC Joint Interoperability Tests</td>
<td>JIT 10-3 &amp; 11-1</td>
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### Discussions for Future Teaming

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<tr>
<th>Customer</th>
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<th>JMETC/JIAMDO/Joint Track Manager</th>
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<tr>
<td>Gerald R. Ford Class (CVN-78)</td>
<td>Joint Strike Fighter (JSF)</td>
<td>JIAMDO/Joint Track Manager</td>
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<tr>
<td>Brigade Combat Team (BCT)</td>
<td>Multi-Function Adv Data Link (MADL)</td>
<td>Multi-Mission Maritime Aircraft (MMA)</td>
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* Each event is normally preceded by 1-3 spirals: Connectivity Check, Integration, and Dry Run
JMETC FY10 Accomplishments

**JMETC Accomplishments**
- Supported 88 distinct customer test activities
- Expanded network from 38 to 57 sites
- ATIN and JTDL Networks transitioned to JMETC
- Upgraded JMETC support applications and utilities to TENA R6
- DIACAP Tiger Team report completed and recommendations being executed
- Enhanced JMETC services and capabilities provided by leveraging InterTEC, Services, and Industry
- Reuse Repository usability improvements

**FY10 Example JMETC Customers**
- Joint Integrated Air & Missile Defense Organization (JIAMDO)
- Broad Area Communications Node (BACN) JUON
- B1-B
- Broad Area Maritime Surveillance System (BAMS)
- Air-Ground Integrated Layer Exploration (AGILE)
- Joint Interoperability Test Command (JITC)

**Selected Benefits to the DoD**
- Integrated DT & OT on a Joint Urgent Operational Need for the warfighter
- Maximized usage of theater assets during limited maintenance windows
- Improved Joint track information sharing to ensure interoperability of systems in theater operations
- Coalition exchange and examination of real-time air picture data
- Identification of Air Force Initiatives ready for warfighter transition
- Investigated tactical UAS deployment in the National Airspace
- Employment of Net-Enabled Weapons
- JCAS immediate request & end-to-end processes “as-is” characterization
- Determined distributed system components were not ready for full live integration testing
- Executed testing to support system-of-system interoperability certification
# FY11 JMETC Events
*(More to Come)*

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<tr>
<td>Joint</td>
<td>JIAMDO Correlation/Decorrelation Interoperability Test (C/DIT)</td>
<td>October 2010</td>
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<td></td>
<td>Integration Events (Continuous) OCONUS</td>
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</tr>
<tr>
<td>Navy</td>
<td>UAS in NAS Runs for Record</td>
<td>October 2010</td>
</tr>
<tr>
<td>Internal</td>
<td>InterTEC Spiral 3 Systems Acceptance Test</td>
<td>October - November 2010</td>
</tr>
<tr>
<td>Joint</td>
<td>JITC Joint Interoperability Tests JIT 11-1,2,3,4,5 (Continuous)</td>
<td>October 2010 – September 2011</td>
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<td>Air Force</td>
<td>B1-B Fully Integrated Data Link Testing</td>
<td>November 2010</td>
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<tr>
<td>Joint</td>
<td>JTRS JPO -- JTRS Ground Mobile Radio</td>
<td>January 2011</td>
</tr>
<tr>
<td>Navy</td>
<td>Broad Area Maritime Surveillance (BAMS) (Continuous)</td>
<td>January – September 2011</td>
</tr>
<tr>
<td>Joint</td>
<td>Joint Track Manager Capability Demonstration (Continuous)</td>
<td>January – September 2011</td>
</tr>
<tr>
<td>Joint</td>
<td>JSF Initial M&amp;S Interoperability (Continuous)</td>
<td>February – March 2011</td>
</tr>
<tr>
<td>Air Force</td>
<td>JSTARS Interoperability Test</td>
<td>May 2011</td>
</tr>
<tr>
<td>Joint</td>
<td>JS J8/JIAMDO Joint Sensor Integration</td>
<td>June – August 2011</td>
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**Discussions for Future Teaming**

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<td>F-22 FY12 Testing Planned</td>
<td>Multi-Mission Maritime Aircraft (MMA)</td>
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JMETC Testing Success

B-2 Spirit ICE Data Link Test (Nov 2009)

- JEFX assessment of B-2 Link-16 interoperability challenges with AWACS
- Connected live B-2 on ramp at Whiteman AFB, MO, an AWACS HITL at Tinker AFB, OK, within a distributed C2 environment
- Time sensitive targeting scenarios with combat ready crews

IMPACT--Cost Savings and Better Product!

- Early testing led to early identification and correction of Link 16 interoperability issues
- No range or flying costs!
JMETC Testing Success

Joint Surface Warfare JCTD
- Point Mugu Test Team demonstrated Net Enabled Weapon Link-16 capability using F/A-18E/F as launch platform, JSOW C-1 as weapon, and JSTARS as 3rd party target source
- Distributed Tests
  - 09-11 Mar 2010
  - 04-05 May 2010
  - 17-19 Jun 2010
  - 31 Aug – 01 Sept 2010

IMPACT--Efficiency, Lower Technical Risk, and Cost Savings!
- Program scheduled & executed short multiple tests for incremental software update evaluation
- Resources expended on test & analysis and not network setup and monitoring
JMETC Testing Success

Joint Integrated Air and Missile Defense Organization (JIAMDO)

- Correlation/Decorrelation Integrated Test (C/DIT-10) to improve interoperability of Aegis, E2C, CAC2S, AWACS, Patriot, and FAAD.

- During Oct 2010 testing, JMETC enabled multiple C/DIT runs with an average turnaround time of 11 minutes – two shifts per day

**IMPACT—Efficiency!**

- Near real time test-fix-test
- C/DIT FY-11 T&E events accelerated into FY10, w/no funding impacts to FY-10
Joint Interoperability Test Command (JITC): Joint Tactical Data Link (JTDL) Testing

JITC conducts interoperability assessments, standards conformance and interoperability certification testing of joint tactical data links in HWIL and operationally realistic environments to validate the implementation of approved standards in a Joint environment.

JITC uses JMETC Connectivity and tools for JTDL Testing

IMPACT--Test Commonality!

- JITC Interoperability Certification is required for Net Ready KPP for all ACAT Programs
- JITs use JMETC infrastructure.
**Program Status/Events:**
BAMS planned sites are: Bethpage – NGC MSSIL (existing), Rancho Bernardo – (Installing), Dam Neck C2/SA/TCC/MOC (existing), Palmdale NGC SIL (TBD), NAS Patuxent River (existing)

Current BAMS schedule: June 2012 (6-12 months) NGC lead. June 2013 – IOC Pax Lead
PSP signed by BAMS and JMETC August 6, 2010

**Issues:**
Working to peer with BAMS Classified Network (BCN) but may be separate agreement with NGC
ESP for flight test needs to be completed, ESP format changes under review by ENG/DOPS
Both BAMS and NGC are still discovering potential T&E requirements including various networks that BAMS interfaces with for flight

**Last Contact:**
BAMS Technical Exchange Meeting Rancho Bernardo, CA March 1-3, 2011

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**Program Description:**
BAMS UAS is an integrated Systems of System that will provide multi-sensor persistent maritime ISR to the Maritime Patrol and Reconnaissance Force

**Program POC:**
Jeff Sappington NAVAIR
JMETC Users Group

• Purpose is to focus on technical requirements and solutions relevant to current and future Distributed Testing needs.
  • Technical and Management level representatives identify core infrastructure requirements, and most importantly resolve issues
• Quarterly meetings of 250-300 JMETC customers, acquisition programs, test events, ranges, LVC sites, tools and network providers

• An established forum for the Distributed Test Community to:
  o Identify core infrastructure requirements and use cases
  o Identify, investigate, & resolve issues
  o Identify opportunities to collaborate
  o Discuss available solutions, tools, and techniques
  o Share lessons learned

Next JMETC Users Group Meeting:
• Scheduled for March 22-23, 2011
• Location: Norfolk, VA
• Tracks:
  • User Requirements
  • Information Assurance / Security
  • Data Management
  • InterTEC (Current & Planned)
  • Networking
Summary

• Distributed Testing can save Acquisition T&E Programs time and money and result in better, more interoperable products while reducing technical risk!

• JMETC is here and proven!
  • Many Sites and Systems already connected via JMETC and well versed in TENA and the InterTEC tools
  • Demonstrated reliability with the capability to execute multiple events simultaneously, supporting high data rates and low latency requirements
  • Multiple examples of JMETC value added for customers
  • Provides Acquisition T&E Programs near real-time Test-Fix-Test capability
  • JMETC offers support to develop our customer’s distributed test requirements

You need only contact us
JMETC Program Points of Contact

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JMETC Lead Network Engineer: Arjuna “AJ” Pathmanathan
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703-601-5214

JMETC Website: www.jmetc.org
Backup Slides
How an Air Force Customer Sees Distributed Connectivity

Hardware-in-the-Loop (HWIL) Availability

All linked by JMETC
### Joint and Service Initiatives

- Joint Tactical Data Link (JITC JTDL)
- Joint Expeditionary Forces Experiment (JEFX)
- Joint Integrated Air and Missile Defense Organization Corr/Decorr Interoperability Test and Joint Sensor Integration (JIAMDO C/DIT & JSI)
- Air-to-Ground Integrated Layer Exploration (AGILE Phase III and IV)
- Network Enabled Weapons Interoperability Working Group (NEW IWG)
- Unmanned Aircraft Systems in National Airspace (UAS in NAS)
- Digitally Aided Close Air Support (DACAS)
- Space Threat Assessment Testbed (STAT)
- Joint Unmanned Aircraft Systems Mission Environment (JUAS ME)
- Joint UAS Digital Information Exchange (JUDIE) Joint Test and Evaluation Program

### Acquisition Programs/PEOs

- Joint Strike Fighter
- F-22 Block 3.2 Link 16 Receive Testing
- Multi-Function Advanced Datalink (MADL)
- Battlefield Airborne Communications Node (BACN) Joint Urgent Operational Need
- B-1 Fully Integrated Data Link (FIDL)
- PEO Integrated Weapons Systems
- CVN-78
- Broad Area Maritime Surveillance System (BAMS)
- AN/SQQ-34 Combat System
- Brigade Combat Team Modernization Program
- Joint Tactical Radio System (PEO JTRS)
- Joint Tactical Radio System Airborne Maritime Fixed (JTRS AMF)
- Ground/Air Task Oriented Radar (GATOR)
- Common Air Command and Control System (CAC2S)
- Small Diameter Bomb, Incr II (SDB II)
Joint Expeditionary Force Experiment (JEFX)

- Chief of Staff of the AF directed series of experiments that combines LVC forces to create an operationally representative environment to assess selected initiatives.
- Goal is to rapidly transition enhanced capability to the warfighter.
- Quarterly events; some Live Fly, some distributed LVC
- JMETC Program support in place for two years

IMPACT--Cost Savings!

- JEFX Reported saving $4.0M in FY 09 using JMETC Connectivity and tools
- Using JMETC, JEFX able to now complete 3 or 4 distributed events per year