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

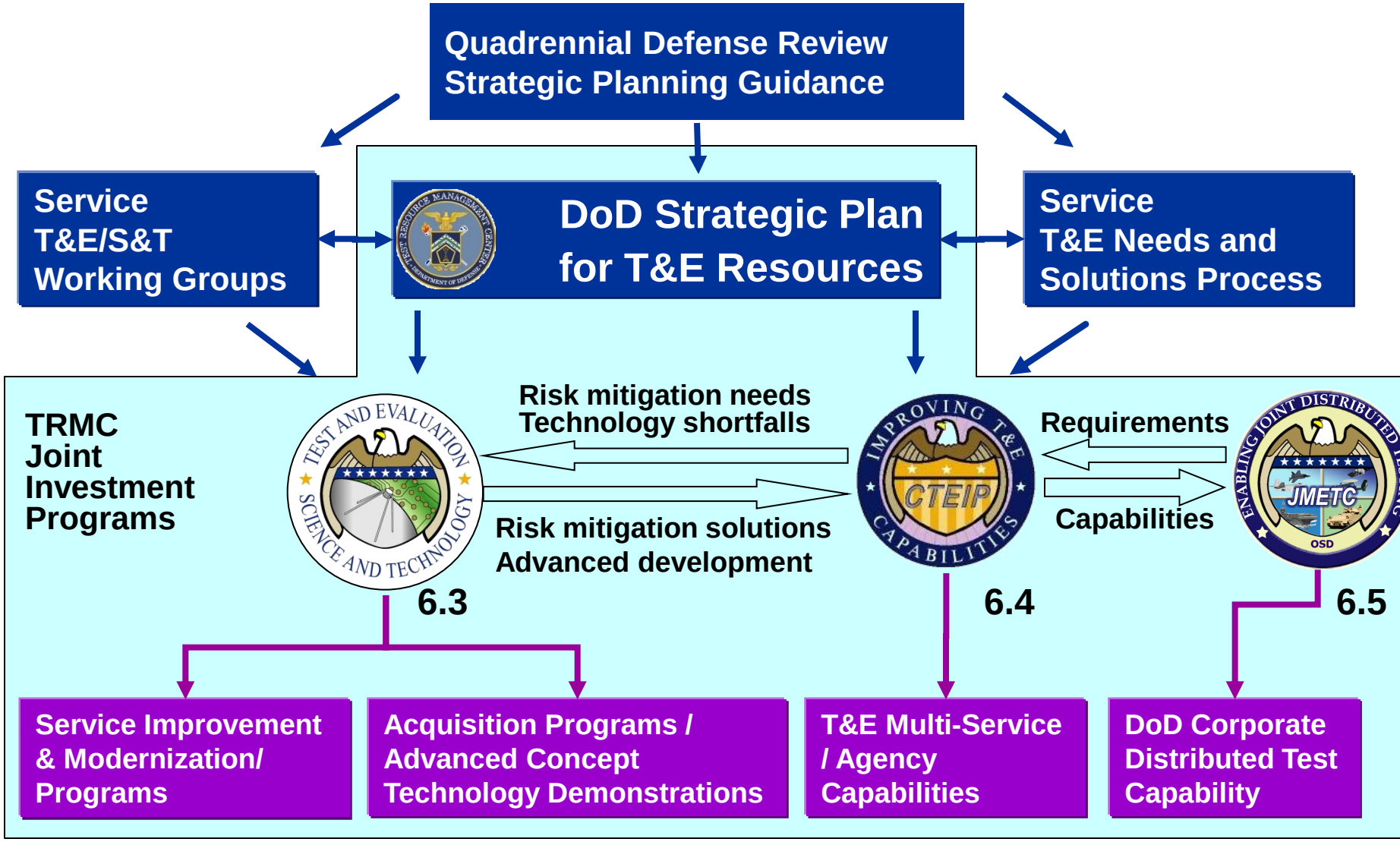
NDIA Annual T&E Conference

Chip Ferguson
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



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

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.

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

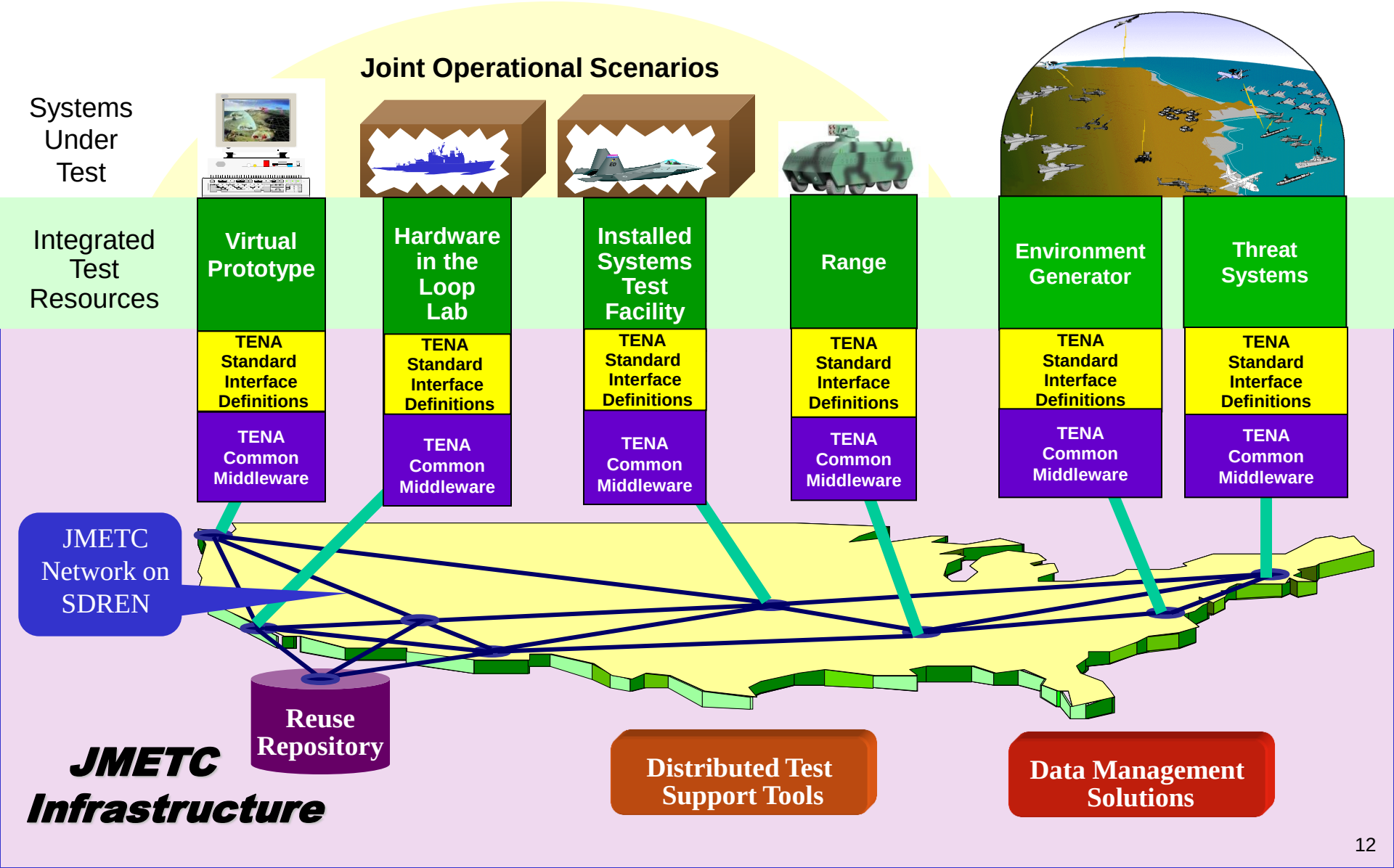
The JMETC Mission

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



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

Boeing: Tukwila
Keyport: NUWC
Ft Lewis: EPG

Site in Alaska
Ft. Greely: CRTC

Sites in SoCal
Edwards: Ridley
China Lake (3): AV-8B, F/A-18, IBAR
Point Mugu (2): ITEC, EA-6B
El Segundo: NGC B-2
Camp Pendleton: MCTSSA
Corona: NSWC
Point Loma (2): RLBTS, SSC-PAC
SSC-PAC HAIPE
Rancho Bernardo, NGC BAMS
West Agg Rtr.

Sites in Hawaii
PMRF: Bldg 105
MHPCC

Dugway Proving Ground
Schriever AFB: JEWL
Whiteman: B-2
Boeing: Berkeley
Nellis AFB: CAOC-N
Tinker AFB: AWACS
Ft. Sill: FSED
Ft Huachuca: JTRS
WSMR: IRCC
Ft Huachuca: (2) JITC, JTDL
Greenville: Rivet Joint
Ft Hood (2): CTSF, TTEC

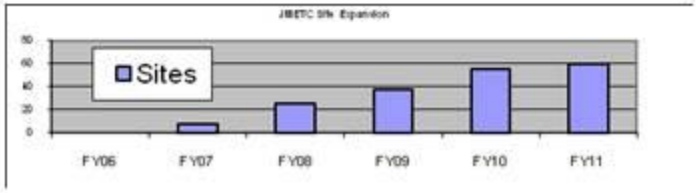
WPAFB: SIMAF
Redstone (6): RTC: DTCC, GMAN
SED: Patriot, THAAD, FAAD, SIV
Redstone: SMDC
Charleston (2): IPC, MEF-MEU

Hanscom AFB: CEIF
Bethpage: NGC BAMS
Ft. Monmouth: JOIN

Sites in MD, DC, VA
Aberdeen: ACCN
Pax River (5): ESTEL E2C/D, MCL ACETEF, SAIL, ATR
JMETC SYSCON
East Agg Rtr.
Pentagon: WARCAP
DISA: Sky 7
Dahlgren (2): CEDL,IWSL
JFCOM: JSIC
Langley (2): C-GIIF, TDLITC
Norfolk: COMOPTEVFOR
Dam Neck: CDSA
Wallops Island: (2) SCSC, SSDS
Newport News: NGC VASCIC
McLean: MITRE NCEL

Sites in Gulf Range
Hurlburt Field: C2DAC
Eglin AFB (4): AOC, DTF, GWEF, KHILS

Melbourne: NGC JSTARS



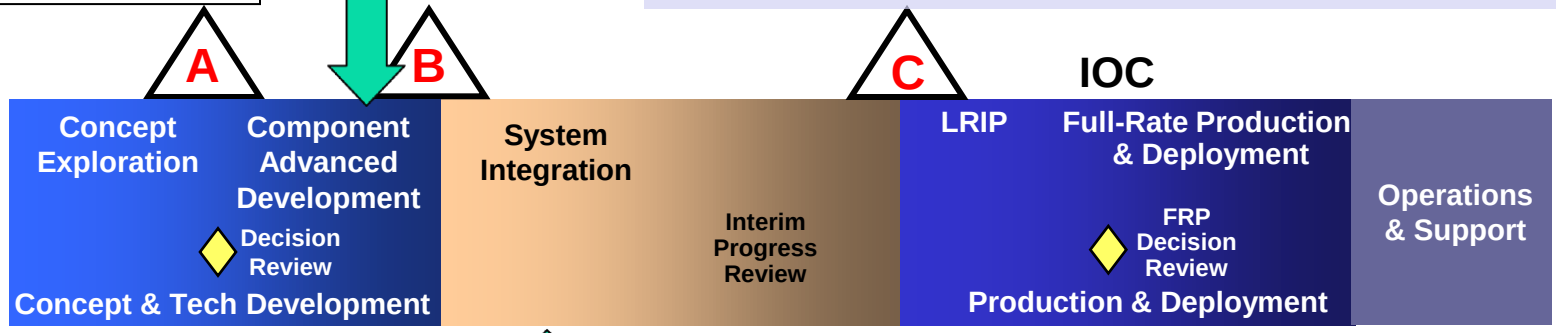
As of 14 Feb 2011

- Army
- Air Force
- Navy
- Marines
- Joint
- Industry

JMETC Allows You to "Test Early and Test Often" Across the Acquisition Life Cycle

Outline Distributed Testing requirements in the TEMP

Rapid Acquisition, Developmental Test, Operational Test, Interoperability Certification, Net-Ready Key Performance Parameters testing, Joint Mission Capability Portfolio testing



Enables <u>early</u> 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

Customer	Event	Record Event Dates*
Air Force	JEFX 10-1/Spirit Ice (B2 Data Link Test)	October – November 2009
Navy	BAMS LVC DE	October – December 2009
Air Force	Battlefield Airborne Comm. Node (BACN) JUON (DT/OT)	November 2009 to September 2010
Air Force	Agile Fire 10-2	January 2010
Air Force	JEFX 10-2/3	February/April 2010
Joint	Joint Surface Warfare JCTD	February to September 2010
JS J8/JIAMDO	Joint Sensor Integration	April to September 2010
Air Force	B1-B Fully Integrated Data Link Testing	April 2010
JFCOM J84/89 (TEST WEEK)	JCAS Distributed Test	June 2010
JIAMDO (Navy Lead)	Correlation/Decorrelation Interoperability Test (C/DIT) Integration Events (Continuous)	July to September 2010
Army (Lead)	UAS in the National Airspace	July to September 2010
Air Force	Agile Fire 10-3	August 2010
Joint	JITC Joint Interoperability Tests	JIT 10-3 & 11-1
Discussions for Future Teaming		
Gerald R. Ford Class (CVN-78)	Joint Strike Fighter (JSF)	JIAMDO/Joint Track Manager
Brigade Combat Team (BCT) Modernization	Multi-Function Adv Data Link (MADL)	Multi-Mission Maritime Aircraft (MMA)

*** Each event is normally preceded by 1-3 spirals: Connectivity Check, Integration, and Dry Run**

15

JMETC FY10 Accomplishments

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)

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

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)

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

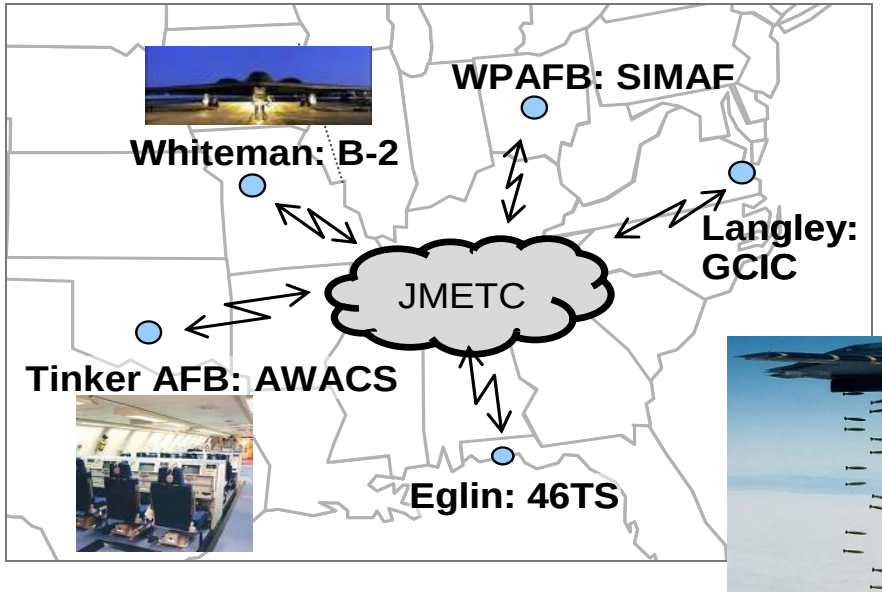
Discussions for Future Teaming		
Gerald R. Ford Class (CVN-78)	Global Hawk	GATOR
Brigade Combat Team (BCT) Modernization	F-22 FY12 Testing Planned	Multi-Mission Maritime Aircraft (MMA)

*** Each event is normally preceded by 1-3 spirals: Connectivity Check, Integration, and Dry Run**

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

Interoperability Certification

Joint Interoperability Test Command (JITC): Joint Tactical Data Link (JTDL) Testing

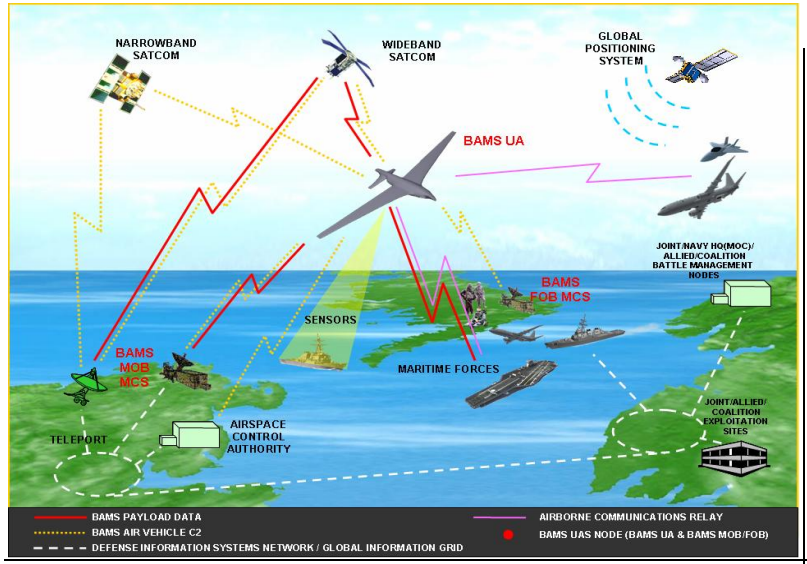
JITC conducts interoperability assessments, standards conformance and interoperability certification testing of joint tactical data links in HWIL and operationally realistic environments to validate the implementation of approved standards in a Joint environment.

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.

Broad Area Maritime Surveillance Unmanned Aircraft System (BAMS UAS)



System Architect v 10.1.11 Encyclopedia BAMS_PBSS (11 Jan 07)v1.1

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

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

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

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:**
  - **Identify core infrastructure requirements and use cases**
  - **Identify, investigate, & resolve issues**
  - **Identify opportunities to collaborate**
  - **Discuss available solutions, tools, and techniques**
  - **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

JMETC Program Manager: **Chip Ferguson** chip.ferguson@osd.mil
703-601-5274

JMETC Principal Deputy PM: **Bruce Bailey** bruce.bailey@osd.mil
703-601-5208

JMETC Lead Operations Planning: **Marty Arnwine** martemas.arnwine@osd.mil
703-601-5215

JMETC Senior Technical Advisor: **George Rumford** george.rumford@osd.mil
703-601-5233

JMETC Lead Systems Engineer: **Ryan Norman** ryan.norman@osd.mil
703-601-5277

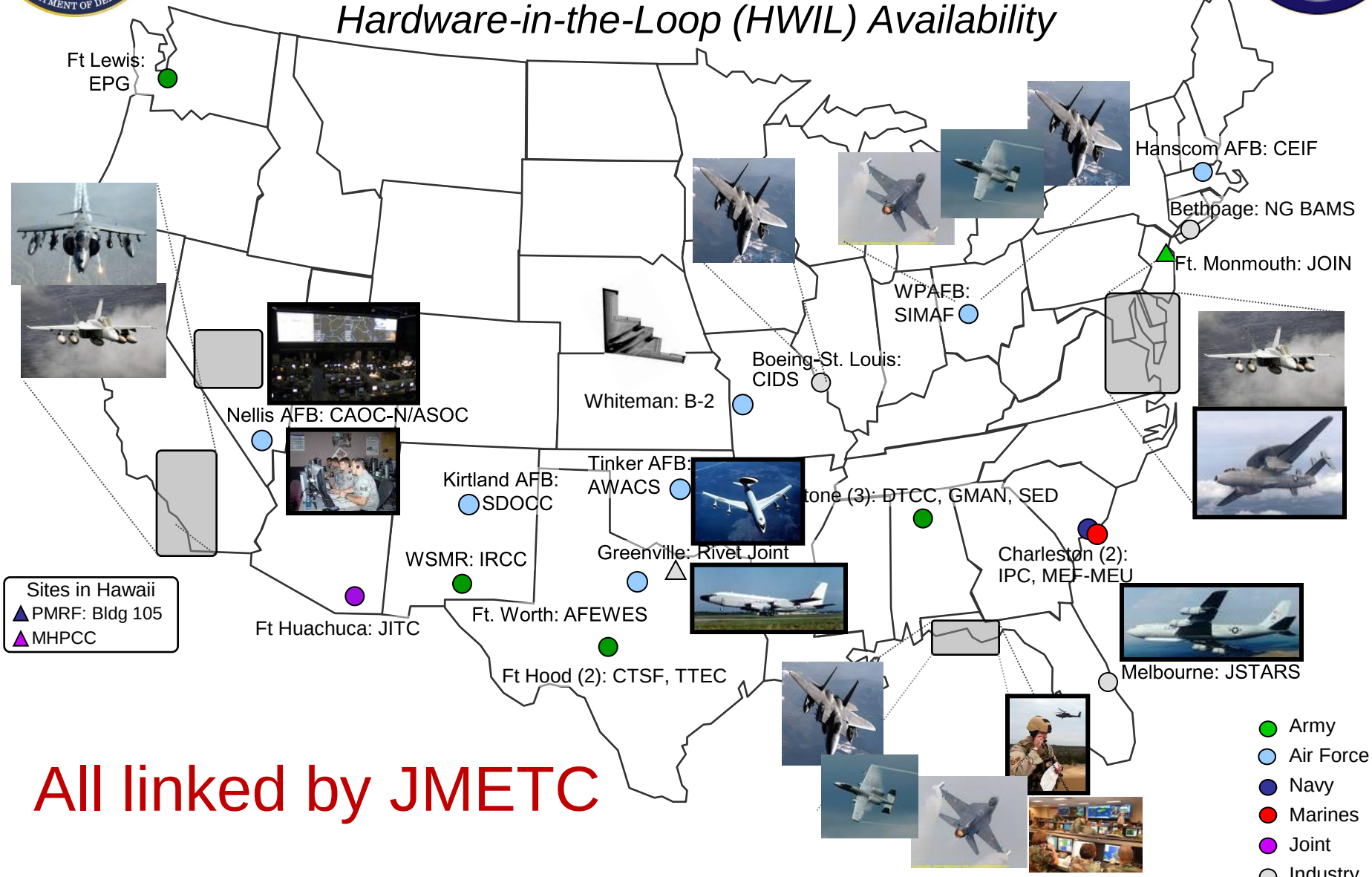
JMETC Lead Network Engineer: **Arjuna "AJ" Pathmanathan**
Arjuna.Pathmanathan@osd.mil
703-601-5214

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

JMETC Planning With 20+ Customers (Active and Prospective)

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

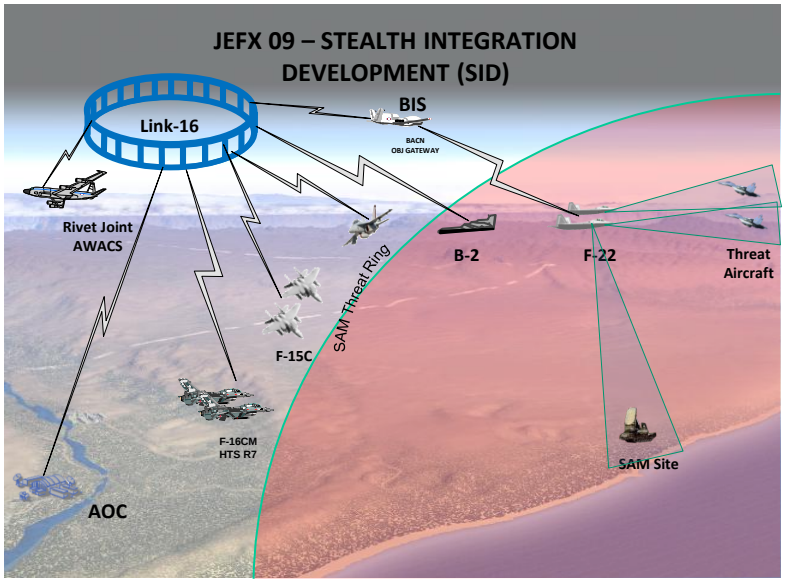
Acquisition Programs/PEOs

- 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)

JMETC Testing Success

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