Joint Mission Environment Test Capability (JMETC)
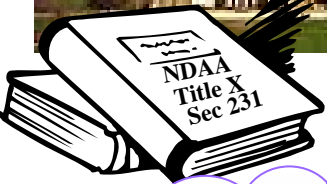
Briefing for the Tenth Annual Systems Engineering Conference

Mr. Richard Lockhart
Deputy Director,
Test Resource Management Center

October 24, 2007

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TRMC Functions

NDAA Title X Sec 231

- **DoD Field Activity**
- **Direct Report to USD(AT&L)**
  SES Director

Biennial 10-Year Strategic Planning

Annual T&E Budget Certification (Military Departments and DoD Agencies)

MRTFB Policy Oversight

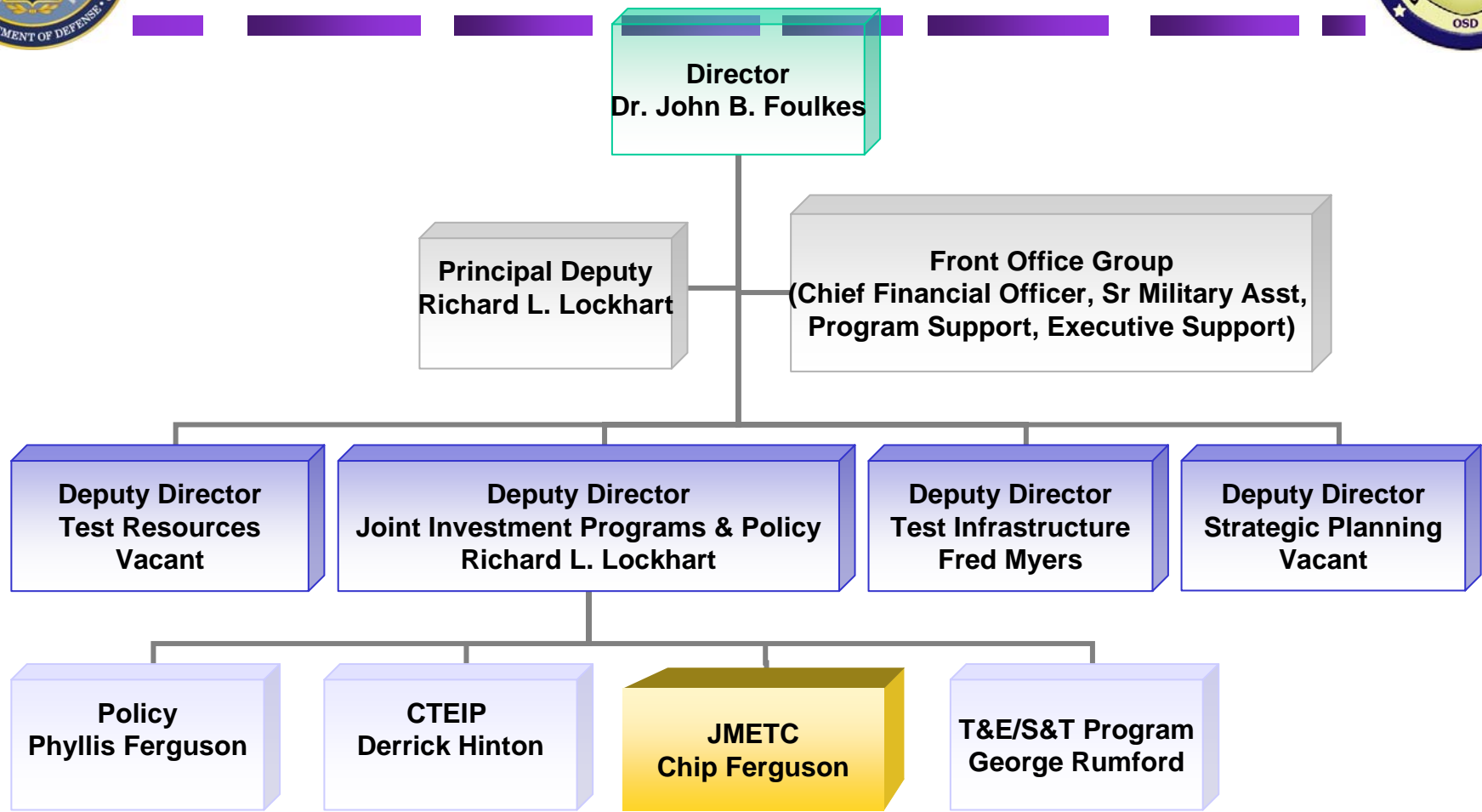Administer T&E Investment Programs (CTEIP, T&E/S&T, JMETC)

Oversee T&E Budgets and Infrastructure (MRTFB and other test facilities)

T&E Workforce

Sec. 231, FY 2003 National Defense Authorization Act
DoD Directive 5105.71, March 8, 2004

TRMC Organization

Director
Dr. John B. Foulkes

Principal Deputy
Richard L. Lockhart

Front Office Group
(Chief Financial Officer, Sr Military Asst,
Program Support, Executive Support)

Deputy Director
Test Resources
Vacant

Deputy Director
Joint Investment Programs & Policy
Richard L. Lockhart

Deputy Director
Test Infrastructure
Fred Myers

Deputy Director
Strategic Planning
Vacant

Policy
Phyllis Ferguson

CTEIP
Derrick Hinton

JMETC
Chip Ferguson

T&E/S&T Program
George Rumford

We are the stewards of the
T&E Infrastructure

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Outline

- ***Background***

- ***Program Overview***

- ***FY07 Accomplishments***

- ***FY08 Plan***

BACKGROUND

Testing in a Joint Environment Background

- **March 2004** – SPG: "Joint Testing in Force Transformation"
  - Policy – *Developing and fielding joint force capabilities requires adequate, realistic test and evaluation in a joint operational context*
  - Direction – *DoD will provide new testing capabilities and institutionalize the evaluation of joint system effectiveness*
  - Action – DOT&E lead development of a Roadmap to define changes *to ensure that T&E is conducted in a joint environment and facilitates the fielding of joint capabilities*

- **November 2004** – DEPSECDEF approved Roadmap, validated SPG
  - Roadmap identified actions to implement Testing in a Joint Environment, including
    - Strengthen and enforce DoD policy (DoDD 5000, CJCSI 3170, JCIDS) to elevate Joint testing requirements in DoD acquisition
    - Develop Joint testing processes and methodology
    - **Establish a corporate approach to Joint distributed testing capabilities**

"…a persistent, robust modern networking infrastructure for systems engineering, DT&E, and OT&E…must be developed that connects distributed live, virtual, constructive (LVC) resources"

- **December 2005 PB 07 PDM**
  - Approved Joint Mission Environment Test Capability (JMETC) program to provide:
    - A corporate approach to joint distributed testing capabilities
  - Established PE under AT&L / TRMC for execution

- **October 2006**
  - JMETC Program Management Office established in Crystal City, VA

JMETC IS ONE YEAR OLD

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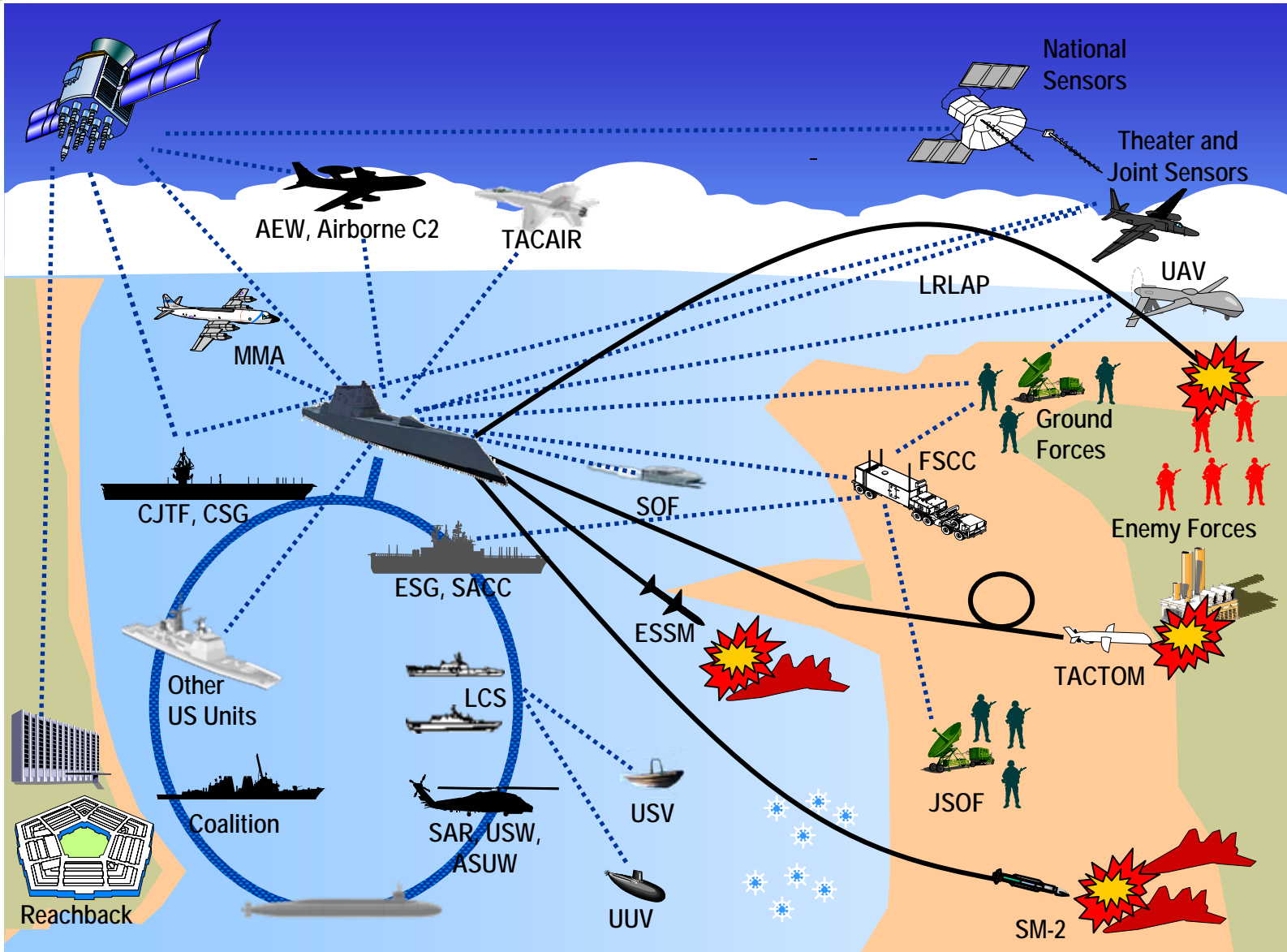# *Interoperability / Net-Ready KPP Testing Requirement*

> *"It is expected any resultant materiel solution will be verified through testing conducted in the expected joint operational environment to demonstrate joint interoperability and, when appropriate, net-readiness"*

CJCSI 3170.01F, dated 1 May 2007

- DoD Policy requires Joint interoperability and net-readiness testing during acquisition

- Interoperability and Net-Ready KPP testing requires testing interactions of multiple systems at the same time
  - Systems or their representations are not all co-located
  - Need to test early and throughout system development process

- Transition to the GIG to realize Net-Centric Warfare will increase the requirement for interoperability and, thus, increase the need for distributed testing

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Notional Operational Context

National Sensors

Theater and Joint Sensors

AEW, Airborne C2

TACAIR

LRLAP

UAV

MMA

Ground Forces

FSCC

Enemy Forces

CJTF, CSG

SOF

ESG, SACC

ESSM

TACTOM

Other US Units

LCS

JSOF

Coalition

SAR, USW, ASUW

USV

Reachback

UUV

SM-2

Interoperability / Net-Ready KPP Testing Problem

- Cost prohibitive, and sometimes impossible, to locate all required systems in one place
  - Laboratory and simulated representations may be the only assets available
  - Systems and their representations are distributed throughout the U.S. (industry, test ranges, government laboratories)

- Difficult, time-consuming, and expensive to plan and execute distributed test events
  - Networks require time-consuming security agreements to be coordinated
  - Instrumentation data definitions differ from laboratory to laboratory
  - Lack of universal tools complicates test integration
  - Distributed test events require engineering each and every time

Interoperability and Net-Ready KPP difficult to test extensively or early in acquisition

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JMETC PROGRAM OVERVIEW

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What is JMETC?

- A corporate approach for linking distributed facilities
  - Enables customers to efficiently evaluate their warfighting capabilities in a joint context
  - Provides compatibility between test and training

- 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 solution
    - Reuse repository

- Provides customer support team for JMETC products and distributed testing

JMETC Supports:

- Testing across full spectrum of acquisition process
  - Developmental Test, Operational Test
  - Interoperability Certification
  - Net-Ready KPP compliance

- Joint mission portfolio testing

- Evaluation of weapons systems in joint mission environment

- Conduct of live, virtual or constructive testing

- Conduct of joint testing and training

> *Used whenever you need to link resources together to conduct a distributed test event*

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- **Persistent connectivity**
  - Readily available network configured for exchanging test data over existing DoD data transport capabilities
  - Solution: Initial VPN has been established and is operational on the Secure Defense Research and Engineering Network

- **Standards for Components / Interfaces**
  - A collection of interface definitions and software algorithms (e.g., Radar, TSPI, coordinate conversions, unit conversions, etc.) that provide a common language used in data exchanges between systems
  - Solution: Use TENA and upgrade per requirements from Users Group

- **Middleware**
  - Universal data distribution software used by every node to send and receive data
  - Solution: Use TENA and provide gateways to connect to other data protocols

- **Distributed Test Support Tools**
  - A collection of common software applications that assist test engineers to plan, prepare, set-up, check-out, monitor, and analyze the distributed test event
  - Solution: JMETC will do a best of breed search for test support tools with final recommendations made by the JMETC Users Group
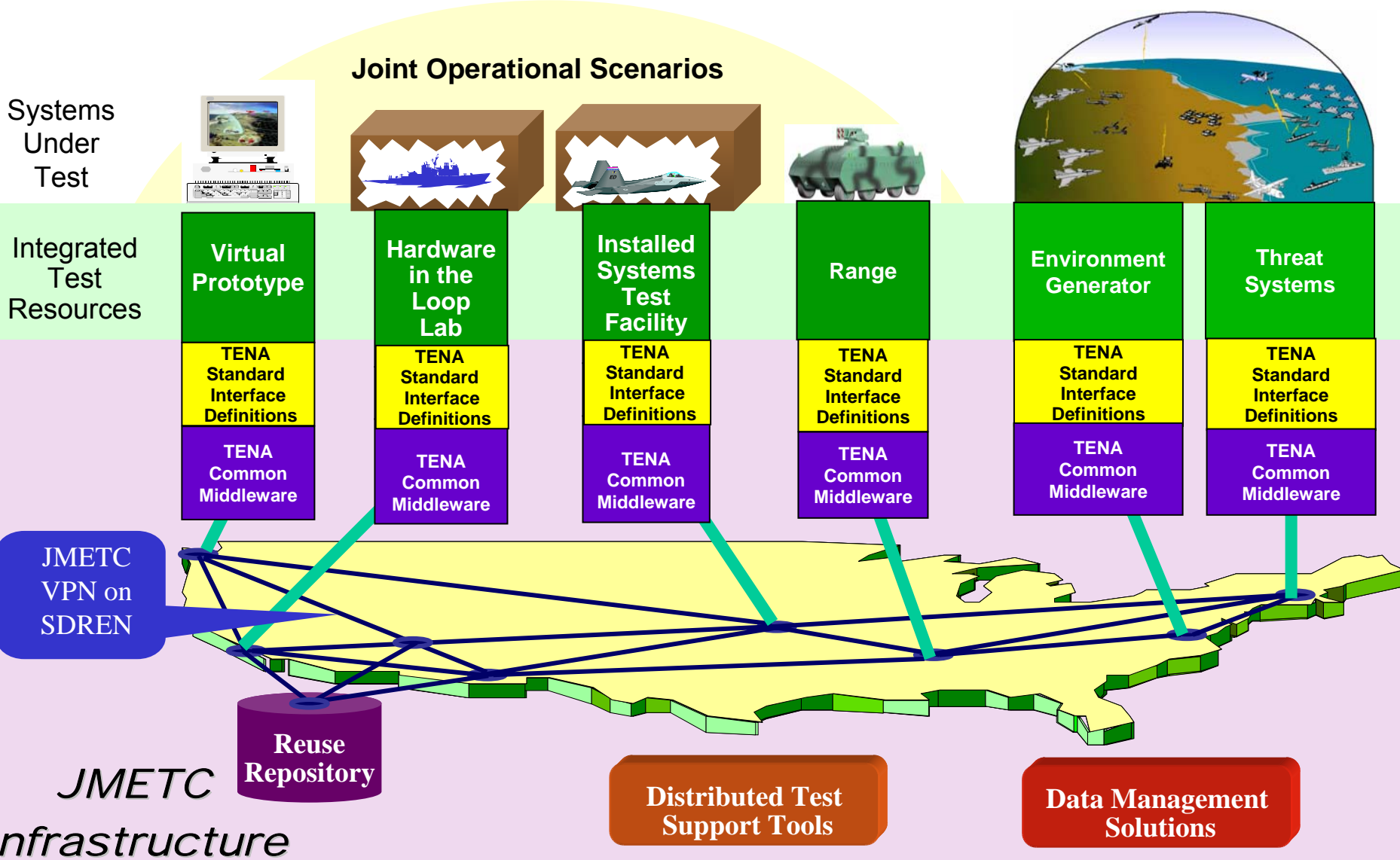
- **Data Management Solutions**
  - A suite of data archiving solutions to store test data collected at multiple locations enabling efficient data collection and analysis for events
  - Solution: CTEIP study to develop roadmap in FY 08 with follow-on CTEIP project to develop solutions

- **Reuse Repository**
  - An on-line web portal with relevant distributed event information (latest middleware, software components, documentation, lessons learned, meta-data) and web-enabled collaboration services
  - Solution: Establishment of www.jmetc.org for re-use repository in FY08

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JMETC Enabled Distributed Testing

Joint Operational Scenarios

Systems Under Test

Integrated Test Resources

Virtual Prototype	Hardware in the Loop Lab	Installed Systems Test Facility	Range	Environment Generator	Threat Systems
TENA Standard Interface Definitions	TENA Standard Interface Definitions	TENA Standard Interface Definitions	TENA Standard Interface Definitions	TENA Standard Interface Definitions	TENA Standard Interface Definitions
TENA Common Middleware	TENA Common Middleware	TENA Common Middleware	TENA Common Middleware	TENA Common Middleware	TENA Common Middleware

JMETC VPN on SDREN

Reuse Repository

JMETC Infrastructure

Distributed Test Support Tools

Data Management Solutions

JMETC Customer

- **Program Manager (PM)**
  - Examples include: Acquisition Program Managers, Portfolio Managers, Advanced Concept Technology Demonstration (ACTD) Managers, etc.

- **Test Agent**
  - Organizations designated by PMs to lead their event test planning and execution (e.g. White Sands Missile Range (WSMR) and Edwards AFB)

- **Resource Owners (Owners of Test Resources)**
  - Capabilities **owned across the Department and <u>in industry</u>** that test warfighting capabilities (e.g., Air Combat Environment Test & Evaluation Facility (ACETEF))
  - Test Resources include: simulations, measurement facilities, System Integration Labs, Hardware-in-the-Loop Labs, installed systems test facilities, open air ranges

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JMETC Customer Support

JMETC supports customer needs at customer request

Technical Expertise:
- Assists in understanding how to use JMETC products
- Assists in developing T&E strategy and requirements
- Supports event planning, preparation, and execution

Product Support:
- Reviews and certifies JMETC products for corporate use
- Integrates new nodes onto JMETC VPN with security agreements
- Augments DREN with sites critical for joint testing (maximizing reuse)
- Measures JMETC infrastructure performance
- Provides Help Desk to assist JMETC product users
- Provides semi-annual TENA training classes

Prioritization of effort is based on funding available

Customer Responsibility

- **The customer is responsible for:**
  - Defining requirements
  - Providing test facilities and resources
  - Installing TENA in their test facilities and resources
  - Requesting and funding field assistance:
    - Technical integration support, including site verification
    - JMETC product training
    - Detailed event planning, preparation, and execution
  - VPN usage fees (charges coordinated with JMETC Program)
  - Unique middleware, object model, and software tool development and upgrades
- **Sites not on JMETC VPN build plan may fund their own addition to JMETC infrastructure**

Industry Involvement

- **Two ways to participate in the JMETC infrastructure:**
  - Being on government contract to support a program or test event using JMETC
    - Contractor-funded sites possible depending on priorities and resources
  - Participate in the JMETC Users Group
    - Next meeting tentative for January 2008, location TBD

- **TENA Architecture Management Team (AMT)**
  - Technical forum providing open dialogue between users and TENA developers
    - Next meeting tentative for January 2008, location TBD
  - Used to identify issues, vet concerns, debate solutions, and agree on way forward
  - Over 27 companies currently are members of TENA AMT
  - TENA middleware/object models freely available (www.tena-sda.org)

> ***Industry is a key component in a successful DoD "corporate approach" to linking distributed facilities***

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JMETC Leadership & Governance

JMETC Chain of Command

Honorable John Young
USD(AT&L)

Dr. John B. Foulkes
Director, Test Resource Management Center (TRMC)

Richard L. Lockhart
Principle Deputy, TRMC
Deputy Director, JIPP

Chip Ferguson
JMETC Program Manager

George Rumford
Systems Engineering Lead (Acting)

JMETC Governance

Testing in a Joint Environment Senior Steering Group
- **Senior DoD Leaders**
- **Status: Charter Drafted**

JMETC Advisory Group
- **Service/Agency reps**
- **Regularly held meetings to discuss/review plans, common issues, needed studies, etc.**

JMETC Users Group
- **Technical representatives of customers and test resource owners**
- **Two meetings held in FY07**
- **~150 participants/meeting**

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JMETC Benefits

- **Provides Department-wide capability for:**
  - Evaluation of a weapon system in a joint context
  - DT, OT, Interoperability Certification, Net-Ready KPP compliance testing, Joint Mission Capability Portfolio testing, etc.

- **Provides test capability aligned with JNTC**
  - Both use TENA architecture
  - Enables joint test and training

- **Reduces time and cost by providing**
  - Readily available, persistent connectivity with standing network security agreements
  - Common integration software for linking sites
  - Distributed test planning support tools

- **Provides distributed test expertise**

The corporate solution to distributed LVC Testing

FY 07 JMETC ACCOMPLISHMENTS

- Established JMETC Program Office October 2006

- Completed the Program Execution Guide briefing to assist customers

- Conducted a DoD Distributed Test Infrastructure Assessment (requested by Joint Staff J8)

- Initiated development of the JMETC Reuse Repository

- Established JMETC Advisory Group
  - Held regular meetings to discuss activities

- Established JMETC Users Group
  - First Meeting, Jun 19-20 with 140 attendees
    - SIAP, JSF, and FCS briefed their plans
  - Second Meeting, 14-15 Aug with 150 attendees
    - Navy DEP briefed their plans
  - Focus groups established for:
    - User Requirements, Tools, InterTEC Spiral 2, Networks, and Data Standards

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- Initiated collaboration with the Training community
  - Used the JNTC-sponsored network aggregator in first test event supported by JMETC
  - Initiated effort to peer JNTC JTEN with JMETC VPN
  - Established the JNTC JATTL as a beta-test site for next version of TENA (TENA 6.0 will be release in FY08)
  - Supported the JFCOM LVC Architecture Roadmap Study

- Stood up the JMETC VPN on the SDREN
  - Established 8 locations on the JMETC VPN available for future use
    - Pax River, Eglin, White Sands, Redstone, China Lake, Pt. Mugu, Pt. Loma, and JITC

- Supported two distributed test events
  - Integral Fire 07
  - InterTEC Spiral 2 Build 1

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JMETC FY 07 Accomplishments
Integral Fire 07 Test Event

– Integral Fire 07 Description:

- A combined, distributed test event conducted in August 07 supporting the following three customers:
    - JFCOM JSIC JCAS Assessment
    - JTEM Methodology Assessment
    - USAF Warplan-Warfighter Forwarder (WWF)

– JMETC Responsibilities:

- Overall lead for creating the distributed test Infrastructure including JMETC VPN (5 locations)
- Connect three enclaves (total of 15 locations) using the JFCOM aggregator router
- Conduct systems integration, site surveys, and dry runs
- Oversee operation of the network and data flow among all sites during the event

– JMETC Significant Accomplishments:

- Stood up and successfully demonstrated the JMETC VPN within 90 days
- Successfully used the Aggregation Router to link three enclaves
- Supported three customers conducting tests using the same network in the same time frame

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Integral Fire Infrastructure
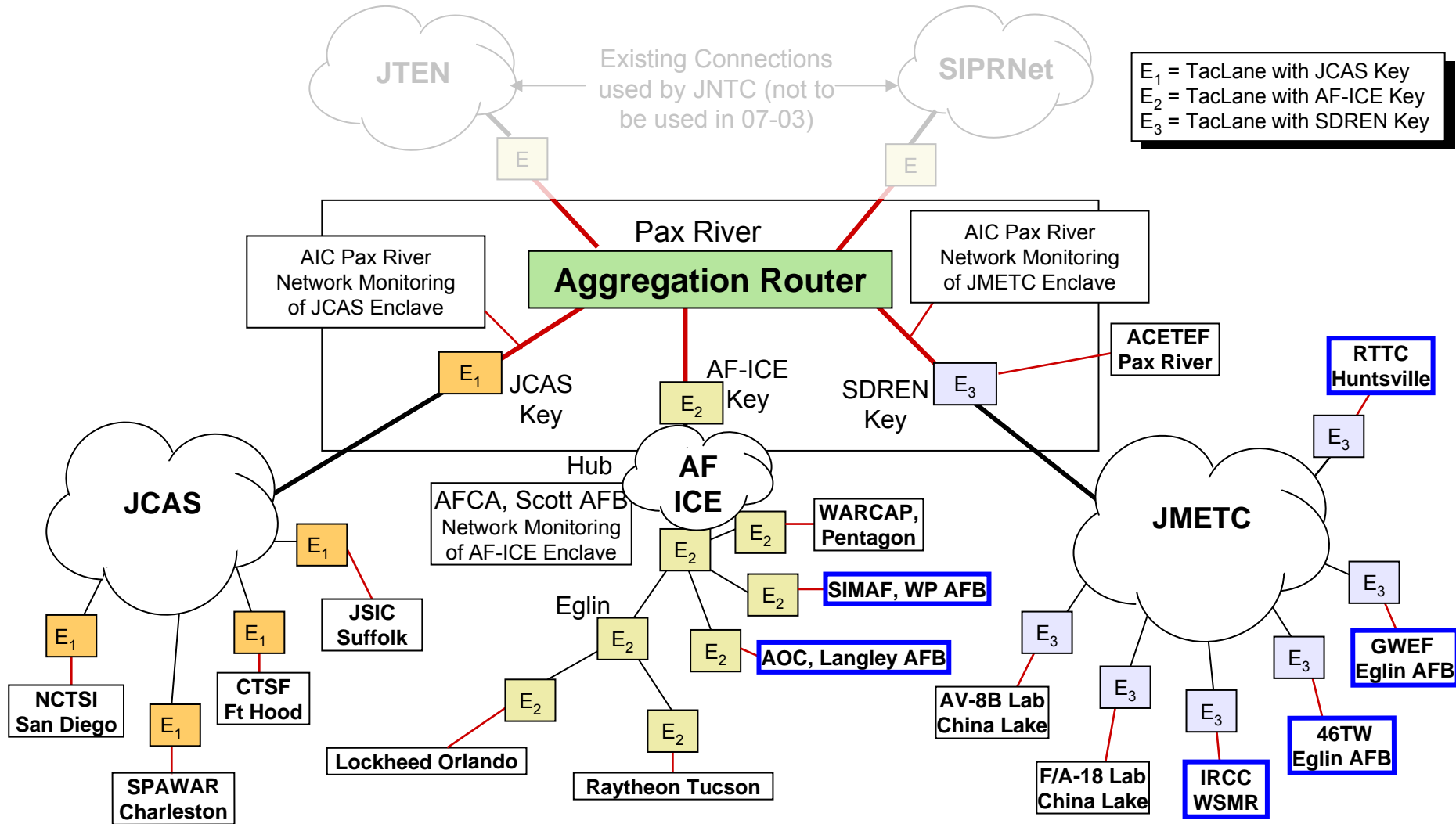
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JMETC FY 07 Accomplishments
InterTEC Spiral 2, Build 1 Test Event

– InterTEC Description:
  - Interoperability T&E Capability (InterTEC) is an OSD-sponsored, Navy-led project under the Central T&E Investment Program (CTEIP)
  - Purpose is to develop an accredited test capability to conduct joint interoperability certification and joint mission thread testing

– Spiral 2, Build 1 Objectives:
  - Developing and assessing tools to test joint threads
  - Assessing the C2 messages sent from sensors to shooters through command and control systems (GCCS-J, GCCS-M, GCCS-A, and TBMCS)
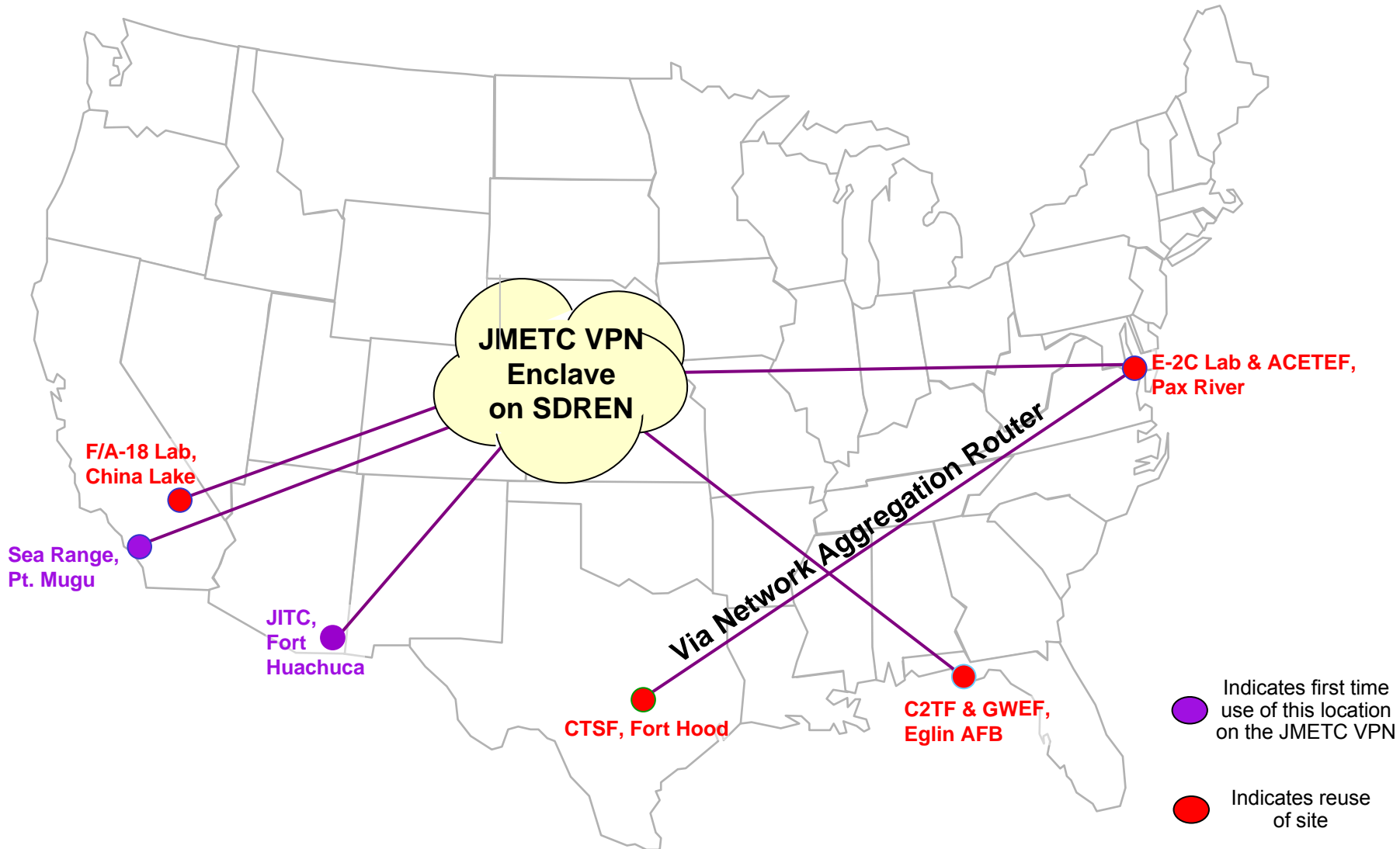
– JMETC Responsibilities:
  - Overall lead for creating the Infrastructure integrating 6 locations
  - Conduct systems integration, site surveys, and dry runs in preparation for the event
  - Oversee operation of the network and data flow among all sites during the event

– JMETC Significant accomplishments
  - Established the new locations on the JMETC VPN within 90 days
  - Demonstrated re-use (three locations from Integral Fire 07 test)
  - Successfully used the Aggregation Router

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JMETC VPN Enclave on SDREN

F/A-18 Lab, China Lake

Sea Range, Pt. Mugu

JITC, Fort Huachuca

CTSF, Fort Hood

C2TF & GWEF, Eglin AFB

E-2C Lab & ACETEF, Pax River

Via Network Aggregation Router

Indicates first time use of this location on the JMETC VPN

Indicates reuse of site

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JMETC FY 08 PLAN

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FY 08 Plan

- Complete hiring for government positions

- Publish Program Execution Guide (handbook)

- Expand JMETC Infrastructure
  - Expand the JMETC VPN per customer requirements and potential for reuse
  - Add 18 locations for a total of 26 available for reuse by the end of FY 08

- Initiate JMETC Reuse Repository at www.jmetc.org

- Hold quarterly JMETC Users Group and JMETC Advisory Group meetings

- Publish Newsletter

- Collaboration with Training Community
  - Continue to collaborate on common distributed test and training infrastructure requirements
  - Continue to support the JFCOM led LVC Architecture Roadmap Study
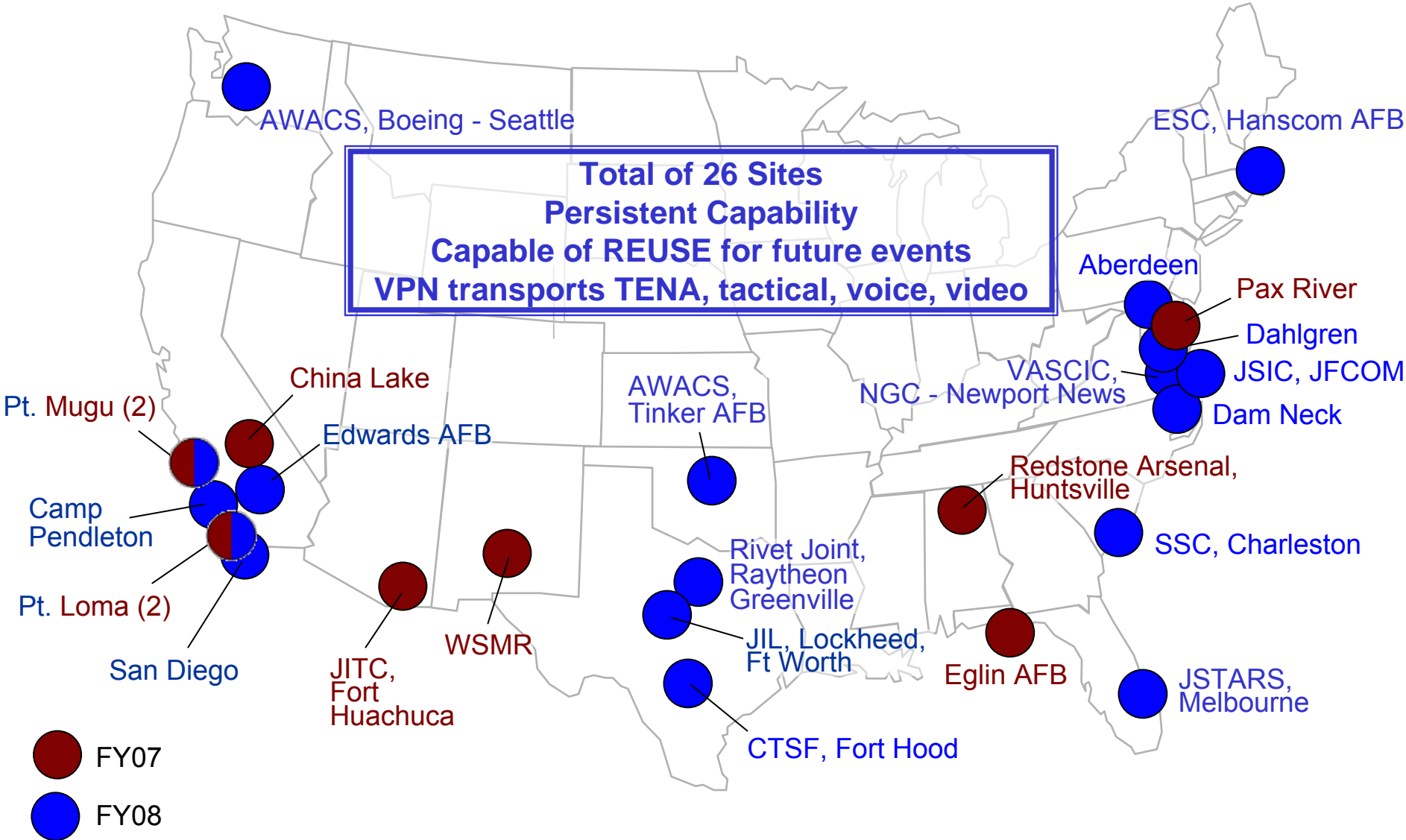 - Demonstrate JTEN and JMETC VPN peering capabilities

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- Support Other JMETC-related Activities
  - JTEM JT&E
  - Support 3 studies resulting from the Distributed Test Infrastructure Assessment
    - Transitioning Test Capabilities to Internet Protocol version 6 (IPv6)
    - Determining the Applicability of a SOA to Support Distributed Testing
    - Determining Test Infrastructure Needed to Test Warfighting Capabilities Using the GIG

- FY 08 Event Support
  - InterTEC Spiral 2, Build 2 and System Acceptance Test (SAT)
    - Spiral 2, Build 2 scheduled in April/May 08 followed by the SAT in June 08
    - Test OTH-G messages using a Joint Fires Scenario
    - Integrating 12 locations
    - May include CVN-21 participation
  - FCS Combined Test Organization
    - Experiment and test of the infrastructure needed to evaluate joint functionality of FCS
    - Jun-Aug 08 (tentative)
    - Planning to adhere to JTEM Methods and Processes
  - SIAP
    - Risk reduction test for a planned Oct 08 event

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JMETC VPN Locations (FY07-08)

**Total of 26 Sites
Persistent Capability
Capable of REUSE for future events
VPN transports TENA, tactical, voice, video**

AWACS, Boeing - Seattle

ESC, Hanscom AFB

Aberdeen

Pax River

Dahlgren

VASCIC,

JSIC, JFCOM

NGC - Newport News

Dam Neck

China Lake

Pt. Mugu (2)

Edwards AFB

AWACS,
Tinker AFB

Camp
Pendleton

Redstone Arsenal,
Huntsville

SSC, Charleston

Pt. Loma (2)

Rivet Joint,
Raytheon
Greenville

San Diego

JITC,
Fort
Huachuca

WSMR

JIL, Lockheed,
Ft Worth

Eglin AFB

JSTARS,
Melbourne

CTSF, Fort Hood

● FY07

● FY08

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Summary

- JMETC Program Office stood up

- JMETC VPN established – 26 locations available for reuse by the end of FY 08 based on customer requirements

- Successfully supported two test events in the first year

- Coordinating with JFCOM to bridge test and training capabilities

- Collaborative effort with the Services and Industry

- Multiple programs requesting support
  - SIAP, FCS, CVN-21, JSF, MMA

JMETC IS THE CORPORATE SOLUTION FOR JOINT DISTRIBUTED TESTING AND IS AVAILABLE NOW

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