Joint Mission Environment Test Capability (JMETC)
Program Overview

June 2019
JMETC Mission

JMETC provides the robust **distributed infrastructure** (network, enterprise resources, integration software, tools, reuse repository) and **technical expertise** to integrate Live, Virtual, and Constructive (LVC) systems for test and evaluation in **Joint Systems-of-Systems and Cyber environments**.
Joint Mission Environment Test Capability (JMETC)

Enterprise Infrastructure for testing like we fight

JMETC Summary:

<table>
<thead>
<tr>
<th>System of Systems Infrastructure</th>
<th>147 Govt. &amp; Industry Sites</th>
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<tbody>
<tr>
<td></td>
<td>272 JSN Test Events FY07-FY18</td>
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<tr>
<td></td>
<td>92% Enterprise Reusability</td>
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<tr>
<td>Common Integration Software</td>
<td>Suite of 56 Integration Tools</td>
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<tr>
<td>(Test &amp; Training Enabling Architecture)</td>
<td>Runs on all DoD-approved Operating System environments (84 different variants)</td>
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<td>Used in 13 partner nations</td>
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<td>Customer Collaboration</td>
<td>9,000+ website user accounts</td>
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<td>(Enables RDT&amp;E Problem-Solving)</td>
<td>20 million+ webpage views in FY18</td>
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<td>94,841 downloads in FY18</td>
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<tr>
<td>Subject Matter Expertise</td>
<td>11,325 Help Tickets Resolved FY12-FY18</td>
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<td>341 Lessons Learned &amp; Shared</td>
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JMETC Mission:

- Optimize the DoD’s distributed system of systems test infrastructure
- Develop & maintain common software that eliminates stove-pipes
- Promote Inter-Service RDT&E collaboration through website services
- Provide expertise to rapidly design, setup, & execute tests
The TRMC Vision:
An Agile T&E Infrastructure to Support Rapid Acquisition
JMETC Benefits Acquisition Programs, Testers, & Evaluators

- Enables **early verification** that systems work in Joint and Cyber contested environments
  - Test whether systems work well together
  - Test whether systems are resilient to cyber threats
  - Identify issues early when they are less costly to fix

- Provides access to **high-demand, low availability systems**
  - Supplements number of live Systems Under Test (SUTs), threats, or “supporting cast” to create a realistic environment
  - Feasible alternative to Live testing in early DT and risk reduction for OT

- Provides access to **cyber ranges**
  - Ability to conduct unconstrained but nondestructive cyber activities in representative environments

- Provides a **collaborative engineering environment**
  - Gives SMEs an opportunity for collaboration without leaving home station

- Supports all aspects of **testing across the acquisition lifecycle**
  - Interoperability, cybersecurity, rapid fielding, DT, OT, etc.

Reduce Acquisition Cost, Schedule, and Risk
JSN Event Examples

Battlefield Airborne Communication Node (BACN)
Joint Urgent Operational Need

- Integration of BACN payload onto multiple platforms for solution to urgent in-theater need:
  - Combat requirement for beyond line-of-sight comm
  - Relay, bridge, and range extension for ground forces and supporting aircraft
- Distributed Testing included Live-fly, DT, and Operational Utility Evaluation

IMPACT
- Efficient integration of DT and OT
- Testing successfully completed without need for live assets to be co-located
- Distributed Testing saved “~$1.2M” (OTA)
- Urgent capability fielded-quickly
Joint Mission Environment Test Capability (JMETC) Program Investment Areas

- **Distributed Testing Support**
  - Event Planning and Execution Support
  - Help Desk Troubleshooting and Subject Matter Expertise

- **Distributed Testing Networks**
  - JMETC SECRET Network (JSN): Always connected
  - JMETC MILS Network (JMN): Event-specific links

- **TRMC Cybersecurity Services**
  - Risk Management Framework Support
  - RDT&E Cybersecurity Standards: Overlay, SW Certification

- **Test & Training Enabling Architecture (TENA)**
  - TENA Software Repository
  - TENA Object Models
  - TENA Web Services

- **Big Data / Knowledge Management Initiative**
  - Enterprise Architecture Framework
  - Proofs of Concept Support

- **National Cyber Range Complex (NCRC)**
  - Cyber Range Infrastructure, Tools, Instrumentation
  - Offensive & Defensive Cyber Tests & Events (OCO/DCO)
  - Cyber SMEs & Support Team (including skilled OPFOR)
TRMC Available Enterprise Services
Hardware, Software, & Subject Matter Expertise

• **JSN-SYSCON Services**
  - Active JSN Monitoring & Troubleshooting
  - VoIP including Conferencing
  - Adobe Connect Collaboration
  - XMPP Chat
  - Secure JSN File Transfer
  - YUM Server CentOS Updates
  - Domain Name Service (DNS)
  - DREN / SDREN RDT&E Cross Domain Solution

• **Cybersecurity**
  - Risk Management Framework Implementation Support
  - RDT&E Overlays
  - RDT&E SW Certification *(future)*

• **TRMC Support Services**
  - TRMC Use Case Archive
  - Test Capabilities Database

• **Enterprise Software Services**
  - Software Repository incl. 50+ common tools
  - JIRA Helpdesk Projects
  - Wiki Collaboration Spaces
  - Email Reflectors
  - TENA Auto-Code Generation
  - Bitbucket Source Code Management

• **NCRC Services**
  - Cyber Event Planning / Design / Execution Tools & Expertise
  - MILS Network connecting Govt, Industry, and Academia at multiple classifications
  - Representative blue / red / gray environments
  - Traffic generation and instrumentation
  - IaaS & System Virtualization
  - Cooperative Vulnerability and Penetration Assessment expertise
  - Data reduction, analysis and customized

*TRMC wants to help turn your capabilities into enterprise services*
TENA at a Glance

TENA is the DoD GOTS range integration architecture

• What does TENA enable?
  • Interoperability between inter- and intra-range assets
  • Elimination of proprietary interfaces to range instrumentation
  • Efficient incremental upgrades to test and training capabilities
  • Integration of Live, Virtual, and Constructive assets (locally or distributed)
  • Sharing and reuse of common capabilities across existing and new investments

• What is included in the TENA architecture?
  • Customizable “data contracts” that standardize repeatable information exchange
  • Interoperability-enabling, auto-code generated software libraries
  • A core set of tools that address common test and training requirements
  • Collaboration mechanisms that facilitate sharing and reuse

• TENA has a plan for continued evolution and funding to execute this plan
TENA By the Numbers

- 9,000+ user accounts
- 250+ separate activity groups
- 20+ million page hits in 2017
- 3,104 helpdesk cases resolved in 2017
- 84 supported computer platforms
- 56 supported test / training tools
- 1,724 different object models
- 94,841 downloads in 2017

100% Government-off-the-Shelf (GOTS)

Distribution Statement A: Approved for public release. Distribution is unlimited.
Worldwide Use of TENA

TENA is used in 13 countries outside the US
TENA Benefits for Range Instrumentation

• TENA saves money through composability & reuse
  • All TENA software and support is free to users
  • TENA has standard object models for enhancing interoperability
  • The TENA web site has extensive documentation, training, and collaboration capabilities
  • The DoD has invested significant resources in already proven TENA-enabled tools & utilities

• TENA Auto-Code Generation makes creating a TENA application as simple as possible
  • Auto-generated starting points mean you never start with a blank page
  • Rapid development of real-time, distributed, LVC applications
  • Auto-generated test programs greatly reduce system integration time & effort

• TENA’s technical approach emphasizes rapid integration and reliability
  • TENA is the most capable and sophisticated interoperability solution
  • TENA software is thoroughly tested
  • The TENA software is hard to use wrong
  • TENA catches many user errors at compile time rather than run time
  • TENA Tools provide unprecedented understanding of an event

Requiring vendors to use TENA interfaces promotes a modular open test and training architecture
JMETC Distributed Test Architecture

JMETC depends on TENA to support distributed testing

Integrated Test Resources
- Virtual Prototype
- Hardware in the Loop
- Installed Systems Test Facility
- Range
- Environment Generator
- Threat Systems

* TENA: Test and Training Enabling Architecture
JMETC has a hybrid network architecture

- The JMETC Secret Network (JSN), based on the Secret Defense Research and Engineering Network (SDREN), is the T&E enterprise network solution for Secret testing.

- The JMETC Multiple Independent Levels of Security (MILS) Network (JMN) is the T&E enterprise network solution for all classifications and cyber testing.
JMETC SECRET Network (JSN)

- Focus is on **persistent connectivity**
  - Standing Agreements
    - All sites have valid Authority to Operate (ATO) and Authority to Connect (ATC)
  - Daily full mesh, end-to-end network characterization ensure optimized performance
  - On demand usage with little to no coordination necessary
    - MOAs in place to authorize connections between all sites

- Persistency enables user to…
  - Test capabilities early and often
  - Execute unscheduled/unplanned testing whenever needed
  - Focus on the test rather than the network

- Operates at **SECRET Collateral**
  - Leverages SECRET Defense Research & Engineering Network (SDREN) for connectivity
  - Functional and growing since 2007

Customer time and dollars not spent on infrastructure by leveraging JMETC
Example Capabilities on JSN

- Leverages the SECRET Defense Research and Engineering Network (SDREN) for connectivity
- Operates at SECRET classification, available 24/7
- Continuous monitoring, troubleshooting, and optimization of the end-to-end network infrastructure
- Capable of supporting numerous simultaneous test events

Functional JSN Locations: 49 (access to 82 labs/facilities)
Planned JSN Locations: 8
Connection Points to Other Networks: 5

Distribution Statement A: Approved for public release. Distribution is unlimited.
JSN Event Support Services

• **Pre-Test / Test Integration Emphasis**
  - Test Development/Design - help users leverage JSN capabilities and services to meet with infrastructure solutions
  - Network Engineering - designs, configures, establishes, and baselines connectivity solutions for test customers
  - Cybersecurity Engineering - support site/user accreditation efforts
  - User Support - ensures JMETC sites have the knowledge, skills, abilities, and site-specific examples to address test resource interoperability issues

• **Test Execution Emphasis**
  - JMETC SYSCON - verifies infrastructure readiness and proactively troubleshoots problems as they are discovered
  - Event Support - provides direct support to customer test activities on an as-needed basis

• **Post Test Emphasis**
  - Capture Lessons Learned and Infrastructure Gaps/Limitations
  - Data dissemination and distributed analysis
JSN Connectivity Services

- **JSN Systems Control (SYSCON)**
  - JMETC Personnel available to test, monitor, and troubleshoot network connectivity
  - Web-Based Help Desk and Phone Support
  - Assistance with site Ports, Protocols & Services management
  - Assistance with site device configuration
  - 9x5 and after-hours support as necessary

- **Inter-Site Collaboration**
  - VoIP Call Manager
  - Chat Server (XMPP)
  - Secure File Transfer Protocol (SFTP) Server
  - Adobe Connect

- **Information Assurance Compliance**
  - Linux and Windows Patches (YUM and WSUS)
  - Anti-virus (McAfee, Symantec, TrendMicro)
  - Scan/STIG tools (SRR, Gold Disk, Retina, etc.)

Continue to expand services offered based on community requirements
JMETC MILS Network (JMN)

- Focus is on providing secure distributed testbeds to support unconstrained cyber activities and users access to enterprise resources at multiple classifications

- Employs Multiple Independent Levels of Security (MILS) architecture
  - Allows for segregation of data streams by protocol, system, event, COI, etc.
    - Capable of supporting multiple simultaneous events at multiple classifications concurrently
    - Ability to create isolated “sandboxes”
  - Accredited by Defense Intelligence Agency (DIA) to operate from Unclassified up to TS//SCI
    - Included NSA Red Team assessment

Distribution Statement A: Approved for public release. Distribution is unlimited.
JMETC MILS Network (JMN)

- Defense Research Engineering Network (DREN) for unclassified transport

- JMN NOSC
  - Primary NOSC and Secondary NOSC provide continuity of operations
  - Manage, optimize and troubleshoot network connectivity
  - Help Desk
  - Provide pre-event checkouts as requested
  - Local infrastructure assistance as requested
  - 10x5 with after hours support as necessary

- Inter-Site Collaboration
  - VoIP
  - Chat Server
  - Secure File Transfer Protocol (SFTP) Server

JMETC will continue to expand tools & services offered based on user requirements
Why Do We Need Cyber Ranges?

- To assess advanced cyberspace technologies or exercise tactics, techniques, and procedures (TTPs) that require **isolated environments** of complex networked systems (e.g., movement on the Internet)

- To **conduct activities that cannot occur on operational networks** due to potential catastrophic consequences (e.g., releasing self-propagating malware)

- To **rapidly and realistically represent cyber contested environments** at different levels of security, fidelity, and/or scale (e.g., Blue [friendly] force, Red [adversary] force, and Gray [neutral] networks)

- For **precise control of the event environment** that allows for rapid reconstitution to a baseline checkpoint, reconfiguration, and repeat of complex use cases (e.g., rapidly running variation of conditions to quickly evaluate hundreds of scenarios)

TRMC manages the National Cyber Range Complex (NCRC) to help address DoD cyber T&E needs
Summary

• **Vision:** Make distributed T&E routine

• **JMETC Mission:** Robust distributed T&E infrastructure and subject matter expertise

• **The JMETC Team is here to help**
  • Event Planning / Design / Development / Integration / Monitoring / Execution for cyber and non-cyber T&E
  • TENA “Free Upgrade” support offer
  • Local and Distributed Network Engineering support
  • Corporate knowledge of assets available for distributed use
  • Information Assurance / Cybersecurity assistance

• **JMETC investments are driven by user requirements**
  • Deployment of JSN / JMN nodes are based on user need
  • JMETC provided tools and services are based on user input
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Help Desk

JTEX-05: December 10-12, 2019; Charlotte, NC