# Theater Medical Information Program – Joint (TMIP-J)

Executive Summary

- The Army Test and Evaluation Command (ATEC) conducted a Multi-Service Operational Test and Evaluation (MOT&E) of Theater Medical Information Program – Joint (TMIP-J) Increment 2 Release 3 (I2R3) that included a cybersecurity Adversarial Assessment from August 13 – 21, 2015. The Air Force Operational Test and Evaluation Center, Marine Corps Operational Test and Evaluation Activity, United States Army Medical Department Board, Air Force Medical Evaluation Support Activity (AFMESA), Marine Corps Tactical Systems Support Activity (MCTSSA), and the Joint Interoperability Test Command (JITC) all participated in the MOT&E. The MOT&E was adequate to assess operational effectiveness, operational suitability, and survivability for the Army, Air Force, and Marine Corps.
- The Commander, Operational Test Force (COTF) conducted Navy OT&E in a test environment aboard the USS *Carter Hall* (LSD 50) while in port at Joint Expeditionary Base, Little Creek, Virginia, and while underway in the nearby Virginia Capes operating area. COTF completed the mission-oriented functional OT&E from November 6 through December 18, 2015, and conducted cybersecurity testing from January 11 – 15, 2016. The Navy OT&E was adequate to support an assessment of survivability, but not adequate to support a full assessment of operational effectiveness or operational suitability for the Navy.
- TMIP-J I2R3 is not operationally effective for the Army, Air Force, and Marine Corps. DOT&E could not fully assess the operational effectiveness of TMIP-J I2R3 for the Navy. The Army and Air Force identified problems in the core mission areas of Health Care Documentation and Medical Command and Control that may pose risks to patient safety and prevent the system from being operationally effective for the Army, Air Force, and Marine Corps until these problems are corrected or mitigated. The Navy collected insufficient samples to determine whether problems reported by other Services in the mission area of Medical Command and Control exist in the Navy implementation of TMIP-J. TMIP-J I2R3 is effective for the Navy in the core Business Process Support mission areas of Health Care Documentation and Preventative Medicine. The three joint interfaces evaluated met the accuracy and timeliness thresholds for interoperability, and network operations were effective for all Services.
- TMIP-J I2R3 is operationally suitable for the Army, Air Force, and Marine Corps. DOT&E could not assess operational suitability for the Navy because positive mission performance results conflicted with negative user opinions from the small number of Navy test participants and the Navy failed to conduct follow-up interviews with TMIP-J I2R3 users during the Navy portion of the MOT&E.

Sustaining Base — Theater
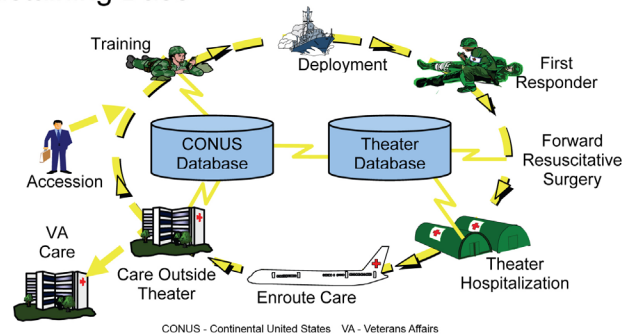
- TMIP-J I2R3 is not survivable. During the Army, Air Force, and Marine Corps MOT&E, cybersecurity test aggressors penetrated the system and gained access to the test patient health records as an insider/nearsider to the system. During the Navy OT&E, cybersecurity test aggressors identified no vulnerabilities with the TMIP-J I2R3 software itself, but did identify vulnerabilities in thr Consolidated Afloat Network and Enterprise Services (CANES) system. The CANES vulnerabilities enabled the cyber aggressors to penetrate TMIP-J workstations.

System

- TMIP-J is a Major Automated Information System that integrates software from sustaining base medical applications into a multi-Service system for use by deployed forces. Examples of integrated applications include the theater versions of the Armed Forces Health Longitudinal Technology Application, Composite Health Care System, and Defense Medical Logistics Standard Support.
- TMIP-J provides the following medical capabilities:
  - Electronic Health Records
  - Medical command and control
  - Medical logistics
  - Patient movement and tracking
  - Patient data to populate the Theater Medical Data Store (theater database) and the Clinical Data Repository (Continental U.S. database)
- The Services provide their own infrastructure (networks and communications) and computer hardware to host the TMIP-J software.
- TMIP-J consists of two increments. The Program Executive Office fielded Increment 1 in 2003 and is developing Increment 2 in multiple releases with the following fielding dates:
  - Increment 2 Release 1 – fielded in 2009.
  - Increment 2 Release 2 – fielded in 2014.

- Increment 2 Release 3 was the system under test during 2015 and is the final TMIP-J release.
- The Program Executive Office initiated the Joint Operational Medicine Information Systems (JOMIS) program in FY15. This program will replace portions of TMIP-J.

Mission
- Combatant Commanders, Joint Task Force commanders, and their medical staff equipped with TMIP-J can make informed and timely decisions about planning and delivering health care services in the theater.

- Military health care providers equipped with TMIP-J can electronically document medical care provided to deployed forces to support continuity of medical care from the theater to the sustaining base.

Major Contractors
- SAIC – Falls Church, Virginia
- Northrop Grumman – Chantilly, Virginia
- Akimeka LLC, Kihei – Maui, Hawaii

Activity
- ATEC conducted an MOT&E of TMIP-J I2R3 in accordance with the DOT&E-approved test plan from August 13 – 21, 2015. The Air Force Operational Test and Evaluation Center, Marine Corps Operational Test and Evaluation Activity, United States Army Medical Department Board, AFMESA, MCTSSA, and JITC also participated in the MOT&E. ATEC tested the Army and Air Force components of TMIP-J I2R3 at AFMESA, Fort Detrick, Maryland, and Marine Corps portions of TMIP-J I2R3 at MCTSSA, Camp Pendleton, California.
- In August 2015, the Threat System Management Office conducted a cybersecurity Adversarial Assessment for the Army, Air Force, and Marine Corps portions of TMIP-J I2R3 in conjunction with the MOT&E.
- COTF conducted Navy OT&E with the DOT&E-approved test plan, in a test environment aboard the USS *Carter Hall* (LSD 50) while in port at Joint Expeditionary Base, Little Creek, Virginia, and while underway in the nearby Virginia Capes operating area. COTF conducted mission-oriented functional OT&E from November 6 through December 18, 2015, and cybersecurity testing from January 11 – 15, 2016.
- Following the MOT&E, the JOMIS Program Manager developed TMIP-J I2R3 Service Pack 1 (SP1) to correct discovered problems.
- In June 2016, the JOMIS Program Manager completed a TMIP-J I2R3 SP1 developmental test and evaluation regression test and released the system software to the Services for implementation.
- In August 2016, the JOMIS Program Manager completed installation of TMIP-J I2R3 SP1 on the TMIP-J baseline system at Joint Task Force Bravo, Soto Cano Air Base, Honduras.

Assessment
- The MOT&E and the Navy OT&E were adequate to assess survivability for all Services. The MOT&E was adequate to assess operational effectiveness and operational suitability for the Army, Air Force, and Marine Corps, but the Navy OT&E was not adequate to fully assess operational effectiveness and operational suitability.

- TMIP-J I2R3 is not operationally effective for the Army, Air Force, and Marine Corps. DOT&E could not fully assess the operational effectiveness of TMIP-J I2R3 for the Navy.
  - There were no deficiencies in the core mission areas of Patient Movement and Medical Logistics. However the August 2015 MOT&E identified problems in the core mission areas of Health Care Documentation and Medical Command and Control that may pose risks to patient safety and prevent the system from being operationally effective until these problems are corrected or mitigated. Specifically, users must manually enter the same patient data into multiple systems as no automated interface between them exists, increasing the potential for errors or incomplete medical data in one or more systems. The Navy collected insufficient samples to determine whether problems reported by other Services in the mission area of Medical Command and Control exist in the Navy implementation of TMIP-J. TMIP-J I2R3 is effective for the Navy in the Business Process Support mission areas of Health Care Documentation and Preventative Medicine.
  - The three joint interfaces evaluated met the accuracy and timeliness thresholds for interoperability.
  - Network operations were effective for all Services, although there were initial difficulties in establishing tactical communications through supporting Service networks. During the first seven days of the MOT&E, the Army, Air Force, and Marine Corps were unable to exchange data over their very small aperture terminal satellite systems. Service technicians isolated the problem to a network device that was altering packets because of an incomplete security certification. They solved the problem by obtaining a new certification. Satellite communications problems aboard the USS *Carter Hall* delayed testing. Once the Navy fixed these problems, TMIP-J I2R3 data successfully traversed the network while both dockside and underway to perform the mission.
- TMIP-J I2R3 is operationally suitable for the Army, Air Force, and Marine Corps. DOT&E could not evaluate operational suitability for the Navy because positive mission performance

results conflicted with negative user opinions from the small number of Navy test participants, and the Navy failed to conduct follow-up interviews with TMIP-J I2R3 users during the Navy OT&E.
- System administrators responded favorably to survey questions regarding administration of the system.
- User opinion surveys from the Army, Air Force, and Marine Corps confirmed that their respondents liked the system and found it easy to use. They reported a mean score of 70 on the System Usability Scale (SUS), indicating acceptable usability. However, Navy user opinion surveys resulted in a very low mean score of 38, indicating unacceptable usability for medical users aboard the USS *Carter Hall*.
- Army, Air Force, and Marine Corps test participants indicated that the TMIP-J I2R3 supporting documentation was helpful and that they were satisfied with help desk performance. The Army and Air Force did not adequately capture reliability and availability data during the test event, but there were no indications that the system is not reliable or available. The Marine Corps reported an availability of 99.8 percent, which exceeded the 99 percent availability threshold with confidence. The Navy reported 243 hours of system operating time, with no observed failures resulting in an 80 percent lower confidence bound of 151 hours Mean Time Between Operational Mission Failures due to software and 100 percent availability.

- TMIP-J I2R3 is not survivable. During Army, Air Force, and Marine Corps OT&E, cybersecurity test aggressors penetrated the system and gained access to the test patient health records as an insider/nearsider to the system. During the Navy OT&E, cybersecurity test aggressors identified no vulnerabilities with the TMIP-J I2R3 software itself, but did identify vulnerabilities in the CANES hosting platform for TMIP-J I2R3. The CANES vulnerabilities enabled cyber aggressors to penetrate TMIP-J workstations.

Recommendations
- Status of Previous Recommendations. There were no previous recommendations.
- FY16 Recommendations.
  1. The Program Executive Officer of Defense Healthcare Management Systems, in coordination with the Services and the Defense Health Agency Functional Advisory Council, should address problems discovered during the MOT&E.
  2. The Operational Test Agencies should retest TMIP-J I2R3 capabilities in a representative operational environment with operational users to support a final fielding of TMIP-J I2R3.
  3. The Navy should ensure all instances of CANES, on all platforms, are properly patched and configured for cybersecurity and routinely conduct cybersecurity testing of CANES installations.