DEPARTMENT OF DEFENSE
Developmental Test and Evaluation

FY 2015 Annual Report

MARCH 2016

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The estimated cost of this report for the Department of Defense
is approximately $326,000 in Fiscal Years 2015–2016.
This includes $131,000 in expenses and $195,000 in DoD labor.
Generated on 2016Jan29 RefID: 5-54C0D7C

Department of Defense Developmental Test and Evaluation FY 2015 Annual Report

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1 EXECUTIVE SUMMARY

The Deputy Assistant Secretary of Defense for Developmental Test and Evaluation (DASD(DT&E)) submits this Annual Report for Fiscal Year (FY) 2015 in response to section 139b(d)(1) of Title 10, United States Code (U.S.C.). This report addresses activities related to the Major Defense Acquisition Programs (MDAPs) including the following:

- A discussion of the extent to which MDAPs are fulfilling the objectives of their developmental test and evaluation (DT&E) plans.
- A discussion of the waivers of and deviations from requirements in the Test and Evaluation Master Plans (TEMPs) and other testing requirements that occurred during the preceding year with respect to such programs, any concerns raised by such waivers or deviations, and the actions that have been taken or are planned to be taken to address such concerns.
- An assessment of the organization and capabilities of the Department of Defense (DoD) for DT&E with respect to such programs.
- Any comments on such report that the Secretary of Defense considers appropriate.

This report includes a separate section that covers the activities of the DoD Test Resource Management Center (TRMC) during FY 2015 and a separate section that addresses the adequacy of resources available to the DASD(DT&E) and the Lead DT&E Organizations of the Military Departments to carry out the responsibilities prescribed by law.

This report provides an assessment of the test and evaluation (T&E) workforce and also highlights the engagement activities and assessments of 37 programs (MDAPs, Major Automated Information System (MAIS) programs, and special interest programs designated by the Under Secretary of Defense for Acquisition, Technology, and Logistics (USD(AT&L)). These selected programs reached significant milestones or had significant DT&E activities in FY 2015.

1.1 Developmental Test and Evaluation

In FY 2015, DASD(DT&E) added focus areas to the Shift Left initiative previously reported. The DASD(DT&E) focus areas are about improving DT&E to enable programs to find and fix problems early during development when fixes are more effective, more efficient, and less costly and to be more responsive to acquisition decision makers. DASD(DT&E) continued to assist programs in developing and executing more robust DT&E activities that provide decision makers with the right information at the right time.

In FY 2015, DASD(DT&E) continued to mature the cybersecurity DT&E process. The cybersecurity DT&E process provides the Chief Developmental Tester (CDT) and T&E community with a set of recommended developmental cybersecurity T&E objectives to consider when planning and assessing a system. The DoD Cybersecurity T&E Guidebook (July 1, 2015) outlines the DT&E process and the procedures necessary to gather test data needed for a major acquisition decision. The guidance will be included in the next update of the Defense Acquisition Guidebook (DAG).

In FY 2015, DASD(DT&E) continued to assist the program offices in developing the TEMP, with special attention given to the Milestone (MS) A and MS B TEMP, and also in developing the Developmental Evaluation Framework (DEF) that is the basis of the TEMP. The DEF serves as a T&E road map and is used to support sound acquisition program decision making. It shows the correlation/mapping between test events, key resources, and the decision supported. DASD(DT&E) routinely provides the specifics of the framework, including its utility and importance across DoD. To increase understanding and expedite adoption of the DEF, DASD(DT&E) formed a team to assist the program offices in developing the DEF. Guidance on the DEF has been incorporated in the Defense Acquisition University (DAU) T&E curriculum and will be included in the next update of the DAG.

Of the 37 programs assessed in this report, none requested a waiver or deviation from requirements in the TEMP in FY 2015.

As in the past, this report uses the self-assessment reports provided to the DASD(DT&E) by DoD Components with MDAPs, MAIS programs, and USD(AT&L)-designated special interest programs. For FY 2015, the DoD Components provided updates to their previous reports regarding T&E involvement in early acquisition activities, T&E planning and execution, and T&E personnel.

1.2 Test and Evaluation Workforce

This report includes DoD Component-specific information on the designation of CDTs (T&E Key Leadership Positions (KLPs)) for MDAPs and MAIS programs, the use of Defense Acquisition Workforce Development Fund (DAWDF) Section 852 funding in support of the T&E workforce, and the adequacy of resources available to the Government organizations serving as Lead DT&E Organizations for the programs being assessed in this report.

DASD(DT&E) routinely monitors and reviews the composition of the T&E workforce. As in previous years, DoD Components continue to rely on support contractors and developer T&E support. Non-acquisition-coded, and specifically non-T&E-coded, personnel are still the major contributors to T&E activities. A significant number of T&E resources remain outside this Defense Acquisition Workforce Improvement Act (DAWIA)-certified workforce. DASD(DT&E) is working with the DoD Components to ensure that all T&E positions are properly coded (T&E acquisition career field).

The DoD Components have identified a shortfall in the number of trained personnel to conduct T&E activities to detect cyber vulnerabilities in acquisition systems. DASD(DT&E) is supporting efforts across DoD to build a fully trained cyber workforce and improve civilian recruitment and retention as outlined in the DoD Cyber Strategy (April 2015). Innovative personnel initiatives are needed to address this shortfall.

An initiative of the USD(AT&L) Better Buying Power (BBP) is to improve the professionalism of the total acquisition workforce by establishing higher standards for KLPs and stronger professional qualification requirements for all acquisition specialties. The DASD(DT&E) convened the DoD's first KLP Qualification Board in December 2014. The board identified 17 individuals, out of 34 applicants reviewed, as qualified to be assigned in a T&E KLP. The results were provided to the

USD(AT&L) via the Director, Human Capital Initiatives, and also presented to the Business Senior Integration Group. The USD(AT&L) presented an "Award for Excellence" to the DASD(DT&E) team members in recognition of their support to the T&E KLP Qualification Board. During the T&E KLP Qualification Board process, DASD(DT&E) collected lessons learned and best practices that were presented to other acquisition career fields and used to update materials and make improvements to the standard operating procedure. The DoD's second T&E KLP Joint Qualification Board occurred on December 8, 2015. The board identified 26 individuals, out of 36 applicants reviewed, as qualified to be assigned in a T&E KLP.

1.3 DoD Test Resource Management Center

The TRMC is responsible for oversight of the DoD test resources. This report provides descriptions of TRMC activities and initiatives during FY 2015. The T&E/Science and Technology (S&T) Program made significant progress across eight focus areas. The Central Test and Evaluation Investment Program (CTEIP) again made significant progress in development and deployment of test infrastructure capabilities. Within CTEIP, advanced electronic warfare T&E was a major focus of analysis, investment, and capability upgrades. The Joint Mission Environment Test Capability (JMETC) Program made strides toward advancing the infrastructure objectives of the "Testing in a Joint Environment Roadmap," which included building and sustaining the infrastructure to support current and future interoperability and cyberspace T&E requirements.

In FY 2015, the TRMC continued work on the Joint Strike Fighter Knowledge Management (KM) project and the Collected Operational Data Analytics for Continuous T&E project, both of which are helping to develop the technologies and processes needed for a T&E enterprise approach to KM. These projects will culminate in the development of a KM investment road map that captures the concepts, requirements, technologies, methodologies, and architecture needed for a T&E enterprise approach.

Work is ongoing on a variety of congressionally directed plans and studies. The TRMC worked with the Office of Science and Technology Policy (OSTP) and the Administrator of the National Aeronautics and Space Administration (NASA) on a Hypersonics Business Case Report. In April 2015, the TRMC launched a three-phase, 20-month study to identify the test infrastructure required to support the development and testing of autonomous systems. The TRMC will conduct a cost-benefit analysis of the feasibility of transitioning entities within the Major Range and Test Facility Base (MRTFB) to the Laboratory Demonstration pay system. The TRMC is also conducting a comprehensive assessment of MRTFB-only military construction needs and investments and developing a plan for ensuring sufficient capacity for all MRTFB facilities to support current and projected future operations. The assessment includes an estimated cost to replace or bring to code deficient structures as well as a plan to ensure sufficient capacity. The TRMC is working on a report to assess the value of leasing/rental services for commercial off-the-shelf research, test, and measurement equipment capabilities.

Test range sustainability has grown in importance with the emphasis on renewable energy projects on or near the ranges. In 2015, the TRMC completed a Test Range Encroachment Review in response to USD(AT&L) growing concerns about how encroachment issues affect the capability of DoD test ranges to meet acquisition program test requirements. The range review confirmed that

electromagnetic spectrum, energy development/adjacent land use, and airspace encroachment are the issues with the greatest impact on T&E infrastructure. The TRMC also initiated the 2016 biennial encroachment survey.

The TRMC continues to develop required T&E infrastructure improvement solutions and to focus on cybersecurity test capability, with continued development of the National Cyber Range (NCR). In FY 2015, the NCR supported 47 training events, operational exercises, and MDAP cybersecurity testing events, which was a more than 100 percent increase over FY 2014.

1.4 Adequacy of Resources

In FY 2015, the Office of the DASD(DT&E) has a staffing level of 11 organic Government personnel, seven detailees, and additional contractor support. Working within available resources, DASD(DT&E) focuses its activities on MDAPs, with additional support to MAIS programs and special interest programs as designated by the USD(AT&L). DASD(DT&E) also devotes resources to support T&E acquisition workforce development.

In FY 2015, DASD(DT&E) continued the process to assess the adequacy of resources available to the Lead DT&E Organizations to carry out the responsibilities prescribed in section 139b of Title 10, U.S.C. The DoD Components provided information on the designation of Lead DT&E Organizations for 35 programs. DASD(DT&E) assessed the T&E expertise and capabilities provided by these Lead DT&E Organizations and funding to support DT&E activities.

2 DASD(DT&E) ACTIVITIES

2.1 DASD(DT&E)/TRMC Focus Areas

DASD(DT&E) and TRMC focus areas encompass those actions that the two organizations are developing to be more responsive to acquisition decision makers, to the test community, and to emerging requirements of the Nation's test infrastructure. These areas are in alignment with the principles of BBP 3.0, introduced on September 19, 2014.

2.1.1 Implementing the Developmental Evaluation Framework (DEF)

Background. DoD Instruction (DoDI) 5000.02, "Operation of the Defense Acquisition System," instructs program managers (PMs) to describe a developmental evaluation methodology in the TEMP starting at MS A that will provide essential information on programmatic and technical risks as well as information for major programmatic decisions. Starting at MS B, the TEMP will include a DEF. The DEF is a tailorable, standardized, tabular means for acquisition programs to clearly and succinctly articulate the TEMP's DT&E strategy, which is focused on system evaluation to inform acquisition, programmatic, and technical decisions. The DEF identifies key data that will contribute to assessing system performance, interoperability, cybersecurity, reliability, and maintainability; the DEF shows the correlation and mapping between decisions, information/data requirements, test events, and key resources. The DEF is the basis for the DT&E plan and is designed to improve DT&E planning and streamline the TEMP.

Rather than simply define the DEF in policy and require the acquisition programs to determine how to apply the concept to their program's needs, DASD(DT&E) developed, chartered, and deploys a DEF Core Team to engage with the acquisition programs, at their locations, to assist in developing a DEF that is tailored to their program's unique needs and circumstances.

During FY 2015, DASD(DT&E) DEF Core Teams engaged with 25 acquisition programs across the DoD warfare areas, at various stages within the acquisition development life cycle. The initial DEF developed during these program engagements was further refined by program office personnel, and then inserted into the TEMP to assist in defining the DT&E strategy. In addition to direct program engagements for socializing and instantiating the DEF, DASD(DT&E) developed a DEF section that will be included in the next release of the DAG to provide detailed guidance to the PM and T&E practitioners. DASD(DT&E) presented educational sessions on the DEF at acquisition centers, conferences, and DAU and conducted collaborative discussions with select Office of the Secretary of Defense (OSD) staff offices.

Next Steps. DASD(DT&E) will continue to mature the DEF and assist programs. DASD(DT&E) is working with the TRMC to refine and prototype a standardized means of defining the linkage between the DEF and the test resources required. Future annual reports will document updates, as needed.

2.1.2 Implementing the TEMP at MS A

Background. DoDI 5000.02 requires that a TEMP be developed and approved beginning with the MS A decision. In FY 2015, DASD(DT&E) developed a TEMP checklist focused on development of a MS A TEMP. The focus areas of this checklist provide guidance to address DT&E strategies and methodologies focused on assessing technology maturity and early program risk reduction, DEFs, T&E decision support matrixes, database management, modeling and simulation (M&S), and early identification of required program T&E resources.

Next Steps. DASD(DT&E) will continue to develop and refine the guidance for implementing the TEMP at MS A with the intent of finalizing and disseminating it to the T&E community by the end of FY 2016. Future annual reports will document updates, as needed.

2.1.3 Improving Reliability T&E

Background: In FY 2015, DASD(DT&E) emphasized early DT&E assessment of reliability program risks and influencing design for reliability planning and reliability growth programs (RGPs). The focus is to ensure that program offices develop a robust and effective RGP, which includes a reliability growth curve, with appropriate DT&E activities and resources identified, planned, and executed during each phase of system development to inform key decisions—from analysis of alternatives through completion of Engineering and Manufacturing Development (EMD). RGP execution and tracking progress would enable sufficient knowledge for decision makers to judge risks about whether reliability requirements will be met throughout the developmental life cycle for each mission-critical subsystem, software build, and integrated system in a mission context.

DASD(DT&E) goals for improving reliability T&E include the following:

- TEMPs submitted for approval have effective and efficient reliability programs that include RGPs. RGPs are collaboratively developed with systems engineering (SE) and included in the MS B TEMP. Reliability growth is monitored and reported throughout the acquisition process.
- Close relationships between CDTs and Chief Engineeers within the program offices are fostered so that the determination of initial reliability is accurately determined before system-level reliability growth testing begins.

Next Steps: DASD(DT&E) is developing guidance to better support personnel in the program offices in developing robust RGPs during each phase of system development. Future annual reports will document updates, as needed.

2.1.4 Improving Cybersecurity DT&E

Background. DASD(DT&E) has emphasized the importance of cybersecurity testing within acquisition programs. DT&E must ensure that security measures designed and implemented within systems perform as intended and provide adequate security. Systems built with security in mind and tested for security deficiencies will be more resilient, more trustworthy, easier to defend, and more effective for Warfighters.

In July 2015, DASD(DT&E) published the DoD Cybersecurity T&E Guidebook. The guidebook provides CDTs and the testing community with greater detail about the processes and activities that programs should undertake during cybersecurity T&E. In addition, DASD(DT&E) contributed to development of the DoD PM's Guidebook for Integrating the Cybersecurity Risk Management Framework (RMF) into the System Acquisition Lifecycle, published in September 2015 and endorsed by the USD(AT&L) and the DoD Chief Information Officer (CIO). The guidebook provides PMs with a more general view of cybersecurity activities (threat analysis, requirements analysis, SE, risk management, T&E) necessary to successfully build a secure system.

In FY 2015, DASD(DT&E) continued to review program TEMPs to ensure that they contain adequate cybersecurity evaluation plans and testing. Each program TEMP includes a DEF with cybersecurity evaluation criteria, which in turn are mapped to test events that will provide data for evaluations. These data are evaluated and used to support critical programmatic, technical, and acquisition decisions.

Next Steps. Through program engagements, DASD(DT&E) will continue to ensure that program TEMPs contain cybersecurity T&E plans (objectives, events, resources) that will identify vulnerabilities and risks to systems. Deficiencies found during cybersecurity T&E will be fed back to systems engineers and developers for remediation. DASD(DT&E) program assessments at MS C will include evaluations of cybersecurity. DASD(DT&E) will refine the cybersecurity guidance as the process evolves in response to lessons learned and increased cyber activities. Future annual reports will document updates, as needed.

2.1.5 Improving Interoperability DT&E

Background. In accordance with DoDI 5000.02, demonstrated interoperability is one of the criteria considered by the Milestone Decision Authority at MS C. To support the MS C decision for MDAPs, MAIS programs, and special interest programs designated by the USD(AT&L), DASD(DT&E) submits a DASD(DT&E) program assessment to the USD(AT&L) that includes an evaluation of activities that a program has done to date toward achieving interoperability.

To perform this interoperability evaluation, developmental testing (DT) must take place during the EMD phase to ensure that adequate data are available for evaluation. The goal of the DASD(DT&E) interoperability initiative is to have programs begin interoperability DT&E activities earlier in the acquisition life cycle. This DT&E should include subsystem, system, and system-of-systems (SoS) testing based on the net-ready key performance parameter (NR KPP), technical requirements, and established SoS architectures. When possible, DT&E data should be attained in such a way that the data will support interoperability certification, which is achieved during initial operational test and evaluation (IOT&E).

DASD(DT&E) has developed a draft interoperability DT&E process that consists of three phases: evaluate requirements, test system interfaces, and test SoS interfaces in a mission environment. In the evaluate requirements phase, DASD(DT&E) ensures that interoperability requirements are testable, measurable, and included in T&E plans. In the test system interfaces phase, DASD(DT&E) ensures that all interfaces are identified, interface standards are met, and basic interoperability is tested. Finally, in the test SoS interfaces in a mission environment phase, a system's ability to

successfully exchange (send or receive) information in support of mission accomplishment is tested and evaluated. The data gathered during these three phases will provide DASD(DT&E) with the information necessary to evaluate interoperability as part of the DASD(DT&E) MS C program assessment. The draft interoperability process will be refined in FY 2016.

Next Steps. DASD(DT&E) will work with the Services, Defense Information Systems Agency (DISA), and program offices to ensure that program TEMPs contain an interoperability DT plan (objectives, events, resources) that will demonstrate interoperability by MS C and support interoperability certification during IOT&E. DASD(DT&E) program assessments at MS C will include evaluations of demonstrated interoperability. Future annual reports will document updates, as needed.

2.1.6 Improving and Maintaining Hypersonic Test Infrastructure

Background. The OSTP, working with the Secretary of Defense and the Administrator of NASA, completed a study, as directed by the FY 2013 National Defense Authorization Act (NDAA), on the ability of the national T&E infrastructure to effectively and efficiently mature hypersonic technologies for defense systems development in the short term and long term. The study evaluated the capabilities of existing ground test facilities and open-air ranges (OARs). It found that although many existing facilities provide substantial capability for testing weapon systems in the hypersonic flight regime, capability gaps exist in ground test facilities, OARs, and M&S. Existing facilities were created to evaluate strategic deterrent, missile defense, and space access systems; however, sustained controlled flight in the hypersonic flight regime requires a more realistic emulation of this extreme environment to better understand the physics and chemistry.

In follow-up to the OSTP study, the TRMC led development of a DoD report and plan on the requirements and proposed investments to meet DoD needs through 2030. The report was sent to the appropriate congressional committees. Based on the findings, the TRMC and the Assistant Secretary of Defense for Research and Engineering (ASD(R&E)) are collaborating on submission of proposed investments to address shortfalls in test capabilities for hypersonic system development for consideration in the budget process.

Testing that can replicate the broad spectrum of operational environments encountered within the hypersonic flight regime will require special considerations. The T&E community identified a need to develop a T&E methodology capable of supporting the effective and efficient development of maturing hypersonic technologies for defense systems and reduce risk before initiating program operation in these speed regimes. The set of expected test requirements will be based on the likely characteristics to be validated for near-term developmental hypersonic systems.

In FY 2015, DASD(DT&E) and the TRMC continued activities to determine cost savings, savings in schedule, and performance improvements that will be realized by having the right infrastructure in place to support hypersonic testing. DASD(DT&E) began development of a road map and a test methodology that consists of a balance of ground and flight tests as well as test support to adequately conduct acquisition-quality testing leading to development of hypersonic weapons.

Next Steps. DASD(DT&E) and the TRMC will expand on the FY 2015 activities. Future annual reports will document updates, as needed.

2.1.7 Incorporating/Improving Big Data/Knowledge Management (KM) in T&E

Background. The current KM capabilities and processes used to gain, collect, and analyze the information necessary to conduct acquisition assessments and evaluations are deficient and ineffective for today's world. Embracing an enterprise approach to T&E KM leveraging commercially proven big data analytics technologies can efficiently and continuously improve the knowledge base throughout the life cycle of a system. Improved analytical tools and methods are needed to quickly and accurately reduce the data and analyze performance within these environments. In addition, T&E data are currently compartmentalized with little discovery or usage outside of the specific event, acquisition program, and organization for which the data were collected. T&E data must be shared and leveraged across programs and throughout the life cycle to allow learning from the knowledge attained by others.

In FY 2015, the TRMC continued execution of two pilot projects intended to better understand the requirements and capabilities necessary to bring big data analytics to T&E. The first pilot project introduced big data analytics concepts and capabilities into DT and operational testing (OT) for an active DoD acquisition program, and the second pilot project applied big data analytics concepts to follow-on T&E, acquisition system block upgrades, and informing next-generation acquisition systems.

Next Steps. In FY 2016, the TRMC will continue efforts to develop an investment road map that will capture the detailed concepts, requirements, technologies, methodologies, and architecture necessary for a T&E enterprise approach. Future annual reports will document updates, as needed.

2.1.8 Understanding and Improving T&E of Autonomous Systems

Background. The increasing development and usage of autonomy in weapon systems is driving unique approaches to test planning and execution as well as unique test facilities, capabilities, and safety concerns. To help ensure that DoD efficiently acquires and effectively employs autonomous systems, DASD(DT&E) and the TRMC have embarked on a multifaceted initiative to identify and acquire the T&E resource categories of skills, methods, and facilities that will be needed to adequately test the emerging variety of these increasingly capable self-operating systems. At the topmost level, this initiative pursues two paths. The first and currently highest priority path addresses the methodologies and resources needed for the testing of the autonomous systems themselves. The second path will then address the potential use of autonomous systems technologies to enhance the efficiency and effectiveness of T&E of all forms of systems acquired for use by DoD.

In FY 2015, DASD(DT&E) activities included identifying the current and emerging state of autonomous technology, its designs and implementations, and the forms of its current testing. With this understanding, the existing and anticipated gaps will be identified in the available personnel skills, test methods, and test facilities available to DoD and the strategies developed to overcome these gaps. The strategies are expected to include course material and guidebooks for educating and training the T&E workforce, research to develop test methodology and techniques for planning and

conducting T&E of autonomous systems, and acquisition plans for obtaining any needed new test facilities.

Next Steps. DASD(DT&E) and the TRMC will address the potential use of autonomous systems technologies to enhance the efficiency and effectiveness of T&E of defense systems. This follow-on effort will also identify workforce, test methodology and facility requirements, shortfalls, and mitigation strategies associated with such technologies. Future annual reports will document updates, as needed.

2.2 T&E Policy and Guidance Activities

Background. In FY 2015, DASD(DT&E) drafted updates and restructured Chapter 9 of the DAG to align with DoDI 5000.02 and several other updated DoDIs. DASD(DT&E) made significant updates to the sections on cybersecurity DT&E, interoperability DT&E, reliability T&E, the DEF, scientific test and analysis techniques (STAT) in T&E, and the TEMP.

Next Steps. Based on guidance from the USD(AT&L), DASD(DT&E) will formalize the draft update to Chapter 9 of the DAG.

2.3 T&E Workforce Development Activities

The DASD(DT&E) serves as the functional leader for the T&E career field. In this capacity, the DASD(DT&E) role is to establish, oversee, and maintain education, training, and experience requirements including competencies and certification standards, the T&E position category description (PCD), and the T&E content of DAU courses as current, technically accurate, and consistent with DoD acquisition policy.

During FY 2015, DASD(DT&E), the DAU T&E Performance Learning Director, and T&E course managers conducted an annual review of the T&E curriculum. The T&E Functional Integrated Product Team (FIPT) reviewed the T&E Workforce Competency Model, the T&E PCD, T&E-specific requirements for the CDT, T&E Certification Guides, and T&E training standards. Based on the review, FY 2016 curriculum updates were made to the T&E PCD; T&E Certification Guides for T&E Level I, Level II, and Level III on the DAU website; the DoD T&E Workforce Competency Model; and TST 102, TST 204, and TST 303 courses. The T&E experience standard, T&E training standard, and T&E education standard remained unchanged.

DASD(DT&E) generated the FY 2015 to FY 2017 road map to assist in T&E workforce development through annual improvement blocks. The goal is to continuously improve the curriculum so that T&E professionals are prepared and capable of performing their critical roles throughout the acquisition life cycle. This road map is reviewed annually and updated as required. Figure 2-1 depicts the FY 2015 to FY 2017 road map.

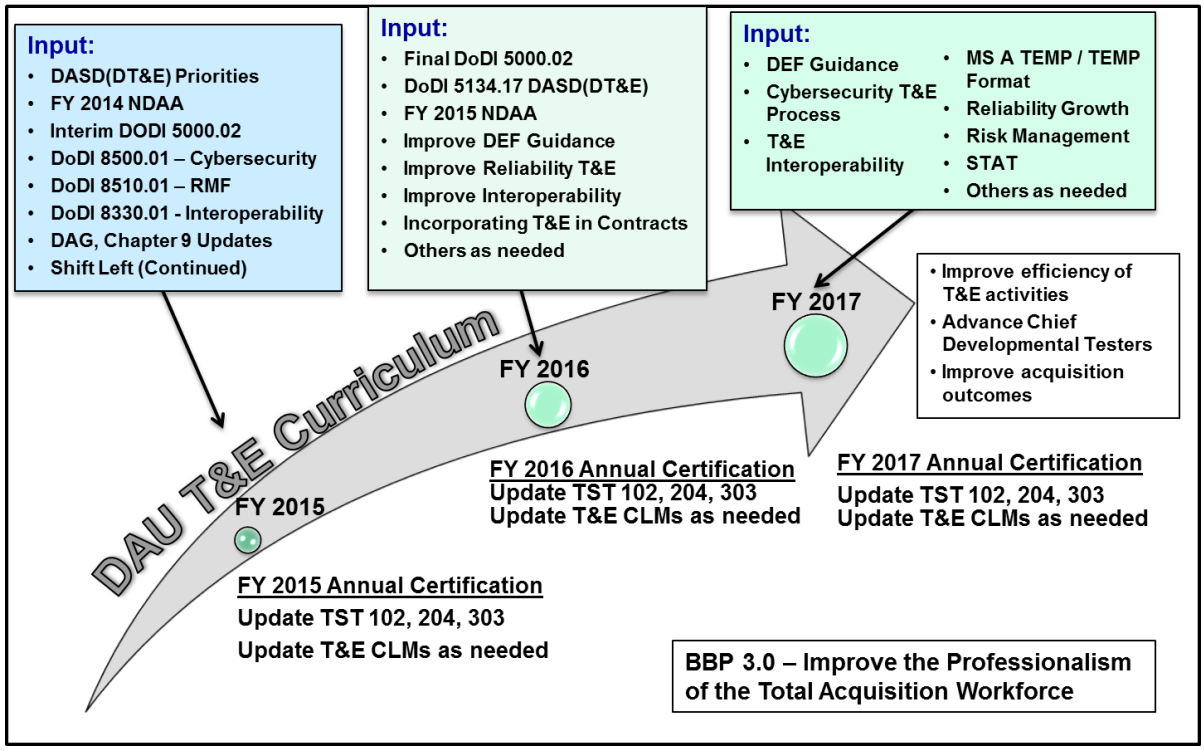


Figure 2-1. DASD(DT&E) FY 2015 to FY 2017 T&E Workforce Development Road Map

2.3.1 T&E Curriculum Updates

Background. The DASD(DT&E) reviewed and certified the FY 2016 T&E core curriculum on June 11, 2015. The T&E workforce development road map guided the review and identified the updates needed for the T&E courses (TST 102, TST 204, and TST 303). Table 2-1 shows key updates to the FY 2016 T&E curriculum.

Table 2-1. Updates to the FY 2016 T&E Curriculum

Course	Updates
TST 102	Update based on DoDI 5000.02 Updated interoperability Included discussion on the DEF
TST 204	Update based on DoDI 5000.02 Updated Developmental Evaluation Methodology and Framework Updated T&E resource lesson to include TRMC video Updated Cybersecurity T&E based on PM Cybersecurity Guidebook
TST 303	Update based on DoDI 5000.02 Developed cybersecurity T&E lesson (critical thinking) Updated Reliability Growth Planning lesson Updated T&E Strategy discussions to include Developmental Evaluation Methodology and Framework

Next Steps. DASD(DT&E) will continue to monitor and annually review the curriculum in accordance with the functional leader responsibilities assigned in DoDI 5000.66, "Operation of the

Defense Acquisition, Technology, and Logistics Workforce Education, Training, and Career Development Program." DASD(DT&E) will continue to implement the DASD(DT&E) road map for the T&E workforce (see Figure 2-1). In addition, DASD(DT&E) will continue to monitor student feedback on T&E courses to improve the overall quality and usefulness of the material.

2.3.2 Acquisition Workforce Qualification Initiative (AWQI)

Background. AWQI is a key element of BBP. The intent of AWQI is to ensure that every member of the acquisition workforce has the skills required to ensure successful outcomes. AWQI is an employee development tool used to identify job-specific gaps in experience, allow for identification of developmental opportunities, and capture demonstrated experience.

From FY 2013 through FY 2014, DASD(DT&E) and subject matter experts from DAU translated T&E career field competencies into measurable on-the-job T&E products and their corresponding T&E tasks (referred to as standards). In FY 2015, these standards were integrated with other career field standards and provided to the DoD Components.

Next Steps: The DoD Components will develop implementation plans for their respective career fields and disseminate them to their organizations. Future annual reports will document updates, as needed.

2.3.3 Acquisition Support to AT&L Workforce Development

Background. Section 1706 of Title 10, U.S.C., establishes a goal to have a properly qualified CDT for each MDAP and MAIS program. The November 8, 2013, USD(AT&L) memorandum, "Key Leadership Positions and Qualification Criteria," designated the CDT as a mandatory KLP for each MDAP and MAIS program and initiated a requirement for KLP Qualification Boards to be established and convened in 2014. This focus area is one of the initiatives of the USD(AT&L) BBP. The initiative is to improve the professionalism of the total acquisition workforce by establishing higher standards for KLPs and stronger professional qualification requirements for all acquisition specialties. The USD(AT&L) BBP 3.0 White Paper states that the T&E field will lead the effort to develop the initial pilot of a professional qualification board and it is expected that the pilot will expand to cover a broader set of KLPs.

The DASD(DT&E) convened the first KLP Joint Qualification Board in December 2014. The board identified 17 individuals, out of 34 applicants reviewed, as qualified to be assigned in a T&E KLP. The results were provided to the USD(AT&L) via the Director, Human Capital Initiatives, and also presented to the Business Senior Integration Group. The USD(AT&L) presented an "Award for Excellence" to the DASD(DT&E) team members in recognition of their support to the T&E KLP Qualification Board. During the T&E KLP Qualification Board process, DASD(DT&E) collected lessons learned and best practices that were presented to other acquisition career fields and used to update materials and make improvements to the standard operating procedure. In accordance with the USD(AT&L) guidance, board qualifications will initially be a discriminator in KLP selection. Over time, board qualification is expected to be necessary, with rare exceptions, for an individual to be considered for KLP selection.

In 2015, DASD(DT&E) conducted activities to prepare for the second T&E KLP Joint Qualification Board, which convened on December 8, 2015. The board identified 26 individuals, out of 36 applicants reviewed, as qualified to be assigned in a T&E KLP.

Next Steps. DASD(DT&E) will continue to support the USD(AT&L) BBP initiative and will conduct follow-on boards annually to select and increase the pool of T&E professionals qualified to be assigned in a T&E KLP. Future annual reports will document updates, as needed.

2.4 Program Engagement

DASD(DT&E) assists acquisition decision makers by providing an impartial evaluation of a program's status and risks prior to a key milestone decision. Program insight comes from early and continuous engagement with MDAPs, MAIS programs, and USD(AT&L)-designated special interest programs. In FY 2015, DASD(DT&E) advised 36 Defense Acquisition Boards (DABs) and 35 Overarching Integrated Product Teams (OIPTs). DASD(DT&E) completed 21 DASD(DT&E) program assessments and engaged closely with program offices to help develop 24 TEMPs. DASD(DT&E) worked with the TRMC to assess the adequacy of resources available to the programs. In FY 2015, no TEMPs were disapproved by the DASD(DT&E).

2.5 Others Activities

2.5.1 Scientific Test and Analysis Techniques (STAT) in T&E

Background. DASD(DT&E) continues to support execution of the STAT in T&E Implementation Plan. The STAT in T&E Center of Excellence (COE), a key component of the implementation plan, continues to assist acquisition programs in the use of STAT to generate T&E efficiencies; provide rigorous, defensible T&E strategies and results; and improve the level of knowledge for the DT planning, execution, and analysis process.

In FY 2015, the STAT in T&E COE provided support to 37 programs:

- **Department of the Army (6)**
  - Armored Multi-Purpose Vehicle (AMPV)
  - Common Infrared Countermeasures (CIRCM)
  - Indirect Fire Protection Capability (IFPC) Increment 2 – Intercept
  - Integrated Air and Missile Defense (IAMD)
  - Logistics Modernization Program (LMP) Increment 2
  - Stryker Engineering Change Proposal (ECP)
- **Department of the Navy (12)**
  - Aegis Flight III
  - Distributed Common Ground System–Navy (DCGS-N) Increment 2

- GERALD R. FORD Class Nuclear Aircraft Carrier (CVN 78)
- Ground/Air Task-Oriented Radar (G/ATOR)
- LHA(R) Amphibious Assault Ship (Flights 0 and 1)
- Maritime Tactical Command and Control (MTC2)
- Multi-Mission Maritime Aircraft (P-8A Poseidon)
- Navy Electronic Procurement System (EPS)
- Next Generation Enterprise Network (NGEN)
- Next Generation Jammer (NGJ)
- Ship-to-Shore Connector (SSC)
- Ship's Signal Exploitation Equipment (SSEE) Modifications

- **Department of the Air Force (16)**
  - Advanced Pilot Training (APT)
  - Air and Space Operations Center–Weapon System (AOC-WS) Increment 10.2
  - Air Force Integrated Personnel and Pay System (AF-IPPS)
  - B61 Mod 12 Life Extension
  - Combat Rescue Helicopter (CRH)
  - Enhanced Polar System (EPS)
  - Global Positioning System (GPS) Generation III (GPS III)
  - Ground-Based Strategic Deterrent (GBSD)
  - Intercontinental Ballistic Missile (ICBM) Fuze – W78/W88-1
  - Joint Space Operations Center (JSpOC) Mission System (JMS)
  - KC-46A Tanker Replacement
  - Military GPS User Equipment (MGUE)
  - Next Generation Operational Control System (OCX)
  - Space Fence
  - Space-Based Infrared System (SBIRS) High Component (SBIRS High)
  - SBIRS Survivable/Endurable Evolution (S2E2)
- **Department of Defense (3)**
  - F-35 Lightning
  - Joint Light Tactical Vehicle (JLTV)
  - Next Generation Diagnostic System (NGDS)

In FY 2015, STAT in T&E COE key contributions included the following:

- For the Aegis Flight III program, the COE supported development of the software Baseline 9.C2 DEF that included cybersecurity and interoperability T&E. The effort resulted in 15 specific detailed test designs to enable a "right-sized" program.
- For the MGUE program, the COE developed a sequential test strategy for the Integrated System Test (IST) 3-3, which included creation of prototype design of experiments (DOE)-based test designs for IST 3-3 Phase 1.
- For the CIRCM program, the COE provided test designs for multiple events in the Technology Development (TD) and EMD phases that reduced the size of test in some cases by more than 50 percent. The analysis of TD data and associated recommendations to improve data collection resulted in better decision-quality information on system capabilities potentially leading to reduction of future test resources.

In FY 2015, the STAT in T&E COE also developed numerous products aimed at providing relevant information to T&E practitioners. The products (best practices, case studies, practitioner tools, STAT lesson, journal articles) are available on the STAT in T&E COE Website (www.AFIT.edu/STAT).

Next Steps. DASD(DT&E) will continue to support implementation of STAT in T&E. The STAT in T&E COE is an important resource for CDTs and Lead DT&E Organizations to use when developing more cost-efficient and effective DT&E programs. DASD(DT&E) views the STAT in T&E COE as a key contributor over the long term in improving acquisition outcomes.

2.5.2 Lead DT&E Organization

Background. Section 139b(c) of Title 10, U.S.C., states that the Secretary of Defense shall require that each MDAP be supported by a governmental test agency, serving as the Lead DT&E Organization for the program.

Section 4.2 of this report describes FY 2015 activities related to implementation of the Lead DT&E Organization.

Next Steps. DASD(DT&E) will continue to report on Lead DT&E Organizations in future reports.

2.5.3 Cost of DT&E

Background. DoD 7000.14-R, "Department of Defense Financial Management Regulations (FMRs)," instructs formulation of the T&E Exhibit "dash one" (T&E-1) needed for review and analysis of DoD Component T&E funding requirements. In FY 2015, DASD(DT&E), with assistance from the TRMC, reviewed the FY 2016 budget submissions for T&E funding to ensure that T&E resources are adequately funded; programs are properly identifying funds for Lead DT&E Organizations and DT; DoD is not maintaining unwarranted test capabilities at private industry facilities, and unwarranted duplication does not exist among DoD Component assets; test facilities and capabilities required are adequately funded and supported; and new major test facilities are

warranted and meet the needs of the DoD Components. In addition, the information in the T&E-1 budget submissions is used to document the resource requirements in the TEMPs.

Next Steps. DASD(DT&E), with assistance from the TRMC, will continue to review future budget submissions for adequacy of T&E funding and resources. Future annual reports will document updates, as needed.

2.5.4 Modeling and Simulation (M&S)

Background. DASD(DT&E), in coordination with the T&E Modeling and Simulation Working Group, conducted a major revision to the DAU continuous learning module (CLM) on M&S for T&E. In FY 2015, DASD(DT&E) submitted the source material to DAU to update the CLM on M&S and worked with DAU and its contractor to ensure that course development activities were on track.

Next Steps. DASD(DT&E) will continue to work with DAU to have the new CLM on the DAU portal in FY 2016. Future annual reports will document updates, as needed.

3 DoD Component Assessments

The following DoD Components provided self-assessments in support of the DASD(DT&E) annual report: Department of the Army (Army), Department of the Navy (DON), Department of the Air Force (Air Force), Defense Information Systems Agency (DISA), and Missile Defense Agency (MDA). For FY 2015, the DoD Components provided updates regarding T&E involvement in early acquisition activities, T&E planning and execution, and T&E personnel. In addition, the DoD Components provided details of the T&E workforce composition including all categories of T&E personnel and addressed the following specific areas of concern from the DT&E FY 2104 Annual Report:

- Army – DASD(DT&E) recommended that the Army continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs.
- DON – DASD(DT&E) recommended that the DON continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs.
- Air Force
    - DASD(DT&E) recommended that the Air Force continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs.
    - The DASD(DT&E) is concerned that the Air Force still has no CDT positions coded as KLPs. In addition, several positions were noted to be coded in a career field other than T&E (i.e., engineering and program management), and assigned personnel do not have adequate T&E certification (Level III required).
    - DASD(DT&E) is concerned about the limited number of Level III positions in Air Force T&E, as DASD(DT&E) believes there are more positions requiring that level of training and experience than the number currently reflected in the Air Force unit manpower documents. In addition, this limited number could impact the ability to prepare CDTs for Air Force MDAPs and MAIS programs.
- MDA – MDA maintains test analysis and evaluation functions within the Directorate for Engineering. DASD(DT&E) continues to recommend that these positions be coded T&E.

Summaries and assessments of the DoD Component responses are provided in the following sections.

The DoD Components continued to actively participate in the DASD(DT&E)-led working groups, such as the T&E Working Group (TEWG), the T&E FIPT, the STAT in T&E Implementation Panel, and groups updating T&E policy and guidance. During FY 2015, these groups supported efforts to develop and implement the T&E KLP Joint Qualification Board, draft the T&E chapter of the DAG, and revise a CLM for T&E certification. Although the DoD Components actively participate in these groups, DASD(DT&E) would like to have more consistent attendance from MDA and DISA representatives.

3.1 Updates from DoD Component Assessments

The DoD Components reported on progress and improvements in T&E acquisition workforce certification rates across the T&E acquisition workforce. The DASD(DT&E) overall goal for certification is for 90 percent of the T&E acquisition workforce to be either certified or within the 24-month grace period for certification. Currently, the overall T&E acquisition workforce is exceeding this goal with 95 percent either certified or within the grace period. The rates shown in Figure 3-1 are taken from the AT&L Workforce Data Mart as of the end of FY 2015.

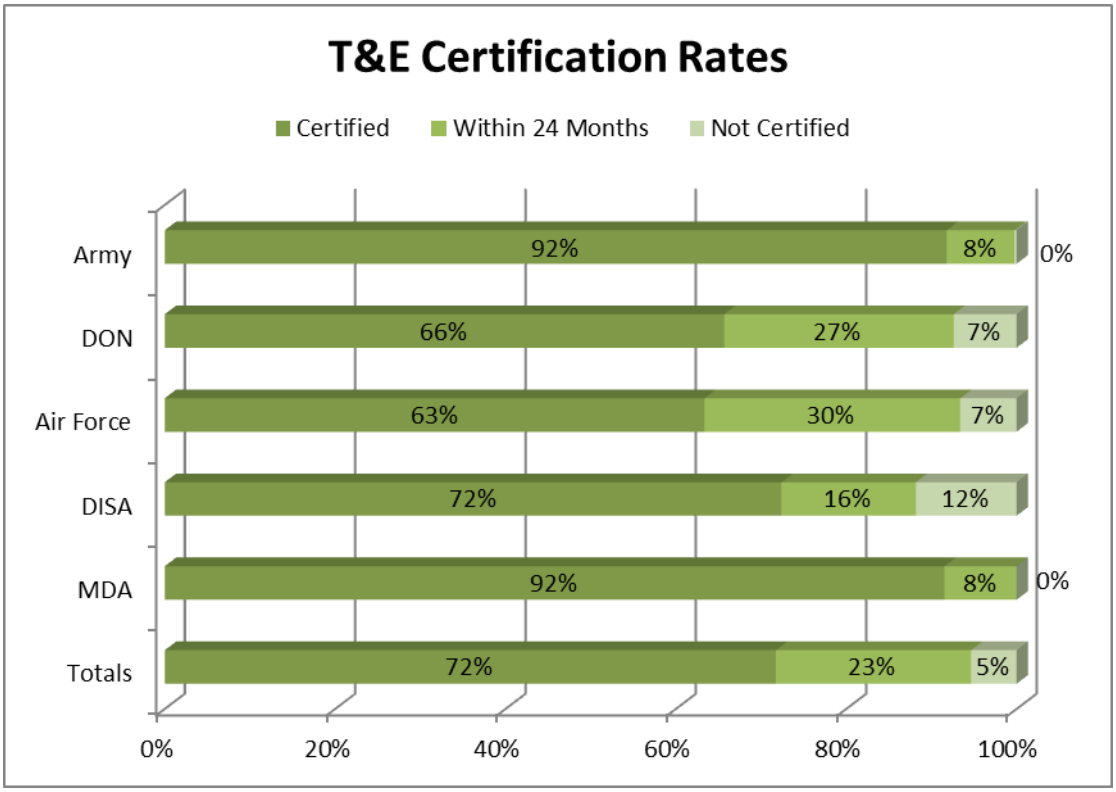


Figure 3-1. FY 2015 T&E Certification Rates

The revised education requirements for certification in the T&E career field became effective October 1, 2014, and are as follows:

- Level I: Associate's degree in any discipline.
- Level II: Baccalaureate degree or higher (any field of study). A total of 24 semester hours or equivalent in technical or scientific courses such as mathematics (e.g., calculus, probability, statistics), physical sciences (e.g., chemistry, biology, physics), psychology, operations research/systems analysis, engineering, computer science, and information technology (IT).
- Level III: Baccalaureate or graduate degree in a technical or scientific field such as engineering, physics, chemistry, biology, mathematics, operations research, engineering management, or computer science.

This revised education requirement is expected to increase the number of T&E personnel who can meet the Level I certification requirements while maintaining the higher standards for Level III T&E members.

Table 3-1 shows the composition of the T&E acquisition workforce by certification level. The table is based on data from the AT&L Workforce Data Mart and includes only the T&E-coded positions at the Military Departments, MDA, and DISA. With the exception of the Air Force, the majority of T&E positions are coded at Level III. In previous annual reports, the DASD(DT&E) stated the position that achieving Level III training and certification should be a goal for the DoD Components in the management of their T&E acquisition workforce positions.

The Air Force reported that it has addressed and started corrective actions on all discrepancies found in the FY 2013 Air Force review of T&E-coded positions. The Air Force considers the balance of Level I, II, and III positions within the T&E portfolio to match the duty responsibilities required. Air Force guidance allows organizations to prescribe the proper T&E duty level required for each position. Only Development Positions, Critical Acquisition Positions (CAPs), and KLPs have mandatory levels. The Air Force will continue to review and ensure that all T&E positions are properly coded and at an appropriate certification level.

DASD(DT&E) remains concerned about the limited number of Level III positions in Air Force T&E, as DASD(DT&E) believes there are more positions requiring that level of training and experience than the number currently reflected in the Air Force unit manpower documents. In addition, this limited number could impact the ability to prepare CDTs for Air Force MDAPs and MAIS programs.

Table 3-1. T&E Acquisition Workforce Certification Levels

Level	Army	DON	Air Force	4th Estate*	Total
Level I	2%	14%	11%	3%	10%
Level II	36%	32%	74%	36%	48%
Level III	62%	54%	15%	61%	42%

*4th Estate refers to DoD organizations, other than the Military Services, having DoD manpower resources. Military personnel assigned to the 4th Estate organizations are tracked by the Services.

The DoD Components reported on their use of DAWDF Section 852 funding. Section 852 funds permit the DoD Components to hire new T&E personnel, provide training for new and existing personnel, develop training courses, provide incentives and awards for T&E, and facilitate outreach programs. DASD(DT&E) will work with the DoD Components to identify training gaps and develop proposals for Section 852 funding.

During FY 2015, DoD Components provided detailed accounts of DAWDF funding used to advance the T&E workforce. The Army used Section 852 funds to support career broadening and academic programs, intern and journeyman hiring, recruitment incentive programs, and outreach programs. The DON used Section 852 funds to develop and deliver core and specialized technical training for the T&E workforce, strengthen educational partnerships, and establish recruitment incentives for hard-to-fill positions. The Air Force used the funding to extend the reach of T&E hiring efforts through recruiting events; update requisite training opportunities, including the T&E certificate program; and develop two Air Force Institute of Technology (AFIT) courses. MDA used Section

852 funds to support intern salaries and career-broadening initiatives. DASD(DT&E) will continue to encourage the DoD Components to use Section 852 funds to recruit and hire, develop and train, and recognize and retain their T&E workforce.

3.2 DASD(DT&E) Assessment of the DoD Component Reports

In September 2015, DASD(DT&E) requested that the DoD Components provide a self-assessment of the capabilities and organizations to support DT&E activities. The self-assessment included the following:

- New efforts and challenges with T&E involvement in acquisition activities.
- Updates to processes and procedures that specifically address attracting, developing, retaining, and rewarding T&E personnel and any new challenges in this area.
- Efforts to develop and mentor future CDTs.
- Composition of the current T&E workforce.
- Organizational changes regarding T&E and details of how the changes impact the T&E workforce.
- Use of DAWDF funding and specific T&E initiatives in support of the T&E acquisition workforce.
- Listing of MDAPs and MAIS programs in its portfolio, and for each program, the CDT by name and current T&E certification status, whether the position is coded T&E, whether the position is designated as a KLP, and whether the CDT currently meets the KLP requirements.
- Status of implementation of the November 8, 2013, USD(AT&L) memorandum, "Key Leadership Positions and Qualification Criteria" (hereafter referred to as "the USD(AT&L) KLP memorandum").
- Listing of MDAPs in its portfolio, and for each MDAP, the Lead DT&E Organization.
- Initiatives in the following areas:
    - Cybersecurity
    - Interoperability
    - Reliability
    - T&E Capabilities
    - T&E of Autonomous Systems
- Efforts to address DASD(DT&E) recommendations and concerns from previous DT&E annual reports.

For FY 2015, DASD(DT&E) assesses that the DoD Components have adequate T&E organization and capabilities to support DT&E activities.

3.2.1 Army Report Summary

The Army report indicates that the state of personnel and other resources required to conduct DT&E within the Army is adequate to support the needs of its acquisition community. The Army is concerned about maintaining this state in future years, under fiscally constrained environment projections.

DT&E is critical to ensuring that the Army continues to reduce program life cycle cost, as well as demonstrate, refine, and modernize system performance within the test-fix-test philosophy of the developmental environment. A constant challenge in many EMD phase efforts is keeping test time and costs at an affordable level. The acquisition community must continue to focus on effective and efficient testing during declining budgets. This effort requires synchronization with the requirements, acquisition, and testing communities early in program development planning efforts.

The Army Test and Evaluation Command (ATEC) is the Army's leading developmental tester and is committed to ensuring that its workforce is prepared to address and meet the requirements and challenges of Army acquisition. ATEC uses targeted recruitment, focused development and training curriculums, and retention programs that are flexible enough to accommodate fiscal and resource constraints. Additionally, ATEC continues to posture itself during these decreased budgetary times by regularly reviewing internal policies and procedures to ensure that the structure and framework of the organization are aligned to accomplish Army acquisition requirements. ATEC efforts in FY 2015 include the following:

- In coordination with program management offices (PMOs), supported development of the DEF and provided employee training to enable MS A TEMPs built on a DEF.
- Led cybersecurity efforts that included drafting guidelines for developers and PMs; providing cybersecurity electromagnetic activities (CEMA) testing support; working on a memorandum of agreement (MOA) with the Program Executive Office (PEO) for Simulation, Training, and Instrumentation (STRI) to pre-position a set of Project Manager for Instrumentation, Targets, and Threat Simulators (PM ITTS) Threat Systems Management Office (TSMO) jammers at the Electronic Proving Ground (EPG), Fort Huachuca, Arizona; and leveraging the Army Research Laboratory (ARL) to defend ATEC's Defense Research and Engineering Network (DREN)-based network.
- Maintained a leadership role in the standardization of test methodology within the Army and continued to lead DoD efforts to develop munitions safety and suitability for service (S3) assessment test procedures.
- Continued to support development of the Army Evaluation Center (AEC)/Army Materiel Systems Analysis Activity (AMSAA) Center for Reliability Growth (CRG). The CRG is funded by the Deputy Under Secretary of the Army for Test and Evaluation to develop and share lessons learned from reliability T&E, develop reliability tools and methodology, and contribute to reliability policy development.
- Continued to review ATEC T&E capabilities to ensure that a complete and viable test infrastructure is maintained while adjusting capacities and requesting that low-usage capabilities be mothballed to comply with fiscal restraints.

- In coordination with PM ITTS, worked to define the set of requirements for an autonomous robotics instrumentation upgrade effort beginning in FY 2017.

The Army utilizes its PEOs in support of the DT&E mission. The Army provided information about PEO Intelligence, Electronic Warfare, and Sensors; PEO Assembled Chemical Weapons Alternatives; PEO Missiles and Space; PEO Command, Control, and Communications–Tactical; PEO Ground Combat Systems; PEO Enterprise Information Systems; and PEO Soldier. These PEOs have T&E personnel to adequately support their programs. The T&E personnel are available either from organic T&E-coded positions or via matrixed personnel from the Research, Development, and Engineering Command's Research, Development, and Engineering Centers; the ARL Survivability/ Lethality Analysis Directorate (SLAD); as well as support contractors to meet the DT&E mission.

The Army also supports the Ronald Reagan Ballistic Missile Defense Test Site (Reagan Test Site) that provides defensive and offensive DT&E for the MDA integrated family of systems, ICBMs, boost-glide systems, and space T&E. The Army's military, civilian, and contractor workforce is sufficient to sustain moderate risk to the T&E mission.

ATEC conducted employee training to enable MS A TEMPs built on a DEF. As the Lead DT&E Organization for Army MDAP systems, ATEC plays a critical part in developing the DEF in coordination with each PMO. During FY 2015, ATEC conducted three training sessions for testers and evaluators, with DASD(DT&E) subject matter experts in attendance, that focused on understanding and developing the DEF. Each session was also open to PMOs co-located at Aberdeen Proving Ground, Maryland.

The Army noted that the fiscally constrained FY 2015 environment is beginning to adversely affect test resources. Some systems are experiencing schedule delays. Test units are balancing test commitment with other demands. Test personnel needed to prioritize efforts because of multiple competing demands.

In the DT&E FY 2014 Annual Report, DASD(DT&E) recommended that the Army continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs. In FY 2015, the Office of the Army Director for Acquisition Career Management (DACM) worked with the PEOs to ensure KLP coding within PEO Tables of Distribution and Allowance and also documented the names of incumbents. The Army DACM Office will continue efforts to ensure that each CDT KLP for the 21 MDAPs and MAIS programs is filled. The names of CDT personnel prequalified by the KLP Joint Qualification Board were provided to the PEOs to aid in this identification. The new Army KLP Hiring and Implementation Policy and Procedures, which should be effective in early FY 2016, will centralize the management of KLPs and incumbents.

Cybersecurity

To help guide developers and PMs, AEC is developing guidelines that will provide cybersecurity characteristics, which should result in more successful cybersecurity survivability ratings/evaluations for AEC acquisition partners. These guidelines will also help inform capability developers and network defenders about potential gaps. By implementing earlier cybersecurity DT&E and cooperative vulnerability and penetration assessments (CVPAs), AEC is providing its acquisition

partners with actionable information in support of finding and fixing cybersecurity vulnerabilities. The research, development, test, and evaluation (RDT&E) workforce supporting cybersecurity continues to be stretched for adversarial assessments (red teams) and CVPAs, as this particular domain continues to expand in the number of events requiring expertise in cybersecurity.

ATEC is working on an MOA with PEO STRI to pre-position a set of TSMO jammers at EPG to support CEMA testing in which EPG personnel, once trained, will operate the jammers and ARL/SLAD will provide the penetration testers.

With respect to activities for defending ATEC's DREN-based network, which began in FY 2015, ARL/SLAD will provide 24/7 cybersecurity monitoring and protection. During FY 2015, ATEC Headquarters (HQ), including AEC, began to assess ATEC's homegrown enterprise applications. To assess software vulnerabilities within ATEC HQ, ATEC developed code using various automated tools to detect known vulnerabilities. Once these known vulnerabilities are identified, ATEC will apply risk mitigations and fixes to increase its overall cybersecurity posture.

Interoperability

ATEC maintains a leadership role in the standardization of test methodology within the Army and continues to lead DoD efforts to develop munitions S3 assessment test procedures. These documents harmonize test procedural requirements between the tri-Services and North Atlantic Treaty Organization (NATO) allies and increase the acceptability of test data. Standardization potentially avoids the need to retest and improves the interoperability of Warfighters at a time of heightened joint operations.

Reliability

The Army CRG is a combined AMSAA and ATEC initiative of dedicated reliability experts who develop the critical tools, methodology, policy, formal guidance, and education needed for improved Army weapon system reliability. The CRG tackles critical reliability challenges on specific Army programs. For more than 6 years, the CRG has provided a reliability short course to key stakeholders within the community of practice (from the action officer level up to the general officer/senior executive service (SES) level). The primary objective of each reliability short course is to share tools, methods, policy, and lessons learned with the acquisition community to help improve the reliability of systems under acquisition. Since inception, the CRG has provided more than 30 reliability training courses to the Army and defense acquisition communities, including 10 sessions in FY 2015. The CRG partners with DAU in course development and participated in five speaking engagements in FY 2015 for the LOG 211, LOG 350, TST 301, and TST 303 courses.

As part of the CRG, AMSAA is responsible for development and maintenance of several reliability tools and models. These tools and models address reliability growth planning, reliability growth tracking, reliability growth projection, early reliability assessment (i.e., scorecards for general systems and software-intensive systems), and reliability growth curve risk assessment. In addition, AMSAA has developed reliability-focused contractual language for both hardware- and software-intensive programs. The language establishes a structured approach to help product managers contract for key reliability elements. AEC is also responsible for archiving and analyzing historical reliability T&E results for lesson learned and incorporating reliability lessons learned, policies, tools,

and methodologies into reliability T&E. In FY 2015, the AEC CRG team focused efforts on several initiatives that impact reliability T&E.

T&E Capabilities

ATEC's civilian manpower has been assessed a significant reduction over the Program Objective Memorandum (POM), which requires a strategic and dynamic plan. ATEC has a diverse command-wide mission that is supported by a highly technical civilian and contractor workforce. The workforce is leveraged by military personnel who provide an invaluable infusion of military knowledge and relevant field experience. This staffing is deemed critical because it provides the "Soldier" interface and operational realism with the Army in the field that are necessary for finding any deficiencies in Army materiel. Given continued pressure to downsize and implement major changes in the way ATEC does business, ATEC must also avoid the risk of losing the "technological edge" found in its civilian core and supporting contractor workforce that is critical in making informed acquisition decisions. ATEC has initiated an aggressive workforce planning effort to streamline business processes and allow ATEC to develop a strategy to comply with FY 2019 manpower levels and minimize the impact on its assigned T&E mission, while also avoiding a reduction in force.

As a result of Budget Control Act reductions, ATEC continues to operate in a highly resource-constrained environment. ATEC's POM planning addresses these resource constraints. ATEC's goal is to maintain all required test capabilities except low-usage capabilities that can be mothballed and reinstated at a later date. ATEC continues to focus on increased efficiencies, reduced overhead, and capacity reduction to reduce costs while maintaining a complete and viable test capability infrastructure. Efficiencies are also gained through investment in automation and modernization of test capabilities and facilities. ATEC accepted risks in the sustainment of test capabilities to minimize the impact on manpower that is critical to the execution of mission activities. All planned FY 2017–FY 2021 POM impacts are assessed at moderate to low risk.

T&E of Autonomous Systems

Together with PM ITTS, ATEC is defining a set of requirements for an autonomous robotics—both land and air—major instrumentation effort beginning in FY 2017. The Robotics/UAS Instrumentation Suite will develop methodologies and instrumentation for the safe tying of ground and aerial systems. The Aberdeen Test Center is the ATEC lead for this effort, with the Redstone Test Center and Yuma Proving Ground in support. Reuse is key. ATEC will leverage ongoing efforts in industry (such as autonomous automobiles) and Air Force, Navy, and Marine Corps T&E UAS/robotic instrumentation plus associated safe tying methodologies (e.g., sense and avoid). Initial operational capability (IOC) is scheduled for FY 2020, and the suite should be available to support the Tank Automotive Research, Development, and Engineering Center's autonomous convoy S&T effort when it transitions to a program of record, approximately in FY 2021.

3.2.1.1 DASD(DT&E) Assessment of the Army Report

Based upon the report submitted by the Army and subsequent discussions, the DASD(DT&E) assesses that the Army has adequate T&E organizations and capabilities to support the Army T&E mission. The Army did note that the fiscally constrained environment is beginning to adversely

affect test resources. DASD(DT&E) will continue to monitor the effect of the FY 2016 budget on test resources.

As in the FY 2014 report, the Army has identified CDTs for MDAPs and MAIS programs with some vacancies. The Army has coded only certain positions as KLPs and has aligned most of the KLPs to the programs in the project management offices rather than in the product management offices. Overall, most of the CDTs have the required level of certification and are expected to meet the requirements described in the USD(AT&L) KLP memorandum.

DASD(DT&E) recommends that the Army continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs.

The Lead DT&E Organizations for the Army MDAPs and MAIS programs are all within ATEC AEC, whose mission includes DT&E and operational test and evaluation (OT&E) activities. DASD(DT&E) continues to monitor the DT&E capabilities needed by AEC to perform the activities of a Lead DT&E Organization.

3.2.2 DON Report Summary

The DON report indicates that the DON T&E workforce and test support to programs were effectively managed in 2015 across the DON T&E enterprise, and the DON workforce is assessed to be adequately structured and trained to support the needs of DON acquisition programs.

The DON T&E organizational structure outlined in the FY 2013 report has not changed significantly. Naval systems commands (SYSCOMs), PEOs, PMOs, and Naval Warfare and System Centers (W/SCs) utilize a Competency Aligned Organization/Integrated Product Team (IPT) business model in the area of T&E. SYSCOM commanders structure and staff their organization to meet workload demands and provide required T&E technical expertise and infrastructure capability. The Deputy DON T&E Executive; Deputy Assistant Secretary of the Navy for Research, Development, Test, and Evaluation (DASN(RDT&E))/Office of the Chief of Naval Operations (OPNAV) N84C; and staff provide oversight, provide policy direction and process information, and monitor activities.

In 2015, the Naval Sea Systems Command (NAVSEA) continued to implement the Engineering and Test and Evaluation (ET&E) Competency, with its Competency Domain Manager (CDM) and T&E Functional Advisory Board, to improve alignment of SYSCOM T&E support activity for affiliated PEOs and their program offices. Emphasis areas include interoperability and integration (I&I) engineering and T&E, mission-based testing, and cybersecurity T&E.

In 2015, the Naval Air Systems Command (NAVAIR) increased development of test capabilities in operationally relevant live, virtual, and constructive (LVC) test environments; cybersecurity T&E; integrated warfare; capabilities-based test and evaluation (CBTE); and autonomous systems T&E. NAVAIR expanded its College of Test and Evaluation curriculum to support workforce development for these initiatives. T&E workforce members were also involved in science, technology, engineering, and mathematics (STEM) outreach programs for youth.

In 2015, the Marine Corps Systems Command (MCSC) DT&E Division achieved full operational capability. This 2-year effort involved establishing and filling T&E positions with qualified

personnel and providing focused training for the division. As a result, the DT&E Division significantly increased its support efforts for programs and the provision of T&E products and services to PMOs compared to previous years. In addition to MCSC HQ in Quantico, Virginia, T&E workforce billets and capabilities also now reside at the Marine Corps Tactical Systems Support Activity and the Amphibious Vehicle Test Branch on the West Coast, providing critical T&E support to acquisition and in-service programs.

In 2015, the Space and Naval Warfare Systems Command (SPAWAR) provided significant support to cybersecurity DT&E workforce development efforts to define key roles, tasks, duties, and responsibilities. SPAWAR, as the lead cyber technical warrant in the DON, defined the knowledge, skills, and abilities needed for the cybersecurity T&E workforce in response to DoDI 8510.01, "Risk Management Framework (RMF) for DoD Information Technology (IT)," and the DoD Cybersecurity T&E Guidebook.

The DON T&E Enterprise Improvement Process (TEIP) remains in use for strategic planning and management of DON T&E enterprise efforts. The TEIP has the following thrust areas: workforce, capability, policy/acquisition program support, and Marine Corps land systems T&E. The Deputy DON T&E Executive serves as the national lead for the T&E career field and is the designated TEIP lead. The TEIP lead is supported by a planning team from the DON T&E office (composed of DASN(RDT&E) and OPNAV N842/N843 senior T&E personnel).

For the workforce thrust area in 2015, the DON T&E Workforce Competency IPT completed the following continuous improvement initiatives:

- Continued use of T&E workforce metrics that resulted in improved incumbent T&E KLP qualifications, T&E certifications, and continuous learning compliance for the DON T&E workforce.
- Update and fielding of the DON T&E Training Course, "Strategies for Effective and Efficient T&E," which has now reached more than 760 T&E personnel across SYSCOMs/PEOs and W/SCs.
- Cybersecurity T&E process training to SYSCOMs and W/SCs in coordination with Director of Operational Test and Evaluation (DOT&E) and DASD(DT&E) action officers.
- The DON T&E Awards Program, which is in its third year, to award and honor individuals and groups for their outstanding T&E achievements.

The DON T&E works closely with the DASD(DT&E) to address T&E workforce competency improvement and DT&E performance initiatives for acquisition programs. DASN(RDT&E) and OPNAV N842 senior T&E staff regularly participate in the OSD T&E FIPT and TEWG meetings to provide working-level support for T&E workforce initiatives.

In 2015, DON T&E personnel support continued for early acquisition activities involving contracting, the requirements process, source selection activities, and translation of operational capabilities into contract specifications. The DON T&E office, and in turn SYSCOM T&E offices, continued to promote early T&E involvement and best practices.

In 2015, NAVAIR continued fielding of its Integrated Warfighting Capabilities Enterprise Team and with the SoS Test Environment Architecture Office, developed and provided operationally relevant LVC test environments. NAVAIR also continued to mature its Integrated Warfare T&E Division that was established to support CBTE, cybersecurity T&E, unmanned air systems common control systems T&E, and electronic warfare (EW) and mission planning for T&E.

In 2015, NAVSEA continued to exercise its T&E Competency under the ET&E Directorate using the Naval Systems Engineering Directorate (SEA 05) T&E CDM as a focal point. The T&E CDM role is to provide greater visibility on the role and responsibilities of NAVSEA T&E to programmatic and technical authority decision making. NAVSEA continues to maintain its Technical Advisor (i.e., a senior leadership position) in HQ and its Warfare Center (WC) T&E Executive as competency workforce managers. Each of the 10 NAVSEA WCs has a T&E Director responsible for oversight and coordination of its local T&E competency activities. The duties and responsibilities of these positions were strengthened in 2015 by implementation of NAVSEA T&E competency guidance, standards, and processes.

In 2015, MCSC continued to mature its DT&E Division, identify T&E positions, and field a trained T&E workforce in support of acquisition projects and programs. Leadership in the DT&E Division is now part of the routing and approval chain depending upon the acquisition category (ACAT) level of the program. This process ensures both a peer review and T&E supervisory input to the preparation and approval of program TEMPs. Once a TEMP is signed, a single repository now exists in MCSC from which TEMPs can be periodically reviewed and referenced.

In the DT&E FY 2014 Annual Report, DASD(DT&E) recommended that the DON continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs. In FY 2015, the DON T&E office conducted a Talent Management Study to address T&E coding, T&E certification, T&E continuous learning compliance, and incumbent T&E KLP/CDT qualifications. This action led to an additional number of T&E KLPs/CDTs becoming qualified, or identifying the individual training plan needed by the incumbent to become fully qualified in the near future. The DON has been and is committed to providing highly qualified and experienced personnel to fill T&E KLPs and provide CDTs for its MDAPs and MAIS programs. The DON T&E leads the other Services in this area. Oversight and monitoring of T&E KLP assignments are provided by the DON T&E office to ensure that policy and program support requirements are being met.

Cybersecurity

NAVAIR has added to its curriculum specializing in cybersecurity T&E and has aggressively pursued developing a workforce with knowledge and skills for supporting cybersecurity T&E. NAVAIR is growing its laboratory and simulation capabilities by standing up a dedicated Cyber Simulation branch and has continued to grow and mature the cybersecurity T&E process for aircraft and weapons by working with the National Cyber Range (NCR) to conduct Cyber Table Top exercises and identify methods for leveraging NCR capabilities and expertise.

SPAWAR led and participated in several initiatives including the DoD CIO cyberspace workforce development to refine positions, specialties, duties, knowledge, skills, and abilities for positions based upon National Initiative for Cybersecurity Education (NICE) standards. SPAWAR supported

additional programs to refine the role of cybersecurity-related functions in the T&E community. SPAWAR provided highly credentialed and experienced testers to support advanced penetration testing against DON and DoD systems in development and production environments.

NAVSEA established cybersecurity as a fourth pillar of the command's Strategic Business Plan. NAVSEA continued to focus on its top priorities for creating a cybersecurity culture across the Navy, establishing cybersecurity education, and identifying cybersecurity best practices. Collaboration and communication of all aspects of cybersecurity are warranted for successful implementation of capability. NAVSEA has established various Cybersecurity Technical Advisory Groups with the mission to identify, define, and pursue cybersecurity initiatives.

MCSC DT&E Division leadership is currently reviewing the NICE standards for application to its T&E workforce and individual training requirements. Additionally, orientation and integration of the DT&E workforce with the capabilities of the Marine Corps information assurance range, coupled with application of Cyber Safe and Risk Management Framework (RMF) techniques will continue to evolve and promote the value of the DT&E Division to the PMOs.

Interoperability

I&I engineering and T&E are core corporate enhancement issues for DON leadership. The NAVSEA Distributed Integration and Interoperability Assessment Capability is being merged with the PEO Integrated Warfare Systems Multi-Site Test process to enhance I&I of systems. This merge facilitates testing Strike Force Interoperability over a common test architecture using the Secure Defense Research and Engineering Network and results in a combined interoperability T&E team that will support Integrated Surface Warfare System interoperability requirements.

Reliability

DON reliability and maintainability (R&M) engineering continues to highlight the importance of R&M in engineering and the supporting role of T&E support for MDAPs and MAIS programs. NAVSEA continues to be provided with R&M engineering training to develop overall workforce capabilities and skills. NAVAIR continued to ensure that naval aviation systems are reliable and maintainable through the application of proven R&M engineering and T&E processes. In 2015, progress continued on the Reliability Growth Development and Management Standard Work Package. The Engineering competency worked closely with the T&E community in regard to R&M planning and assessment.

T&E Capabilities

NAVSEA is pursuing development of laser weapon systems and their installation on Navy platforms and recognizes the need to develop a T&E workforce that is more knowledgeable in the area of laser weapon systems. At NAVAIR, demand for threat/target testing support resulted in an increased need for employees with operational experience. Identification and development of skills to support cybersecurity T&E is a key focus across the entire organization.

T&E of Autonomous Systems

The demand for T&E of autonomous air vehicles and functions has been building and is expected to increase rapidly in the near future. Much of the DON activity relating to autonomous systems is in research and development (R&D) and S&T demonstration efforts, but it does include some programs

of record with extensive T&E activity. T&E-supported activity at SYSCOMs and W/SCs also includes STEM outreach and T&E workforce education efforts. Examples include the following:

- Each of the Naval SYSCOMs participates on the Autonomy Test, Evaluation, Verification, and Validation (TEVV) Working Group, sponsored by the DoD Autonomy Community of Interest. The group coordinates and reports on needed TEVV standards, best practices, and resources (including technical competencies and test ranges) required to enable future autonomous and self-governing defense systems. SYSCOMs are specifically interested in understanding the training and skills required to design test scenarios that are sufficient to demonstrate autonomous system capabilities.
- In 2015, NAVAIR's Naval Air Warfare Center, Aircraft Division (NAWCAD) successfully tested autonomous aerial refueling for the first time by the Northrop Grumman X-47B Unmanned Carrier Air Vehicle demonstrator. The Naval Air Warfare Center, Weapons Division is supporting the design and test of the Defense Advanced Research Projects Agency Cooperative Operations in Denied Environment program, which makes extensive use of autonomy. In September 2015, NAWCAD supported the Naval Surface Warfare Center Panama City Division and the Office of Naval Research (ONR) in their autonomous underwater vehicle (AUV) demonstration in the Naval Air Station Patuxent River complex. The 2-week event featured demonstrations of numerous AUVs and related technologies.
- The Autonomous Aerial Cargo/Utility System is an ONR Innovative Naval Prototype program exploring advanced autonomous capabilities for reliable resupply and casualty evacuation by an unmanned air vehicle under adverse conditions. NAVAIR T&E and the U.S. Naval Test Pilot School have been involved in reviewing test plans and test strategies, monitoring quarterly performance reviews, and capturing methods to successfully test autonomy.
- NAVSEA has recognized the importance of unmanned vehicles and autonomous systems and their design, development, and test efforts. NAVSEA goals in this area are to address full life-cycle naval architecture and marine engineering support of unmanned vehicles, vehicle systems, integration, launch and recovery, power and energy, and autonomy.

3.2.2.1 DASD(DT&E) Assessment of the DON Report

Based upon the report submitted by the DON and subsequent discussions, the DASD(DT&E) assesses that the DON has adequate T&E organizations and capabilities to support the DON T&E mission.

The DON has identified CDTs for MDAPs and MAIS programs with only a few vacancies. The DON identified which positions are coded T&E and the level of T&E certification. The few vacant positions have personnel under consideration for fill. Overall, positions are filled with personnel expected to be qualified and meet the requirements described in the USD(AT&L) KLP memorandum. The DON has been committed to code and fill CDTs (T&E KLPs) with highly qualified and experienced personnel.

DASD(DT&E) commends the DON on its efforts to fill CDTs (T&E KLPs) and recommends that the DON continue its outstanding efforts to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs.

3.2.3 Air Force Report Summary

The Air Force report indicates that overall, the Air Force T&E enterprise is adapting to support the needs and requirements of Air Force acquisition programs. The Air Force continues to rise to the challenges presented by budget and personnel reductions as well as the uncertainties of repeated continuing resolutions. Through refinement of its internal processes and organizations, the Air Force T&E enterprise is working to minimize the impacts of these recent challenges and execute T&E activities, recapitalize critical infrastructure, and build and develop the T&E workforce.

The Air Force report describes the activities, processes, changes, and initiatives that the Air Force has implemented or will implement to ensure greater efficiency and effectiveness in the Air Force T&E enterprise.

The Air Force report describes ongoing Air Force efforts to implement congressional direction to designate CDTs and Lead DT&E Organizations for MDAPs. The report also covers the implementation of KLP qualifications for CDTs.

The Air Force Directorate of Test and Evaluation (AF/TE) continues its active participation in OSD-led working groups such as the TEWG, T&E FIPT, and DAG rewrite team. AF/TE made significant contributions to DAU by helping to write new courses on integrated testing and by teaching in local-area T&E sessions. Additionally, AF/TE participated in revamping the DAWIA T&E certification requirements by updating the list of needed experience and coursework.

For FY 2015, the Air Force expressed several concerns in its report, including the following concerns directly related to the T&E workforce:

- Maturation of cyber testing efforts is a focus of the Air Force T&E enterprise. Key aspects of cyber testing include properly educated and trained personnel, adequate resources, necessary infrastructure, and appropriate guidance at Air Force and DoD levels.
    - Personnel who meet the requirements necessary for cyber testing are in high demand, and recruiting and retaining such personnel remain a significant challenge.
    - Resources, infrastructure, and close cooperation will be required to create and implement an adversarial testing capability that demonstrates resiliency and survivability of cyber systems and provides confidence to Warfighters.
    - More fully developed guidance by both DoD and the Air Force will be required to ensure that cyber capabilities are sufficiently tested, evaluated, and assessed.
- OSD oversight lists have been separated into three lists (USD(AT&L) list, DOT&E list, DASD(DT&E) list) that are incompatible with each other.
- Full population of the CDT KLP positions was not completed by the end of the FY 2015 OSD waiver time frame because of availability of qualified candidates. The Air Force has made a robust effort to encourage personnel to apply to the annual T&E KLP Joint Qualification Board and provided assistance to enable applicants to successfully compete.
- Continuing resolutions have caused increased uncertainty in RDT&E resource budgets and disruptions that have required significant rephasing of program funds.

In FY 2015, Air Force T&E personnel have leveraged the training courses available via AFIT and DAU to apply STAT and DOE to various test programs. AF/TE continued to raise awareness of these resources through informational memorandums to the centers and direct contact with Air Force test professionals at Air Force T&E policy summits. Air Force Instruction (AFI) 99-103, "Capabilities-Based Test and Evaluation," provides clarification and emphasis on early test involvement, beginning before MS A. No major changes occurred for test execution, data analysis, evaluation, and reporting activities. T&E execution is aided by ensuring that all T&E assets are available at the proper time and place as the test program unfolds. Air Force testers, both DT&E and OT&E, are integrating their test efforts. Integrated testing is the best strategy for increasing test efficiency and effectiveness.

In the DT&E FY 2014 Annual Report, DASD(DT&E) recommended that the Air Force continue its efforts to identify T&E KLPs to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs. In FY 2015, the Air Force continued to be committed to efficiently maintaining a highly qualified T&E workforce. The Air Force implemented the newest version of AFI 36-1301, "Management of Acquisition Key Leadership Positions (KLP)," signed on October 19, 2015, designating all CDT positions as mandatory KLPs. Substantial efforts were made to encourage personnel to apply to the CDT KLP Joint Qualification Boards, resulting in the Air Force having the greatest number of joint qualified KLP CDTs in FY 2014 and more candidates to the joint board in FY 2015 than all other Services combined.

The DASD(DT&E) also had concerns about the number of Level III positions in Air Force T&E and that the Air Force still has no CDT positions coded as KLPs. In addition, several positions were noted to be coded in a career field other than T&E (i.e., engineering and program management), and assigned personnel do not have adequate T&E certification (Level III required). In FY 2013, the Air Force completed a review of all T&E-coded positions to ensure that all coded positions met established grade guidelines (DAWIA T&E position code requirements). Only 4 percent of positions showed discrepancies in the level assessments. These discrepancies have been addressed and corrective actions started. The Air Force considers the balance of Level I, II, and III positions within the T&E portfolio to match the duty responsibilities required. Air Force guidance allows organizations to prescribe the proper T&E duty level required for each position. Only Development Positions, CAPs, and KLPs have mandatory levels. The Air Force will continue to review and ensure that all T&E positions are properly coded and at an appropriate certification level.

Cybersecurity

AFI 99-103, released on October 16, 2013, provided the Air Force T&E community with initial guidance regarding cyber testing. This version of AFI 99-103 is not fully sufficient because it lacks requirements for weapon system testing to measure mission effectiveness in contested cyber environments. AFI 99-103 is being reviewed for another release, currently scheduled for June 2016, to address policy gaps for cyber testing. AF/TE is a member of several Air Force and DoD-level working groups attempting to articulate, clarify, and create cyber guidance that provides necessary and sufficient conditions for cyber-resilient systems. For T&E, the focus is not just on the certification and accreditation process; it also includes proper identification of threats, vulnerabilities, and attack surfaces to establish representative test environments and techniques to deliver measures of weapon system resiliency in a cyber-contested environment. The T&E approach that has been

developed for EW systems is instructive and applicable for cyber testing and will be leveraged for the development of cyber guidance.

Interoperability

The Air Force ensures that the requisite personnel and organizations responsible for interoperability certification and testing are included in all Integrated Test Teams. All TEMPs since October 2013 include the interfaces and interoperability with all other supporting/supported systems described in the system enabling and operating concepts and operational architectures.

Reliability

The Air Force updated policy documents with added focus on reliability growth planning. To ensure that reliability is built into systems during DT&E so that systems are found to be operationally suitable in OT&E, the activities and plans are outlined in the TEMP, Systems Engineering Plan, and Life Cycle Sustainment Plan. The Air Force continues to emphasize early reliability growth planning to support effective operational suitability testing in IOT&E. The Air Force has added an AFIT course on reliability growth that covers the proactive approach of designing reliability into the system up front (design for reliability) and the reactive reliability growth modeling.

T&E Capabilities

Some Air Force programs reported risks associated with decreased availability of chase/target aircraft, limited test range time, and the number of available personnel to conduct concurrent testing. Recent reductions in the size of the Air Force Materiel Command aircraft fleet, primarily the F-16, necessitate agile scheduling of test support assets. The demand for cyber T&E professionals continues to increase to the point that the current cyber assessment teams report an inability to support all requested T&E activities. The Air Force is maturing cyber policy and guidance to provide a holistic approach to cyber T&E. Further, the Air Force has several initiatives under way to meet the growing need for dedicated, trained cyber test experts to support acquisition development programs. Initiatives include organizational, training, and infrastructure changes to meet emerging program requirements. The Air Force is currently providing support to TSMO to improve test capabilities for fifth-generation aircraft by developing and fielding nine open-loop, high-fidelity, high-power, reprogrammable, and relocatable radar signal emulators at Air Force open-air test ranges to emulate priority S-band and C-band threat systems. The Air Force started efforts for upgrading the Benefield Anechoic Facility to provide high-fidelity threat generators sufficient to emulate near-real-world threat density levels in a controlled environment.

T&E of Autonomous Systems

The Air Force Research Laboratory is engaged in several S&T projects of autonomous systems incorporating artificial intelligence (AI). Presently, all remain at the R&D level. Currently, there is no specifically defined Air Force capability to accurately characterize or evaluate how an AI system will respond to a fixed or dynamic scenario in an open-air and/or a ground-based test facility. A joint effort (for mostly Army and Navy programs) has been started via the CTEIP to obtain funds for the required infrastructure. The infrastructure is necessary to facilitate capture and analysis of the internal sensor data and autonomous processing capabilities of future autonomous systems in mission scenarios and the national airspace.

3.2.3.1 DASD(DT&E) Assessment of the Air Force Report

Based upon the report submitted by the Air Force, the DASD(DT&E) assesses that the Air Force has adequate T&E organizations and capabilities to support the Air Force T&E mission.

The Air Force has identified personnel assigned as the CDT for its MDAPs and MAIS programs with a few vacancies. However, not all the CDT positions have been coded as T&E KLPs. The DASD(DT&E) is concerned that the Air Force is lagging behind the other DoD Components when coding positions as KLPs. In addition, several positions were noted to be coded in a career field other than T&E (i.e., engineering and program management), and assigned personnel do not have adequate T&E certification (Level III required). The Air Force has indicated in discussions that it is coding all T&E KLP positions. This coding will be a great step forward to cover all of the Air Force MDAPs and MAIS programs. DASD(DT&E) will continue to monitor the Air Force as it implements the USD(AT&L) KLP memorandum. DASD(DT&E) recommends that the Air Force take action in FY 2016 to increase the number of CDT coded positions to achieve the goal of having a CDT assigned to each of its MDAPs and MAIS programs. The Air Force has made an effort to encourage its personnel to apply to the T&E KLP Joint Qualification Board. DASD(DT&E) commends the Air Force on its efforts to increase the pool of highly qualified individuals.

The Air Force has a concern that the three OSD oversight lists (USD(AT&L) list, DOT&E list, DASD(DT&E) list) are incompatible with each other. DASD(DT&E) engages with MDAPs, MAIS programs, and USD(AT&L)-designated special interest programs, which make up the USD(AT&L) list.

3.2.4 DISA Report Summary

The DISA report indicates that the overall state of personnel to conduct DT&E within DISA is adequate to support the DISA mission.

DISA is composed of nearly 6,000 civilian employees; more than 1,500 active duty military personnel from the Army, Air Force, Navy, and Marine Corps; and approximately 7,500 defense contractors. DISA provides, operates, and ensures command and control (C2) and information-sharing capabilities and a globally accessible enterprise information infrastructure in direct support of joint Warfighters, national-level leaders, and other mission and coalition partners across the full spectrum of military operations.

The DISA T&E workforce is composed of engineers, computer scientists, IT specialists, and operations research professionals. For the DT&E workforce, the personnel are primarily spread across DISA PMOs with a portion of them assigned under the Joint Interoperability Test Command (JITC). DISA is able to target and hire interns directly into the T&E acquisition career field when necessary.

In FY 2015, DISA disestablished the Office of the T&E Executive and realigned all DISA T&E oversight responsibilities under the JITC Commander. JITC reports directly to the DISA Development and Business Center Director and is the joint interoperability certifier of DoD IT/ national security systems (NSS). JITC is the only non-Service Operational Test Agency and performs OT&E execution and cybersecurity assessments for DISA and other external customers.

JITC provides DT&E services to DISA programs when required; however, many DISA programs have test managers within their PMOs who are responsible for testing. DISA MAIS programs establish dedicated DT&E teams, allowing JITC to focus on its role as the independent test agent for interoperability evaluations, OT&E, and cybersecurity assessments.

Within DISA, a broad range of IT exists that T&E must support. Cloud services, whether Government or public, are being integrated onto a single converged IT infrastructure. This integration necessitates more stringent interoperability evaluations. Likewise, mobility and unified capabilities as service programs are adding new services/capabilities to the distant end user, and cyber defense initiatives have resulted in a new DoD cyber C2 framework. These new concepts have required DISA T&E to evolve its methods for conducting T&E without increasing resources or time to test.

DISA T&E continues to build out the DoD enterprise test environment, ensuring that test tools, reference implementations, and test infrastructure are in place to support rigorous T&E of applications and services. DISA T&E is evolving this environment to serve as a federated infrastructure that aids development and ensures that DISA rigorously tests, evaluates, and certifies enterprise solutions before they are fielded.

Cybersecurity

JITC cybersecurity service areas include RMF assessments, vulnerability and risk assessments, intrusion detection systems and security tools assessment, cybersecurity OT&E support, and major combatant command (CCMD) exercise assessments. JITC assists Government and non-Government organizations with their security certification and accreditation-related initiatives for full compliance with legislative requirements and established guidelines. In addition, JITC's cybersecurity technical framework provides assessment support inclusive of Defense in Depth and DoD Information Network operations.

Developmental and laboratory testing of the joint regional security stacks and Joint Information Environment cyber capabilities continued in FY 2015 at Joint Base San Antonio, Texas, and the DISA Enterprise Services Lab at Fort Meade, Maryland. In addition, JITC conducted Technical Vulnerability Assessment (vulnerability and penetration test) version 2.

In FY 2015, the JITC Cybersecurity Assessment Team was tasked with assessing cyber operations at U.S. Strategic Command, U.S. Transportation Command, and U.S. Cyber Command. The JITC Cybersecurity Assessment Team worked closely with personnel from operations, cyber, and training directorates within the CCMDs to develop an assessment plan that meets DOT&E requirements and to give the combatant commander a measure of operational risk posed by the cybersecurity posture of the systems and networks deployed in support of the combatant commander's assigned missions.

In FY 2015, the JITC Cybersecurity Assessment Team provided assessments for three major Tier I exercises as well as planning for future exercise assessments. JITC also continued to conduct cybersecurity tests and assessments of commercial products for accreditation and entry on the Unified Capabilities Approved Products List in accordance with the policy and guidelines set forth by DoDI 8100.04, "DoD Unified Capabilities (UC)."

Interoperability

DISA worked with DASD(DT&E), DoD CIO, USD(AT&L), the Joint Staff, and the Service components to update DoD interoperability policy and processes and publish DoDI 8330.01, "Interoperability of Information Technology (IT), including National Security Systems (NSS)." DISA also worked with the interoperability community to develop the Interoperability Process Guide (IPG) that details the processes and procedures to validate interoperability requirements earlier in the life cycle, while streamlining requirements needed for joint interoperability certification. The IPG Version 2 was released in March 2015.

To increase test rigor and reduce PM test costs and schedules, DISA expanded the use of its Automated Test Case Generator, an automated Link 16 standards conformance test tool, and its Joint Analysis Net-Centric Evaluation Testing Toolkit, an automated interoperability data collection and analysis capability.

Reliability

DISA employs two basic strategies to evaluate reliability for hardware systems under test: direct measurement during test events, and continuous monitoring before and after fielding. Direct measurement during test events normally provides insufficient data to achieve statistical confidence because of the relatively short duration of observation periods.

T&E Capabilities

JITC is the major element of the DISA MRTFB, DoD's only non-Service and IT-focused MRTFB. JITC global reach extends to the entire spectrum of DoD, Federal Government, private industry, and allies in support of C2, intelligence, and defense reform initiatives. As an MRTFB, JITC can engage directly with vendors to obtain critical pre-acquisition test results. JITC also supports non-DoD organizations such as the National Geospatial-Intelligence Agency, National Security Agency, and Federal Emergency Management Agency.

JITC emulates IT/NSS operational architectures in its test facilities, ensuring that interoperability issues around the globe can be reconstructed and addressed remotely. JITC facilities are strategically located at Fort Huachuca, Arizona; Indian Head, Maryland; and Fort Meade, Maryland. The diverse capabilities of each respective location allow the Services to have access to a dynamic environment for laboratory tests and on-site field evaluations.

3.2.4.1 DASD(DT&E) Assessment of the DISA Report

Based upon the report submitted by DISA and subsequent discussions, the DASD(DT&E) assesses that DISA has adequate T&E organizations and capabilities to support the DISA T&E mission.

DISA has identified CDTs for its two MAIS programs and reported on the KLPs in its organization. The CDTs are occupying properly coded KLPs and have Level III certification.

DISA did not provide information on the Lead DT&E Organization because DISA does not have MDAPs. For MAIS programs, DISA PMOs are structured to effectively support DT&E efforts surrounding the program test activities.

DISA reported the disestablishment of the DISA T&E Executive position and realignment of those T&E responsibilities to the JITC Commander. DASD(DT&E) is concerned about the lack of a senior executive to provide leadership and subject matter expertise on all DT&E and OT&E efforts across DISA. The T&E Executive also represented the agency to the DoD T&E community, ensuring alignment with OSD and the Joint Staff as a member of T&E boards and working groups. The T&E Executive was active in development of the agency's T&E career field and for recruiting, training, and retaining a professional T&E workforce. Although JITC is a valuable resource for joint interoperability certification and as an Operational Test Agency, it is not resourced to provide T&E expertise to ensure a consistent application of DT&E strategies, methodologies, and processes across DISA.

3.2.5 MDA Report Summary

MDA reported an optimum balance of T&E expertise in the workforce with the right skill sets, education levels, and technical experience to conduct a successful T&E program. During FY 2015, the MDA Director for Test maintained this balance through implementation of MDA Engineering and Support Services (MiDAESS) contracts and by taking full advantage of the Missile Defense Career Development Program. Vacated MDA civilian T&E positions were reengineered and realigned to address high-priority requirements. MDA has no MRTFB T&E personnel.

The MDA T&E program functionally aligns a highly technical and qualified workforce composed of employees from multiple sensor, shooter, and C2 program offices and various support functions across MDA to execute an increasingly complex ground test, flight test, war games, and exercises program. The MDA Director for Test serves as the Test Functional Manager (TFM) to coordinate all activities within the Ballistic Missile Defense System (BMDS) Test Functional Area (TFA). The MDA T&E workforce consists of civilian and military acquisition-coded T&E personnel, other career field civilian personnel that support T&E activities, MiDAESS contractor support personnel, Joint National Integration Center Research and Development Contract personnel, and Federally Funded Research and Development Center (FFRDC) personnel.

All civilian, military, and contractor positions in the TFA are documented in the MDA manpower tool. The TFM determines Government manpower and support contractor requirements, approves all hiring action, executes a standardized Government civilian hiring process to recruit quality personnel in a timely manner, and ensures that support personnel matrixed to the TFA are meeting expectations.

MDA reported that no specific challenges occurred with T&E involvement in acquisition activities for FY 2015. MDA designated the Deputy Director for Test position as the T&E KLP and CDT for the BMDS program. This SES position was filled in June 2015.

As noted by DASD(DT&E) in previous reports, MDA's test analysis and evaluation functions continue to reside within the Directorate for Engineering rather than in the Directorate for Test. MDA stated that because of the complex nature of BMDS testing, MDA uses a phased process to integrate Directorate for Test, Directorate for Engineering, element program executives/directors/managers, and other organizational and functional managers to establish a single T&E workforce executing the full life cycle of any given test event. The Directorate for Engineering leads test event

requirements identification and test event analysis and reporting, and the Directorate for Test leads test event planning and design. A Mission Director leads test event readiness and test event execution. Although the Directorate for Test and Directorate for Engineering share responsibilities as the offices of primary responsibility across test phases, the result is a single, integrated T&E workforce that works together, independent of organizational boundaries, to successfully execute the BMDS test program. The current alignment of the test evaluation and analysis functions within the MDA Directorate for Test and Directorate for Engineering organizations meets NDAA Title 10 requirements.

Within MDA, functional managers are responsible for defining DAWIA career field certification requirements for their respective workforce. The MDA Director for Test, as the functional manager for the test workforce, establishes T&E certification requirements for core and matrix test positions. The Director for Engineering, as the engineering workforce functional manager, establishes engineering certification requirements for core and matrix engineering positions. Thus, MDA has reevaluated and continues to assess that the test analysis and evaluation functions should remain engineering coded. These positions are complementary to MDA's single, integrated T&E workforce.

Cybersecurity

MDA continues to increase cybersecurity discipline for ground test, flight test, war games, and exercise infrastructure systems and remote sites. Top cybersecurity emphasis areas are strong authentication, such as implementation of Public Key Infrastructure; device hardening, such as patching and Security Technical Implementation Guide configuration; reducing the attack surface, such as moving any public-facing websites or applications to demilitarized zones; and alignment to computer network defense service providers, such as implementation of a host-based security system and reporting upward. MDA has performed the planning and preparation required for the upcoming transition to the RMF starting in FY 2016.

Interoperability

The Command and Control, Battle Management, and Communications element of the BMDS demonstrated its force multiplier and interoperability capabilities during several Warfighter exercises. MDA conducted Integrated Ground Test-06 Part 1 hardware-in-the-loop (HWIL) testing to assess interoperability and performance of new capability upgrades of U.S. ballistic missile defense elements, including Aegis Ashore, Aegis at sea, and the Army Navy/Transportable Radar Surveillance (AN/TPY-2) (forward-based mode). MDA conducted developmental HWIL interoperability testing activities with the U.S. Army Integrated Air and Missile Defense Battle Command System as early risk reduction for ground tests supporting the European Phased Adaptive Approach Phase 3 technical capability declaration.

Reliability

MDA Policy Memorandum #77 was issued in November 2014 to implement highly accelerated life testing and highly accelerated stress screening into MDA programs. In April 2015, MDA chartered and implemented a Reliability, Availability, and Maintainability (RAM) Working Group to ensure consistent execution of RAM engineering activities across MDA programs/products and to address issues impacting reliability of BMDS.

T&E Capabilities

Although flight tests have become more sophisticated and complex, the test resource budget has decreased by 36 percent since FY 2012. MDA eliminated two airborne sensor platforms, the Wide-Area Sensor Platform and High-Altitude Observatory (HALO) III aircraft, and the Mobile Launch Platform used to launch targets at sea. Additionally, MDA deferred the airborne sensors fleet replacement until FY 2017. The HALO I, II, and III aircraft are 44 years old; there are no critical spares, and significant supply chain issues exist. These aircraft collect flight test optical data and provide critical data on flight test anomalies. MDA has also deferred maintenance and dry-dock periods for the Pacific Collector and Pacific Tracker. These ship platforms provide telemetry collection, radar characterization, and flight safety. Their deferred maintenance adds significant risk that these ships may be unavailable for flight tests.

To provide the operational realism required to execute Flight Test Operational-02 Event 2, the MDA Director for Test established a range capability in and around Wake Island. This range capability was established because the target trajectory, flight test safety, and debris mitigation requirements at existing ranges were too restrictive to meet the operational realism required for this test.

T&E of Autonomous Systems

MDA has no autonomous systems.

3.2.5.1 DASD(DT&E) Assessment of the MDA Report

Based upon the report submitted by MDA and subsequent discussions, the DASD(DT&E) assesses that MDA has adequate T&E organizations (though not properly coded) and capabilities to support the MDA T&E mission.

MDA aligns test analysis and evaluation functions within the Directorate for Engineering and codes these positions as engineering. MDA feels that the Directorate for Engineering works collaboratively with the Directorate for Test to leverage expertise in defining technical objectives and analyzing test results. While DASD(DT&E) supports the integration between engineering and T&E, DASD(DT&E) continues to recommend that positions performing T&E functions be coded T&E. DASD(DT&E) understands that individuals in the systems engineering organization may be performing both systems engineering and T&E functions but recommends that these positions be reviewed and aligned to the proper career field or more than one career field, if possible.

The evaluation functions (planning, analysis, and results) are inherently part of the T&E process and identified in the acquisition T&E career field competency model. DASD(DT&E) believes that an individual performing the duties associated with T&E (as described in the T&E Workforce Competency Model) should be coded as T&E regardless of where the individual is aligned organizationally. DASD(DT&E) does not object to the organizational construct of MDA but believes that individuals performing T&E duties should be coded T&E. T&E-coded positions could be organized under the Directorate for Engineering because of the complex nature of BMDS testing. USD(AT&L) guidance on coding positions clearly indicates that if the duties associated with the position clearly map to a career field, then that position category should be assigned to the position. By not coding the individuals, DASD(DT&E) cannot accurately report the actual size of the T&E

acquisition workforce and, more importantly, ensure that individuals performing essential T&E functions are appropriately skilled and experienced.

DASD(DT&E) and MDA have agreed to work together to resolve this concern. MDA will review the positions in the systems engineering organization that are currently performing the analysis, assessment, evaluation, and reporting of test data/results and recode those positions to T&E if the majority of duties and responsibilities are T&E functions. DASD(DT&E) will investigate the possibility of coding positions in more than one career field.

MDA is the Lead DT&E Organization for the BMDS program. DASD(DT&E) plans to continue to monitor and review the ability of an organization that is part of a program office to perform the statutory responsibilities of a Lead DT&E Organization.

3.3 T&E Acquisition Workforce

3.3.1 T&E Workforce

In accordance with DoDI 5000.66, the DASD(DT&E) is the functional leader for the T&E career field in the acquisition workforce. This section provides a global perspective of the entire DoD T&E workforce, including DT, OT, Government, contractor, acquisition, and non-acquisition. The entire T&E workforce includes personnel supporting all aspects of the T&E mission beyond the acquisition-specific matter. These personnel provide critical expertise in support of the DT&E mission and the success of T&E across DoD but are not part of the acquisition workforce.

Over the last 7 years, the DASD(DT&E) has requested data on the entire T&E workforce. As noted in previous reports, limitations to the data exist because the DoD Components used manual methods rather than automated systems to collect the data and the data were not all-inclusive. Over the years, the DoD Components have improved their manual processes to provide DASD(DT&E) with T&E workforce data that better estimates the entire T&E workforce.

The T&E workforce data categories are as follows:

- Military and Civilians
  - T&E Coded
  - Acquisition Coded Non-T&E
  - Non-Acquisition Coded
- Additional T&E Support
  - Support Contractors
  - FFRDC/University Affiliated Research Center (UARC)
  - Developer T&E Support

3.3.2 Total Government T&E Workforce

DASD(DT&E) used the Defense Manpower Data Center data and extracted the number of Government personnel that support T&E organizations to estimate the total Government T&E personnel shown in Figure 3-2. The MRTFB workforce consists of personnel assigned at DoD facilities and ranges, as well as all other physical assets that are used to support DoD T&E. The MRTFB workforce continues to have the majority of the Government T&E workforce.

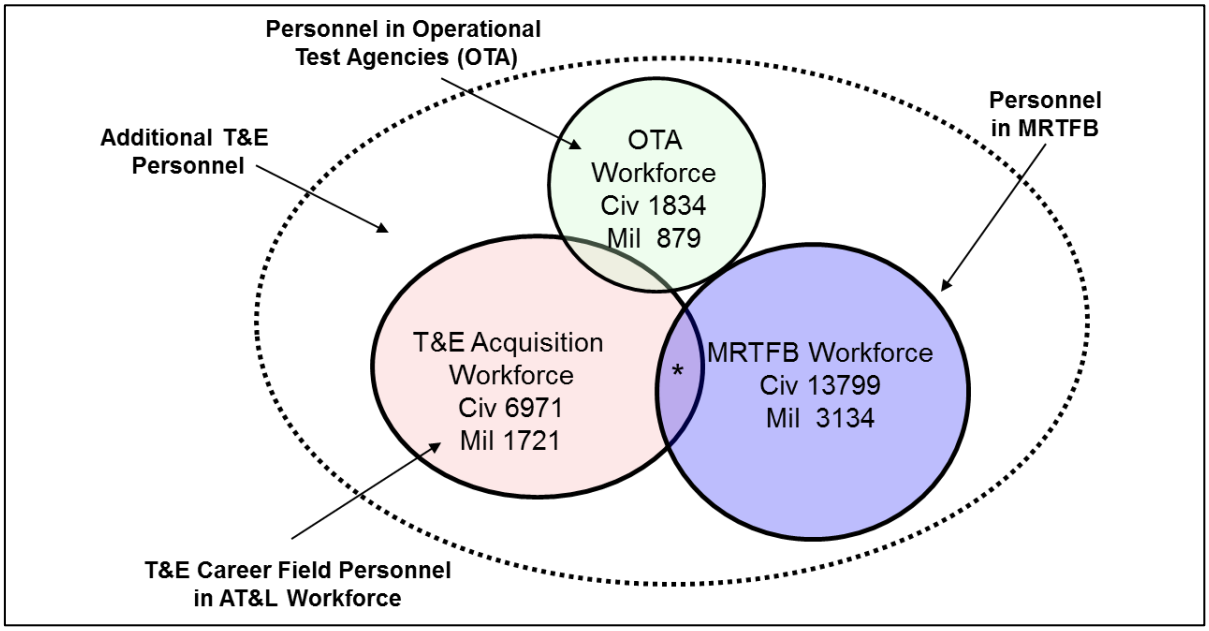
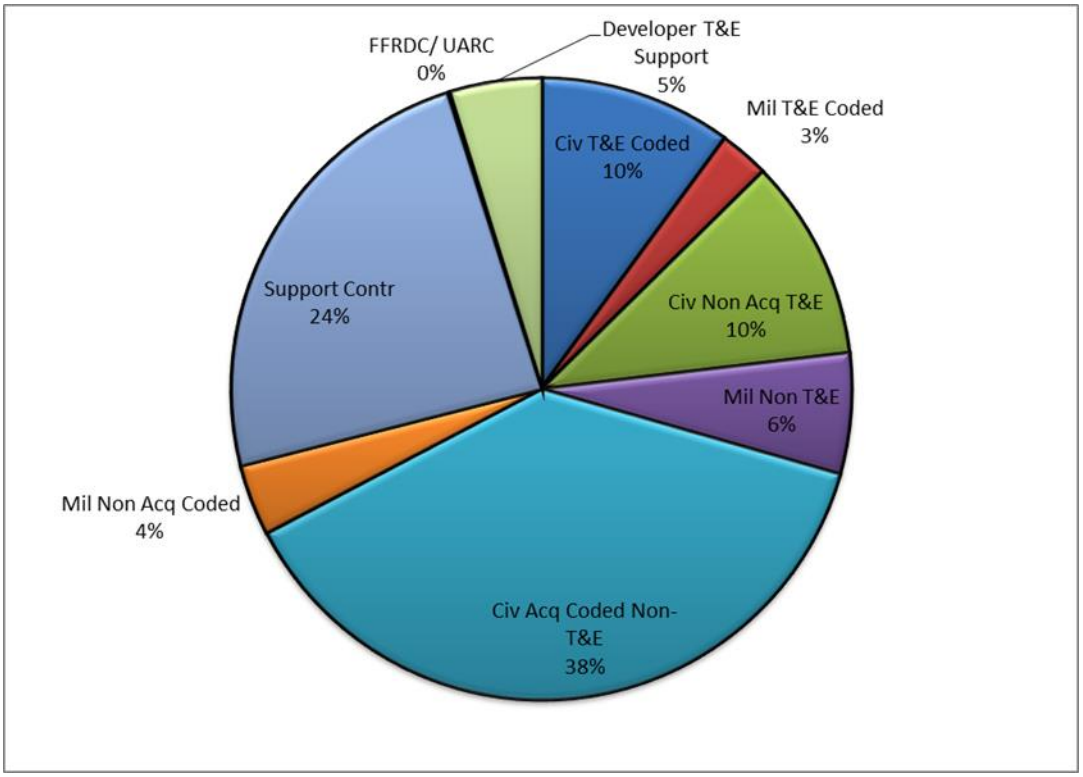


Figure 3-2. FY 2015 Government T&E Personnel Breakdown

3.3.3 T&E Workforce Based on DoD Component Reports

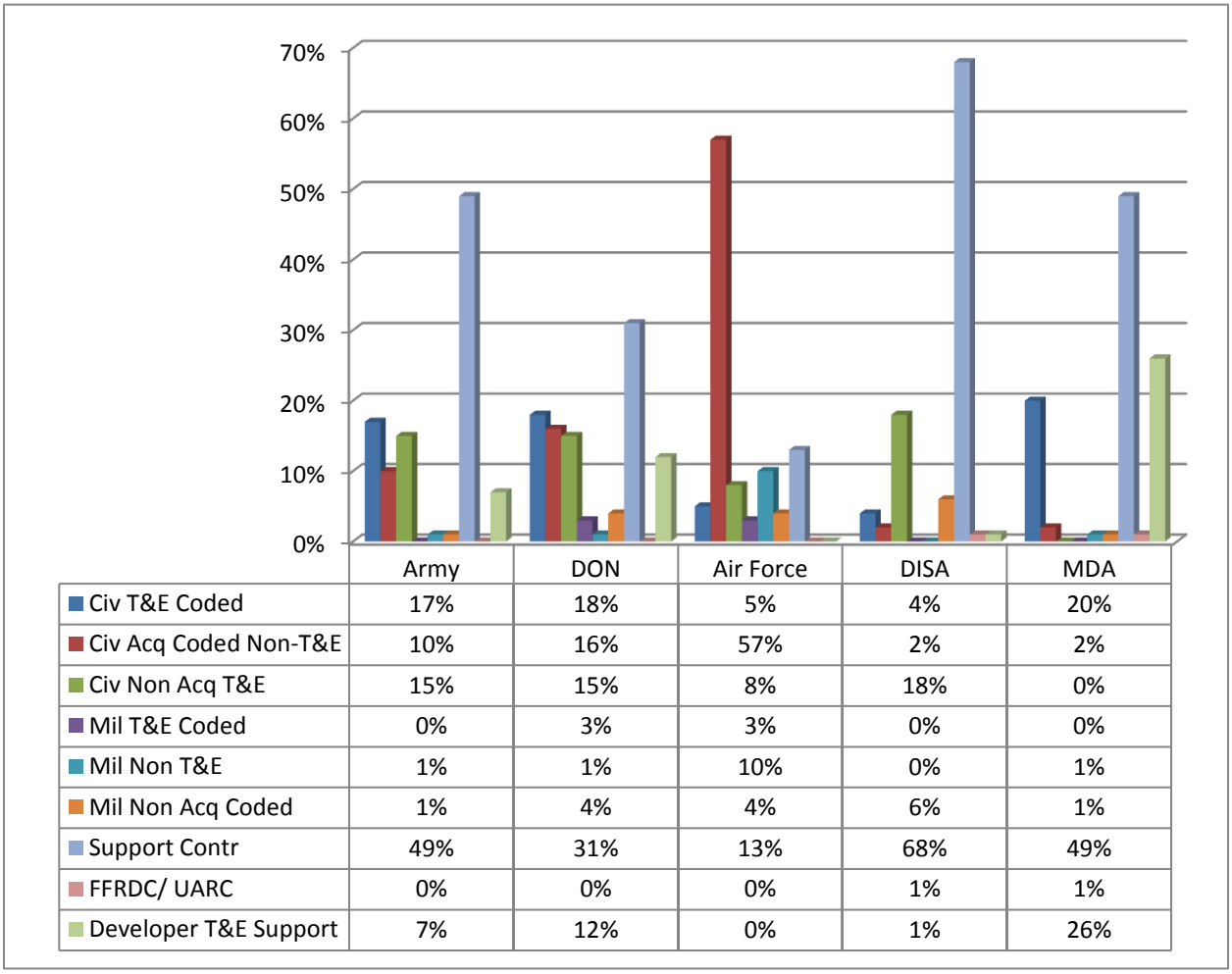
Figure 3-3 shows the composition of the T&E workforce based on data from the DoD Component reports. As in past years, the category of civilian acquisition coded non-T&E personnel has the highest percentage at 38 percent, and support contractors ranks next highest at 24 percent. The civilian T&E-coded personnel percentage is 10 percent, and the military T&E-coded personnel percentage is 3 percent. The civilian non-acquisition T&E personnel (10%) is a small subset of the MRTFB workforce, noted in Figure 3-2, that provides support to the programs and range support during testing.



(0% indicates a number less than 1%)

Figure 3-3. FY 2015 T&E Personnel Breakdown

Figure 3-4 displays the composition of the T&E workforce by DoD Component, based on data from the DoD Component reports.



	Army	DON	Air Force	DISA	MDA
Civ T&E Coded	17%	18%	5%	4%	20%
Civ Acq Coded Non-T&E	10%	16%	57%	2%	2%
Civ Non Acq T&E	15%	15%	8%	18%	0%
Mil T&E Coded	0%	3%	3%	0%	0%
Mil Non T&E	1%	1%	10%	0%	1%
Mil Non Acq Coded	1%	4%	4%	6%	1%
Support Contr	49%	31%	13%	68%	49%
FFRDC/ UARC	0%	0%	0%	1%	1%
Developer T&E Support	7%	12%	0%	1%	26%

(0% indicates a number less than 1%)

Figure 3-4. FY 2015 T&E Personnel Breakdown by DoD Components

3.3.4 Acquisition T&E Workforce

A subset of the entire T&E workforce is the acquisition T&E workforce. Minimal changes occurred in the acquisition T&E workforce over the past 4 years. Table 3-2 shows the acquisition T&E workforce comparison between FY 2014 and FY 2015. During FY 2015, the acquisition T&E workforce had an overall increase of 123 T&E positions. The Army showed a decrease in T&E-coded positions, whereas the DON, Air Force, and Fourth Estate showed an increase. T&E workforce data, extracted from the AT&L Workforce Data Mart system, are consistent with data provided in the DoD Component reports; however, some minor differences exist between the DoD Component data and the data in the AT&L Workforce Data Mart system. The average age of the T&E workforce has increased from 42.3 years old in FY 2014 to 42.5 years old in FY 2015.

Table 3-2. Acquisition T&E Workforce Comparison, FY 2014 vs. FY 2015

DoD Component	FY 2014			FY 2015			Difference
	Civilian	Military	Total	Civilian	Military	Total	
Army	2,009	28	2,037	1,932	24	1,956	-81
DON	2,700	479	3,179	2,877	451	3,328	+149
Air Force	1,746	1,229	2,975	1,781	1,246	3,027	+52
Fourth Estate*	378		378	381		381	+3
TOTAL	6,833	1,736	8,569	6,971	1,721	8,692	+123

*Fourth Estate refers to DoD organizations, other than the Military Services, having DoD manpower resources. Military personnel assigned to the Fourth Estate organizations are tracked by the Services.

3.3.5 Key Leadership Positions (CDTs)

Background. In accordance with sections 139b and 1706 of Title 10, U.S.C., the Secretary of Defense shall require that each MDAP and MAIS program be supported by a CDT. The CDT is responsible for the following:

- Coordinating the planning, management, and oversight of all DT&E activities for the program.
- Maintaining insight into contractor activities under the program and overseeing the T&E activities of other participating Government activities under the program.
- Helping PMs make technically informed, objective judgments about contractor DT&E results under the program.

In addition, USD(AT&L) policy designates the CDT as a mandatory KLP for each MDAP and MAIS program, and the CDT must be designated in the T&E career field. The DoD Components are working to code CDT positions as T&E KLPs for MDAPs and MAIS programs and are filling those positions with qualified individuals.

In FY 2015, DASD(DT&E) and the Services continued to focus on supporting implementation of the USD(AT&L) KLP memorandum. Table 3-3 shows the total number of MDAPs and MAIS programs, as reported by the DoD Components, and number of CDTs identified by name. The DON continues to report a high number of CDTs and qualified CDTs because of the proactive management approach and importance placed on filling these positions with highly qualified and experienced personnel. Overall, of the 122 MDAPs and MAIS programs reported by the DoD Components, 84 percent have a CDT identified by name.

Table 3-3. MDAPs/MAIS Programs and CDTs in FY 2015

	Fourth Estate	Army	DON	Air Force	Total
MDAPs/MAIS Programs	3	28	54	34	119
CDTs Identified by Name	3	19	54	24	100
CDTs Vacant	0	9	0	10	19

Table 3-4 shows the total number of MDAPs and MAIS programs, as reported by the DoD Components, and CDT positions coded as T&E KLPs. The Army and DON reported CDT positions coded as T&E KLPs at 79 percent and 81 percent, respectively. The Air Force reported 26 percent. Overall, of the 119 MDAPs and MAIS programs reported by the DoD Components, 66 percent have CDT positions coded as T&E KLPs.

Table 3-4. MDAPs/MAIS Programs and CDT T&E KLPs in FY 2015

	Fourth Estate	Army	DON	Air Force	Total
MDAPs/MAIS Programs	3	28	54	34	119
CDT Positions Coded as T&E KLPs	3	22	44	9	78
CDT Positions Not Coded as T&E KLPs	0	6	10	25	41

Next Steps. DASD(DT&E) will continue to work with the DoD Components as they progress in designating and coding CDTs as T&E KLPs for MDAPs and MAIS programs and tracking qualification of incumbent KLPs. DASD(DT&E) will update requirements and training curriculum to ensure that CDTs are properly qualified. Future annual reports will document progress, as needed.

4 ADDITIONAL REPORTING REQUIREMENTS

The FY 2013 NDAA, signed on January 2, 2013, includes additional requirements for the DT&E annual report to Congress. The FY 2013 NDAA requires a separate section that addresses the adequacy of resources available to the DASD(DT&E) and the Lead DT&E Organizations of the Military Departments to carry out their responsibilities.

4.1 Adequacy of Resources for DASD(DT&E)

DASD(DT&E) resources addressed are the FY 2015 budget and associated staff allocated to carry out assigned responsibilities.

The FY 2015 budget, shown in Table 4-1, provides funding for the responsibilities prescribed by law and assigned in DoDI 5134.17, "Deputy Assistant Secretary of Defense for Developmental Test and Evaluation (DASD(DT&E))."

Table 4-1. DASD(DT&E) FY 2015 Budget ($K)

Program Element	FY 2015 President's Budget	FY 2015 Appropriation
0605804D8Z	$15,187	$19,187

DASD(DT&E) executes its statutory responsibilities with a professional staff of 11 organic Government personnel. Table 4-2 provides the DASD(DT&E) Government workforce and contractor support. Organic staff of the DASD(DT&E) office consists of the DASD(DT&E), one SES Principal Deputy, one Military Staff director, six senior civilian (GS-15 level) Deputy Directors, and two civilian staff specialists. The DASD(DT&E) augments its Government staff with personnel detailed from the TRMC. These personnel include three Military Service members and four civilians to provide additional Government representation in program engagements. At the current staffing levels, DASD(DT&E) remains selective in its level of engagement with MDAPs, MAIS programs, and USD(AT&L)-designated special interest programs. DASD(DT&E) assesses DT&E activities to the level of available resources to inform decision makers.

Table 4-2. DASD(DT&E) Workforce and Contractor Support

DASD(DT&E) Workforce Staffing (Government and Contractor)	Organic	TRMC Detailee	Total
Government Civilian	10	4	14
Military	1	3	4
Contractor/FFRDC Support	53	0	53
Total			71

4.2 Adequacy of Resources for DoD Component Lead DT&E Organizations

In accordance with section 139b of Title 10, U.S.C., Lead DT&E Organizations are responsible for the following:

- Providing technical expertise on T&E issues to the CDT for the program.
- Conducting DT&E activities for the program, as directed by the CDT.
- Assisting the CDT in providing oversight of contractors under the program and in reaching technically informed, objective judgments about contractor DT&E results under the program.

Also in accordance with section 139b of Title 10, U.S.C., DASD(DT&E) monitors and reviews the DT&E activities of the MDAPs (including the activities of the CDTs and Lead DT&E Organizations).

4.2.1 Process to Assess the Adequacy of Resources for DoD Component Lead DT&E Organizations

Table 4-3 lists the Lead DT&E Organizations for 35 programs. To assess the adequacy of resources available to the Lead DT&E Organizations, DASD(DT&E) requested that the program offices address the following items:

- Provide the name of the Government agency serving as the Lead DT&E Organization.
- Describe the T&E expertise and capabilities (ranges, instrumentation, etc.) needed to support the program in FY 2015 and beyond.
- Describe any gaps in the Lead DT&E Organization and any other participating test organizations supporting the Lead DT&E Organization.
- Provide any feedback regarding the Lead DT&E Organization and its future ability to support the program office.

DASD(DT&E) also requested that the Lead DT&E Organizations address the following items:

- Describe the DT&E activities that have been directed by the CDT and how the Lead DT&E Organization interacts with the CDT on DT&E activities.
- Describe the test organizations providing significant support to the Lead DT&E Organization.
- Describe the Lead DT&E Organization role in assisting the CDT in providing oversight of contractors under the program and in reaching technically informed, objective judgments about contractor DT&E results.
- Provide details of any high-demand skills and expertise that the Lead DT&E Organization provides to programs, the current gaps or perceived future gaps, and how the Lead DT&E Organization will meet future demands for these skills and expertise.

Table 4-3. List of Lead DT&E Organizations and Programs

Lead DT&E Organization	Program Name
ARMY	
ATEC AFED	Army Integrated Air and Missile Defense (IAMD)
	Joint Air-to-Ground Missile (JAGM)
	M109A7 Family of Vehicles (FoV), Paladin Integrated Management (PIM) Self-Propelled Howitzer (SPH) and Carrier, Ammunition, Tracked (CAT) Vehicle
ATEC C4ISRED	Integrated Personnel and Pay System–Army (IPPS-A) Increment II
	Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) Rifleman Radio (RR)
	Mid-Tier Networking Vehicular Radio (MNVR) (AN/VRC-118(v)1
	Warfighter Information Network–Tactical (WIN-T) Increment 2
ATEC MSED	Abrams M1A2 System Enhancement Package Version 3 (SEPv3) Engineering Change Proposal (ECP) 1a
	Joint Light Tactical Vehicle (JLTV)
AMSAA	Assembled Chemical Weapons Alternatives (ACWA)
NAVY	
NAWCAD HX-21	CH-53K Heavy-Lift Replacement Helicopter
	Presidential Helicopter Fleet Replacement (VH-92A)
NAWCAD VX-20	MQ-4C Triton Unmanned Aircraft System (UAS)
	Multi-Mission Maritime Aircraft (P-8A Poseidon)
NAWCAD VX-23	F-35 Lightning
NSWC PHD	Common Aviation Command and Control System (CAC2S) Increment 1
	Littoral Combat Ship (LCS) and Mission Packages (MPs)
	ZUMWALT-Class Destroyer (DDG 1000)
NUWC NPT	VIRGINIA-Class Submarine
PEO IWS 7	Naval Integrated Fire Control–Counter Air (NIFC-CA)* (From-the-Sea (FTS) Capability)
PMA-298	NIFC-CA* (From-the-Air (FTA) Capability)
PMS 378T	GERALD R. FORD Class Nuclear Aircraft Carrier (CVN 78)
PMS 397	OHIO-Class Submarine Replacement
SSC PAC	Mobile User Objective System (MUOS)
SSP	Trident II Life Extension (D5LE)
AIR FORCE	
96th Test Wing	Air and Space Operations Center–Weapon System (AOC-WS) Increment 10.2
	B61-12 Life Extension Program (LEP) Tail Kit Assembly (TKA)
	Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)
	Small Diameter Bomb Increment II (SDB II)
412th Test Wing	F-35 Lightning
	KC-46A Tanker Modernization
	RQ-4B Global Hawk
AFLCMC/HNIZ	Defense Enterprise Accounting and Management System (DEAMS)
AFLCMC/WI	MQ-9 Reaper
SMC/GPEV	Global Positioning System (GPS) Enterprise
SMC/RSE	Space-Based Infrared System High Component (SBIRS High)
MDA	
MDA Directorate for Test	Ballistic Missile Defense System (BMDS)

*Technically, NIFC-CA is a project and not an MDAP.

4.2.2 Assessment of Adequacy of Resources for DoD Component Lead DT&E Organizations

The DoD Components reported that the resources for the Lead DT&E Organizations are adequate to support near-term priorities and identified some concerns. The DoD Components are implementing different constructs to meet the statutory requirement that each MDAP be supported by a governmental test agency, serving as Lead DT&E Organization for the program. The Lead DT&E Organizations for all Army MDAPs and MAIS programs are within ATEC AEC, whose mission includes both DT&E and OT&E activities. AMSAA serves as the Lead DT&E Organization for the DoD ACWA program. The Navy Lead DT&E Organizations include program offices, warfare centers, and PEOs. The Air Force uses test wings, the Air Force Life Cycle Management Center (AFLCMC), and the Space and Missile Systems Center (SMC) to perform the Lead DT&E Organization duties. MDA is the Lead DT&E Organization for the BMDS program, and DISA did not provide information on the Lead DT&E Organization because DISA does not have any MDAPs.

Since the statutory requirement began in FY 2012, DASD(DT&E) has been reviewing the constructs annually and will report out in future reports as these models evolve and acquisition outcomes are realized. DASD(DT&E) continues to engage with the Lead DT&E Organizations, address their concerns, and monitor the DT&E capabilities needed by AEC and the ability of an organization that is part of a program office to perform the statutory responsibilities of a Lead DT&E Organization.

Tables 4-4 through 4-7 provide the assessments of the adequacy of resources for the Lead DT&E Organizations to carry out their responsibilities.

4.2.2.1 Army Lead DT&E Organizations

The Army Lead DT&E Organizations within ATEC AEC include the Aviation-Fires Evaluation Directorate (AFED), the C4ISR Evaluation Directorate (C4ISRED), and the Mounted Systems Evaluation Directorate (MSED). The primary focus of AEC is to plan, support, conduct, and provide independent evaluations, assessments, and experiments in order to provide essential information to decision makers. The AEC mission includes both DT&E and OT&E activities. DASD(DT&E) continues to monitor the DT&E capabilities needed by AEC to perform the activities of a Lead DT&E Organization and will report out in future reports, if needed. AMSAA serves as the Lead DT&E Organization for the DoD ACWA program.

Table 4-4. Assessment of Adequacy of Resources for Army Lead DT&E Organizations

Lead DT&E Organization	Supported Programs	Assessment
ATEC AFED	Army IAMD	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC AFED are adequate to support near-term priorities. The PMO's future concern (identified below) will be considered during TRMC strategic planning efforts for T&E facilities and resources, which include an assessment of future T&E requirements. *Lead DT&E Organization*: ATEC AFED identified no gaps. *PMO*: The PMO identified no gaps. The PMO expressed concern for the future regarding having an adequate number of qualified personnel with the proper air and missile defense expertise and the infrastructure to concurrently

Lead DT&E Organization	Supported Programs	Assessment
		execute test activities for multiple ACAT 1D programs. The PMO also noted that the communications backbone at ATEC ranges and test centers needs to continuously improve as programs' data requirements increase.
ATEC AFED	JAGM	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC AFED are adequate to support near-term priorities. No current gaps have been identified. The PMO's future gap (identified below) will be considered during TRMC strategic planning efforts for T&E facilities and resources, which include an assessment of future T&E requirements. *Lead DT&E Organization*: ATEC AFED identified no gaps. *PMO*: The PMO-identified future gap (FY 2018 and beyond) at Redstone Test Center is the JAGM all-up round, high-rate, nondestructive test station(s) that will allow the PM to reduce planned fly-to-buy lot acceptance over the production life cycle.
ATEC AFED	M109A7 FoV, PIM SPH and CAT Vehicle	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC AFED are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: ATEC AFED identified no gaps. *PMO*: The PM identified no gaps.
ATEC C4ISRED	IPPS-A Increment II	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC C4ISRED are adequate to support near-term priorities. No gaps have been identified; however, some difficulties and challenges in testing have been identified. DASD(DT&E) recognizes the increasing demands for cybersecurity test resources and is working with the TRMC to address current and future demands. *Lead DT&E Organization*: ATEC C4ISRED noted that cybersecurity resources are inadequate. *PMO*: The PM has a concern that cybersecurity test resources are inadequate and may not be sufficient to concurrently support the IPPS-A Increment II test schedule, the semiannual Network Integration Evaluation, and other test events.
ATEC C4ISRED	JTRS HMS RR	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC C4ISRED are adequate to support near-term priorities. No gaps have been identified; however, some difficulties and challenges in testing have been identified. DASD(DT&E) recognizes the challenges with geographically dispersed test centers and is working with the TRMC to address current and future demands. *Lead DT&E Organization*: ATEC C4ISRED identified no gaps. *PMO*: The PM noted that geographically dispersed test centers lead to logistics issues in providing personnel support and executing testing. Instrumentation will always be an issue on the dismounted radios to provide a solution that captures all pertinent information and is usable in both a DT and an OT environment.
ATEC C4ISRED	MNVR (AN/VRC-118(v)1)	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC C4ISRED are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: ATEC C4ISRED identified no gaps. *PMO*: The PM identified no gaps.

Lead DT&E Organization	Supported Programs	Assessment
ATEC C4ISRED	WIN-T Increment 2	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC C4ISRED are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: ATEC C4ISRED identified no gaps. *PMO*: The PM identified no gaps.
ATEC MSED	Abrams M1A2 SEPv3 ECP 1a	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for ATEC MSED are adequate to support near-term priorities. DASD(DT&E) will review the organizations and capabilities with respect to DT&E in future reports. DASD(DT&E)/TRMC has an initiative to improve big data analytics. *Lead DT&E Organization*: ATEC MSED identified a gap in expertise with database management for large data sets. The current and future plan to address this need is to use contract support. *PMO*: The PMO identified that staffing levels at ATEC may need to be increased to support current and future major programs; particularly, the Abrams ECP 1a program will be in direct competition with Bradley/PIM programs for ATEC staff (test officers).
ATEC MSED	JLTV	*DASD(DT&E):* DASD(DT&E) assesses that the resources for ATEC MSED are adequate to support near-term priorities. No gaps have been identified. DASD(DT&E) supports ATEC's approach to work with the Engineer Research and Development Center (ERDC) to improve test expertise related to soft soil testing. *Lead DT&E Organization:* ATEC MSED stated that ATEC currently lacks expertise in soil mechanics and leverages the expertise of ERDC. ATEC works closely with ERDC to improve test expertise related to soft soil testing. *PMO:* The PM identified no gaps.
AMSAA	ACWA	*DASD(DT&E):* DASD(DT&E) assesses that the resources for AMSAA are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization:* AMSAA identified no gaps. *PMO:* The PM identified no gaps.

4.2.2.2 Navy Lead DT&E Organizations

The Navy Lead DT&E Organizations include program offices, warfare centers, and PEOs. For the programs reviewed in this report, the Navy Lead DT&E Organizations include NAWCAD, Naval Rotary-Wing Aircraft Test and Evaluation Squadron Two One (HX-21); NAWCAD, Air Test and Evaluation Squadron Twenty (VX-20); NAWCAD, Air Test and Evaluation Squadron Twenty-Three (VX-23); Naval Surface Warfare Center (NSWC), Port Hueneme Division (PHD); Naval Undersea Warfare Center (NUWC), Newport (NPT); PEO for Integrated Warfare Systems (IWS) 7; Air Warfare Mission Area/FTA Program Office (PMA-298); PEO for Aircraft Carriers (PMS 378T); OHIO Replacement Program Office (PMS 397); SPAWAR Systems Center Pacific (SSC PAC); and Strategic Systems Programs (SSP).

Table 4-5. Assessment of Adequacy of Resources for Navy Lead DT&E Organizations

Lead DT&E Organization	Supported Programs	Assessment
NAWCAD HX-21	CH-53K	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NAWCAD HX-21 are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NAWCAD HX-21 identified no gaps. *PMO*: The PMO identified no gaps.
NAWCAD HX-21	VH-92A	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NAWCAD HX-21 are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NAWCAD HX-21 identified no gaps. *PMO*: The PMO identified no gaps.
NAWCAD VX-20	MQ-4C Triton UAS	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NAWCAD VX-20 are adequate to support near-term priorities. Because there is currently no impact on Triton's ability to execute testing, DASD(DT&E) will monitor the concern (identified below) regarding naval flight officer (NFO) manning. *Lead DT&E Organization*: NAWCAD VX-20 identified test pilot/NFO manning as a current gap, but it has not impacted Triton's ability to execute testing. *PMO*: The PMO identified that NFO manning is the only current gap in T&E capabilities and workforce with risk mitigation options currently being evaluated.
NAWCAD VX-20	P-8A Poseidon	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NAWCAD VX-20 are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NAWCAD VX-20 identified no gaps. *PMO*: The PMO identified no gaps.
NAWCAD VX-23	F-35 Lightning	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NAWCAD VX-23 are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NAWCAD VX-23 identified no gaps. *PMO*: The PMO identified no gaps.
NSWC PHD	CAC2S Increment 1	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NSWC PHD are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NSWC PHD identified no gaps. *PMO*: The PMO identified no gaps.
NSWC PHD	LCS and MPs	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NSWC PHD are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NSWC PHD identified no gaps. *PMO*: The PMO identified no gaps.
NSWC PHD	DDG 1000	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NSWC PHD are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NSWC PHD identified no gaps. *PMO*: The PMO identified no gaps.

Lead DT&E Organization	Supported Programs	Assessment
NUWC NPT	VIRGINIA-Class Submarine	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for NUWC NPT are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: NUWC NPT identified no gaps. *PMO*: The PMO identified no gaps.
PEO IWS 7*	NIFC-CA (FTS Capability)	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for PEO IWS 7 are adequate to support near-term priorities. No gaps have been identified. DASD(DT&E) plans to continue to monitor and review the ability of the organization in the program office to perform the necessary level of DT&E for this demonstration project. *Lead DT&E Organization*: PEO IWS 7 is the Test Lead and has identified no gaps. *PMO*: The PMO identified no gaps. *NIFC-CA is a project and not an MDAP. There is not a Lead DT&E Organization assigned for the NIFC-CA project. PEO IWS 7 is the systems engineering and test lead for NIFC-CA FTS capability.
PMA-298**	NIFC-CA (FTA Capability)	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for PMA-298 are adequate to support near-term priorities. DASD(DT&E) will monitor the gap identified below. DASD(DT&E) plans to continue to monitor and review the ability of the organization in the program office to perform the necessary level of DT&E for this demonstration project. *Lead DT&E Organization*: PMA-298 identified no gaps. *PMO*: The PMO identified gaps in certain LVC capabilities that resulted in having more aircraft to be flown to support NIFC-CA FTA test events. **NIFC-CA is a project and not an MDAP. There is not a Lead DT&E Organization assigned for the NIFC-CA project. PMA-298 is the systems engineering and test lead for NIFC-CA FTA capability.
PMS 378T	CVN 78	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for PMS 378T are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: PMS 378T identified no gaps. *PMO*: The PMO identified no gaps.
PMS 397	OHIO-Class Submarine Replacement	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for PMS 397 are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: PMS 397 identified no gaps. *PMO*: The PMO identified no gaps.
SSC PAC	MUOS	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for SSC PAC are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: SSC PAC identified no gaps. *PMO*: The PMO identified no gaps.
SSP	Trident II D5LE	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for SSP are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: SSP identified no gaps. *PMO*: The PMO identified no gaps.

4.2.2.3 Air Force Lead DT&E Organizations

The Air Force uses test wings, AFLCMC, and SMC to perform the Lead DT&E Organization duties. The Air Force Lead DT&E Organizations include the 96th Test Wing; 412th Test Wing; Enterprise Integration, AFLCMC (AFLCMC/HNIZ); Intelligence, Surveillance, and Reconnaissance and Special Operations Forces, AFLCMC (AFLCMC/WI); GPS Directorate's Systems Engineering Division, SMC (SMC/GPEV); and Remote Sensing Systems Engineering Branch, SMC (SMC/RSE).

Table 4-6. Assessment of Adequacy of Resources for Air Force Lead DT&E Organizations

Lead DT&E Organization	Supported Programs	Assessment
96th Test Wing	AOC-WS Increment 10.2	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 96th Test Wing are adequate to support near-term priorities. DASD(DT&E) will monitor the future gap identified below. *Lead DT&E Organization*: The 96th Test Wing stated that a future gap is tied to the requirement of supporting concurrent test events between AOC-WS Increments 10.1 and 10.2. Subject matter experts (SMEs) are limited and tasks have to be prioritized based on AOC-WS System Program Office (SPO) guidance. In addition, SMEs will have to be taken off of other program test events to support Increment 10.2. Direction will come from the SPO/PEO. *PMO*: The PMO identified a future gap in the limited number of 46th Test Squadron personnel available to support concurrent DT activities between AOC-WS Increments 10.1 and 10.2.
96th Test Wing	B61-12 LEP TKA	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 96th Test Wing are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: The 96th Test Wing identified no gaps. *PMO*: The PMO identified no gaps.
96th Test Wing	FAB-T	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 96th Test Wing are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: The 96th Test Wing identified no gaps. *PMO*: The PMO identified no gaps.
96th Test Wing	SDB II	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 96th Test Wing are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: The 96th Test Wing identified no gaps. *PMO*: The PMO identified no gaps.
412th Test Wing	KC-46A Tanker Modernization	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 412th Test Wing are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: The 412th Test Wing identified no gaps. *PMO*: The PMO identified no gaps.
412th Test Wing	RQ-4B Global Hawk	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for the 412th Test Wing are adequate to support near-term priorities. DASD(DT&E) will monitor the actions being taken by the Lead DT&E Organization to mitigate the shortage (identified below) and consider the potential shortage during

Lead DT&E Organization	Supported Programs	Assessment
		TRMC strategic planning efforts. *Lead DT&E Organization*: The 412th Test Wing identified gaps in trained sensor operator resources and a shortage of remotely piloted aircraft pilot Test Pilot School graduates. Actions are being taken to mitigate the impact. *PMO*: The PMO identified no gaps.
AFLCMC/ HNIZ	DEAMS	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for AFLCMC/ HNIZ are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: AFLCMC/HNIZ identified no gaps. *PMO*: The PMO identified no gaps.
AFLCMC/WI	MQ-9 Reaper	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for AFLCMC/WI are adequate to support near-term priorities. No gaps have been identified. DASD(DT&E) recommends that the PMO utilize the Lead DT&E Organization to support integrated testing. *Lead DT&E Organization*: AFLCMC/WI identified no gaps. *PMO*: The PMO stated the need for additional resources/staffing to improve the effectiveness and efficiency of integrated testing in support of the approved MQ-9 hybrid acquisition concept, which relies on integrated testing.
SMC/GPEV	GPS Enterprise	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for SMC/GPEV are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: SMC/GPEV identified no gaps. *PMO*: The PMO identified no gaps.
SMC/RSE	SBIRS High	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for SMC/RSE are adequate to support near-term priorities. No gaps have been identified. *Lead DT&E Organization*: SMC/RSE identified no gaps. *PMO*: The PMO identified no gaps.

4.2.2.4 MDA Lead DT&E Organization

MDA is the Lead DT&E Organization for the BMDS program. MDA has assigned an organization, MDA Directorate for Test, within the agency to act as the Lead DT&E Organization.

Table 4-7. Assessment of Adequacy of Resources for MDA Lead DT&E Organization

Lead DT&E Organization	Supported Program	Assessment
MDA Directorate for Test	BMDS	*DASD(DT&E)*: DASD(DT&E) assesses that the resources for MDA are adequate to support near-term priorities. No gaps have been identified. DASD(DT&E) plans to continue to monitor and review the ability of an organization that is part of a program office to perform the statutory responsibilities of a Lead DT&E Organization. *Lead DT&E Organization*: The MDA Directorate for Test identified no gaps. *PMO*: The PMO identified no gaps.

5 DoD Test Resource Management Center

In FY 2015, the TRMC provided advocacy, oversight, and guidance for all matters pertaining to assessment of and strategic planning for DoD T&E resources. These responsibilities included annual certification of the Service and Defense Agency T&E budgets and wide-ranging studies on topics such as fifth-generation threat requirements; a hypersonic business case; T&E of autonomous systems; Laboratory Demonstration; military construction; and acquisition of commercial research, test, and measurement capability. In addition, the TRMC oversees management of the CTEIP, T&E/S&T Program, JMETC Program, and NCR.

5.1 TEMP Review

The TRMC reviewed acquisition program TEMPs as needed to support DASD(DT&E). These reviews assessed the adequacy of test resources documented in the TEMP, including test infrastructure, distributed testing, interoperability, and cybersecurity. Feedback through DASD(DT&E) to programs assisted in overcoming some test limitations and improving program awareness of all DoD test capabilities. In addition, information gleaned from TEMPs informs the overall knowledge of test infrastructure, capability shortfalls, and potential investments in test infrastructure by programs.

The TRMC identified several issues for further investigation including the following: test target and threat system cost, availability, and fidelity in threat representations, and limitations to support full power testing of jamming systems. The TRMC has responded by initiating the Fifth-Generation Aerial Target Joint Service Tiger Team, continuing investments in threat-representative target technologies via S&T programs, and continuing engagement with range sustainability stakeholders to monitor and help mitigate encroachment and environmental regulation impacts.

5.2 Near-Term Gaps

5.2.1 Live, Virtual, and Constructive (LVC) T&E

In FY 2015, the TRMC began an initiative to create an integrated LVC T&E distributed simulation-based T&E environment that can provide the level of complexity and realism necessary to effectively test acquisition systems. Work has begun on an LVC T&E prototype that will place emphasis on identifying the policy and guidance necessary to achieve this end-state goal. This prototype will concentrate on T&E needs of acquisition programs as they relate to platform integration and mission effectiveness. The prototype will also identify and prioritize detailed technical and nontechnical requirements including technical specifications, standards identification, and policy requirements and implications. DoD has significant investments in stand-alone virtual simulations and constructive capabilities that can be leveraged. For example, the Government-owned Test and Training Enabling Architecture provides the framework for integrating LVC systems. The TRMC JMETC Program provides the network infrastructure and subject matter expertise to create these complex test environments. In addition, technologies including cloud computing and computer processing have matured to the point that such an approach is now feasible. The LVC T&E prototype will leverage

these existing capabilities and others to meet technical requirements, identify resources required to satisfy technical requirements, and establish a phased implementation strategy for achieving technical requirements.

5.2.2 Big Data Analytics and Improved KM

DoD efforts to improve its ability to quickly and thoroughly analyze the large amounts of test data it collects are focused on development of KM capabilities and big data analytics. Work in this area, led by CTEIP, seeks to increase the speed of development, testing, and deployment of systems by leveraging commercial and Government development tools, techniques, and best practices. The Joint Strike Fighter KM Joint Improvement and Modernization (JIM) project is a proof of concept to ascertain how well KM capabilities and big data tools can assist large acquisition programs in discovering trends, dependencies, and unknowns through analysis of multiple sets of flight test data at distributed test locations. The Collected Operational Data Analytics for Continuous T&E JIM project is consolidating and analyzing very large data sets across multiple commodity areas (e.g., automotive test vehicle data and theater-collected performance/reliability data) to diagnose and visualize complex trends and undiscovered issues.

5.2.3 Range Sustainability

Current activities at all levels of the Department have highlighted that a "stronger" approach to preventing encroachment is needed to preserve the set of unique capabilities that the MRTFB provides in support of the DoD acquisition system. Protections afforded the Department are not adequate to ensure that noncompatible land use developments can be efficiently halted or reversed to prevent potentially significant negative impacts on national security. DON analysis of the Great Bay Wind I energy project determined that the project would significantly impair and degrade RDT&E activities located at Naval Air Station Patuxent River, Maryland. DoD accepted the DON's findings and formally objected to the project in accordance with Part 211 of Title 32, Code of Federal Regulations. However, without significant support from Maryland legislators, the developer may not have decided to abandon the project. A comprehensive national strategy must be developed to address encroachment issues impacting the MRTFB.

In 2015, the TRMC completed a Test Range Encroachment Review in response to growing USD(AT&L) concerns about the effect of encroachment issues on the capability of DoD test ranges to meet acquisition program test requirements. The range review confirmed that electromagnetic spectrum (EMS), energy development/adjacent land use, and airspace encroachment are the issues with the greatest impact on T&E infrastructure. The TRMC also initiated the 2016 biennial encroachment survey, which added climate change and foreign investment factors. The TRMC uses the results from this survey to ensure that the test ranges are adequately sustained, remaining viable for critical weapons systems testing despite the growing pressures of numerous and diverse encroachment factors. The TRMC has ongoing initiatives to address spectrum encroachment, which are described in section 5.8.2 of this report.

The TRMC participated heavily within the sustainability community and is a member of the Siting Clearinghouse and the Sustainable Ranges Initiative Organization. The TRMC continues its participation in two sustainability forums: the Southeast Regional Partnership for Planning and

Sustainability (SERPPAS) and the Western Regional Partnership (WRP). Both SERPPAS and WRP are composed of local government and civilian officials partnered with DoD and other Federal and tribal agencies to address regional issues of common concern, including encroachment affecting military-controlled lands. These forums provide early insight into issues and interface with the Services, developers, and local and state governance to mitigate or avoid issues before they may impact a range.

5.3 Studies

5.3.1 Fifth-Generation Threat Requirements Study

Competing nations are developing fifth-generation aircraft that meld advanced high-performance aircraft characteristics including low-probability-of-intercept radar, advanced electronic warfare (EW) capabilities, stealth signatures, high-performance airframes, and super-cruise propulsion. Broad agreement exists within the weapon system community on the need for a representative threat capability to test against fifth-generation threat aircraft. The USD(AT&L) directed the TRMC to lead a rapid analysis team to provide technically sound, prioritized developmental and operational test emulation requirements for fifth-generation aerial threats. The TRMC led the Joint Rapid Analysis Team and published its report in July 2015 with unanimous concurrence.

The report identifies shortfalls in the Department's emulation capabilities for current and emerging aerial threats. These shortfalls impact the T&E of U.S. weapon systems critical to defeating these threats. The information presented in the report indicates that a broad enterprise solution is required. The report identifies several modernization efforts that could potentially close some emulation shortfalls in the near term, as well as data collection efforts that would support a joint team development of a well-balanced long-term emulation investment strategy. The joint team should also leverage ongoing full-scale target development efforts led by the DOT&E.

5.3.2 Hypersonic Business Case Report

As called for by the FY 2013 NDAA, the OSTP, working with the Secretary of Defense and the Administrator of NASA, completed a study on the ability of the national T&E infrastructure to effectively and efficiently mature hypersonic technologies for defense systems development in the short term and long term. The study evaluated the capabilities of existing ground test facilities and open-air ranges (OARs). It found that although many existing facilities provide substantial capability for testing weapon systems in the hypersonic flight regime, capability gaps exist in ground test facilities, OARs, and M&S. Existing facilities were created to evaluate strategic deterrent, missile defense, and space access systems; however, sustained controlled flight in the hypersonic flight regime requires a more realistic emulation of this extreme environment to better understand the physics and chemistry.

In follow-up to the OSTP study, the TRMC led development of a DoD report and plan on the requirements and proposed investments to meet DoD needs through 2030. The report was sent to the appropriate congressional committees. Based on the findings, the TRMC and ASD(R&E) are

collaborating on submission of proposed investments to address shortfalls in test capabilities for hypersonic system development for consideration in the budget process.

5.3.3 T&E of Autonomous Systems

In April 2015, the TRMC launched a three-phase, 20-month study to identify the test methodology and infrastructure required to support the development and testing of autonomous systems. In Phase 1, the team interviewed 23 organizations and 13 programs to identify the test tools used, test methods employed, and challenges faced by the autonomy community. This investigation produced nine use cases covering air, undersea, sea, and land operational domains. The use cases were functionally decomposed into 43 unique mission phases and 143 functional requirements that resulted in 278 autonomy test requirements. In Phase 2, the team will assess the available test infrastructure against these requirements to identify capability gaps. In Phase 3, the team will recommend time-phased investments in key infrastructure and capabilities and required test evaluation methodologies to support the Department's autonomy programs. The TRMC is also addressing this area within the T&E/S&T Program, discussed in section 5.4 of this report.

5.3.4 Laboratory Demonstration (Lab Demo)

As directed by the House Armed Services Committee (HASC) Report on the NDAA for FY 2016, the TRMC conducted a cost-benefit analysis (CBA) of the feasibility of transitioning the Lab Demo pay system to the MRTFB. In addition to evaluating the merits of transitioning an MRTFB entity to the Lab Demo system or the similar DoD Civilian Acquisition Workforce Personnel Demonstration Project (AcqDemo) system, the CBA will develop criteria to identify which MRTFB entities would most benefit from the transition. The TRMC selected the NAVAIR Science and Technology Reinvention Laboratory (STRL) as a Lab Demo reference case for this assessment. Initial findings indicate that 10 of 23 MRTFB activities are already in a demonstration project, either Lab Demo or AcqDemo, and NAVAIR's ability to attract, hire, and retain a specialized workforce has improved since its transition at STRL. Congress was provided a copy of the brief on November 30, 2015.

5.3.5 Military Construction

As directed by the HASC Report on the NDAA for FY 2016, the TRMC is conducting a comprehensive assessment of MRTFB-only military construction needs and investments. The assessment includes an estimated cost to replace or bring to code deficient structures, as well as a plan for ensuring sufficient capacity for all MRTFB facilities to support current and projected future operations. To facilitate the study, the TRMC assembled an Integrated Product Team with members from the Army; Navy; Air Force; DISA; Office of the Assistant Secretary of Defense for Energy, Installations, and Environment; and Office of the Under Secretary of Defense (Comptroller). Preliminary findings indicate that MRTFB facility conditions are a reflection of the DoD-wide real property portfolio, with similar percentages of fair to good, poor, and failing assets. Although the current assessment found no capability or capacity limitation to support acquisition program test requirements, there is an increasing sustainment cost burden to DoD Components if those poor and failing facilities are not mitigated. As a follow-on to the assessment, the TRMC will (1) review mitigation plans for consistency with future impacts on acquisition and development program T&E

requirements, costs, and schedules; (2) track the condition ratings of each MRTFB activity's real property assets via the DoD Real Property Assets Database to determine potential impacts on MRTFB capabilities and capacity; (3) conduct annual MRTFB infrastructure readiness reviews; (4) use the results to inform the TRMC annual budget certification of DoD T&E accounts; and (5) report the status of MRTFB constructed real property assets to Congress through the biennial Strategic Plan for DoD T&E Resources. As required by the HASC Report, a preliminary findings briefing was submitted to the HASC on January 15, 2016. A final report is due to the congressional defense committees on March 1, 2016.

5.3.6 Acquisition of Commercial Research, Test, and Measurement Capability

Senate Report 114-49 on the NDAA for FY 2016 directs that DoD and its contractors should assess the best way to acquire research, test, and measurement capability, particularly when this equipment, once purchased, is often used for only limited periods of time with a low utilization in an environment in which research, testing, and measurement technologies can become obsolete relatively quickly. The committee believes that DoD should assess the value of leasing/rental services for commercial off-the-shelf (COTS) research, test, and measurement equipment capabilities for DoD requirements in support of RDT&E programs and activities rather than purchasing equipment to acquire the capabilities. The TRMC is currently working in cooperation with the Services and DISA to do the following:

- Determine whether prior documented business case analyses exist.
- Conduct a review of the acquisition practices for acquiring COTS research, test, and measurement equipment capabilities.
- Assess the value of leasing/rental services for COTS research, test, and measurement equipment capabilities and whether any current policies or procedures hinder such leasing/rental services.

5.4 T&E/S&T Program

The T&E/S&T Program develops test technologies to keep pace with evolving weapons technologies. Funded within the Advanced Technology Development Budget Activity, the T&E/S&T Program is critical to ensuring that DoD has the ability to adequately test advanced systems that will be fielded in the future. T&E/S&T Program technology development projects typically begin at Technology Readiness Level (TRL) 3 and mature to TRL 6; deliverables include test technology prototypes and demonstrations in relevant test environments. Although the T&E/S&T Program primarily addresses long-term gaps in the T&E infrastructure, it also performs risk reduction for the development of test capabilities by CTEIP and DoD Component Improvement and Modernization (I&M) efforts.

The TRMC centrally manages the T&E/S&T Program. The program employs a decentralized execution process through eight Test Technology Areas, each of which is led by an Executing Agent from one of the Services and based at a test organization in the field. Moreover, each Executing Agent leads a working group composed of representatives from the DoD T&E and S&T communities, with expertise related to the respective test technology. The eight Test Technology Areas are EW Testing; Cyberspace Testing; Command, Control, Communications, Computers, and

Intelligence (C4I) and Software-Intensive Systems Testing; High-Speed Systems Testing; Directed Energy Testing; UAS Testing; Advanced Instrumentation Systems Technology; and Spectrum-Efficient Technology.

The T&E/S&T Program also advances OSD science, technology, engineering, and mathematics initiatives for the T&E community by involving academic institutions in projects initiated by response to broad agency announcements and by supporting intern activities within the TRMC and at DoD test ranges and facilities.

Significant Ongoing Technology Developments

- **Improving Hypersonic Propulsion Systems Testing**. The High-Speed Systems Test Technology Area is developing a hypersonic aeropropulsion clean air test bed that better replicates a realistic flight profile in a wind tunnel at the required temperatures and with the ability to vary Mach number from roughly 5 to 8. The first phase of this development has demonstrated a capability to flow clean air into a test engine at temperatures that the system would experience traveling at Mach 7.5, exceeding more than twice the previous U.S. ground test capability. This technology will advance DoD efforts to reduce developmental and acquisition risks of high-speed strike weapons by adequately testing scramjet engine performance and operability in ground test facilities.
- **Improving Infrared Countermeasures (IRCM) Systems Testing**. The EW Test Technology Area is developing a realistic, high-resolution, infrared two-color scene projector capable of emulating hot objects rapidly traversing a realistic background. This technology will provide the ability to project an infrared scene of an incoming target into an aircraft sensor and enable realistic dynamic testing of two-color missile warning systems and directed IRCM systems.
- **Expanding the Test Opportunities for High-Energy Lasers (HELs)**. The Directed Energy Test Technology Area is developing an integrated system, including three prototype light detection and ranging systems to characterize the atmosphere on slant propagation paths, to provide range-resolved refractive turbulence profiles, water vapor density, and extinction due to aerosols. This technology will provide the ability to understand how atmospheric effects distort HEL beam propagation along a slant path.
- **Improving Extended-Range Weapons Testing**. The Spectrum Efficient Test Technology Area is prototyping a beam-forming phased array telemetry antenna system suitable for mounting on a large unmanned aircraft to support over-the-horizon test operations. Designed to support extended-range missile defense tests, this prototype will augment the sea-based telemetry network and reduce the risk of telemetry dropouts in key phases of missile tests across the Pacific Ocean.
- **Improving Sanitization of Cyber Test Environments**. The Cyberspace Test Technology Area effort is developing an automated sanitization framework of cyber-range components. This trusted, consistent sanitization approach will enable specialized assets to be shared among user communities that require access at varying levels of security without risk of compromising classified data or artifacts at the NCR.
- **Improving Behavior Prediction for Autonomous System Testing**. The UAS Test Technology Area is developing a stress-testing tool for UAS software that reveals behavior performance failures within the system. Identifying weaknesses and improving resiliency of autonomy

software, an early version of the software test tool supported the testing of autonomous system technology demonstrators, and the tool will ultimately be transitioned into Government system integration test laboratories to support the testing of next-generation autonomous systems.

All of the above Test Technology Areas are described more fully in a separate T&E/S&T Program Annual Report, which is provided to stakeholders and other interested parties.

5.5 Central Test and Evaluation Investment Program (CTEIP)

CTEIP provides an enterprise approach for DoD investments in T&E capabilities that meet multi-Service and Defense Agency test requirements. The major portion of CTEIP funding is devoted to JIM projects, which address critical, leading-edge capabilities needed to support T&E of increasingly complex and sophisticated weapons, sensor, and command and control systems. JIM projects are nominated by T&E Executive Agents on behalf of their respective Service or Defense Agency. CTEIP also funds Resource Enhancement Program (REP) projects, which address high-priority, near-term OT needs nominated by the Service or Defense Agency operational test commands and approved and prioritized by the DOT&E. Additionally, CTEIP funds threat simulator development efforts through the Threat Systems Program (TSP). In total, CTEIP funds 40 to 50 projects a year ranging from studies of test technologies to full-scale developments.

During FY 2015, two studies and six projects were successfully completed and 47 projects continued in execution. A complete review of all 2015 CTEIP projects will be published in the 2015 CTEIP Annual Report. The following is a summary of ongoing and new projects in the major enterprise investment areas.

- EW Testing. Several OSD studies have identified gaps in the Department's ability to test EW capabilities. Programs of record need to verify and validate U.S. and allied EW system performance against dense and diverse radio frequency (RF) threat system environments. In response to this need, CTEIP established the Electronic Warfare Infrastructure Improvement Project (EWIIP) as a portfolio that will develop advanced installed system test facility (ISTF) and OAR threat simulation capabilities. The major components of EWIIP are the OSD-led Radar Signal Emulator project, which develops high-power, reprogrammable, relocatable RF emitters, and the Navy-led Closed Loop Passive Electronically Scanned Array Simulator project, which fields relocatable, closed-loop surface-to-air missile simulators. The Next-Generation Electronic Warfare Environment Generator (NEWEG) project develops a high-fidelity EW environment generation capability that upgrades Navy and Air Force ISTFs and establishes commonality among DoD RF stimulators. The Advanced Dynamic Transmit Array (ADTRA) project develops a free-space RF transmission capability that will serve as the amplification/antenna subsystem for the next-generation signal generator at the Benefield Anechoic Facility. ADTRA will be interoperable with the Combat Electromagnetic Environment Simulator (CEESIM), the NEWEG, and the CEESIM I&M Program Life Cycle Extension. Other key investments include the REP-funded Digital Integrated Air Defense System (DIADS) Weapons Control and DIADS Sensor Reactivity Upgrade and the TSP-funded Integrated Air Defense System for OT.
- Net-Centric and Cyber Warfare Testing. Cyber/net-centric operations are a critical enabler for operations in air, land, maritime, and space domains. During FY 2015, CTEIP continued execution of JIM projects supporting critical cyber and net-centric enablers. The Network-

Centric Weapons T&E Environment project is developing a distributed capability to assess net-centric weapons system-of-systems performance (e.g., Small Diameter Bomb II). The Cyber Test Analysis and Simulation Environment project will expand cybersecurity testing analysis capabilities and M&S tools. The Multi-Level Secure – Joint/Coalition Network Environment project will provide a persistent, multi-level secure data management capability on the JMETC network for the DoD RDT&E community.

- Space Flight and Strategic Warfare Testing. CTEIP continues to modernize DoD T&E capabilities to protect the Department's strategic warfare systems from the damaging effects of electromagnetic pulse (EMP) and high-power microwave (HPM) threats. The ongoing CTEIP Vertical EMP Simulator JIM project is developing a vertical EMP test capability at two test facilities and a narrowband HPM test capability for conducting aircraft intersystem electromagnetic vulnerability testing. Additionally, as a risk reduction measure for future ground test facilities, CTEIP is developing a prototype mid-pressure arc heater to support materials characterization of nose and leading-edge components for new classes of hypersonic systems.
- Spectrum-Efficient Telemetry. The availability of RF spectrum to support DoD test requirements is becoming more restrictive as systems under test require more bandwidth because of increased test data requirements. As a result, CTEIP is improving DoD telemetry systems to add flexibility for real-time management of test data and instrumentation during missions as well as to use the newly available C-band frequencies. The ongoing integrated Network Enhanced Telemetry JIM project will enhance current one-way serial streaming telemetry with a two-way C-band network radio capability that provides real-time management of aircraft test data and instrumentation. Similarly, the Commercial Derived Aircraft-Based Instrumentation Telemetry System project will provide long-range autonomous range control, range safety and flight termination services, and improved airborne telemetry for open-ocean testing worldwide. Spectrum efficiency is achieved through the use of phased array antennas providing a five-fold increase in the number of systems tracked.
- High-Accuracy Time-Space-Position Information (TSPI). The accuracy of advanced guidance and navigation systems in high-performance aircraft and advanced precision munitions has equaled or surpassed the TSPI capability of current test instrumentation. CTEIP is improving DoD ability to more accurately measure a test item's location and phenomenology while in flight. The ongoing Common Range Integrated Instrumentation System JIM project will replace the aging Advanced Range Data System and provide ranges with the capability to collect highly accurate TSPI (i.e., less than 1 meter). The Advanced Range Tracking and Imaging System JIM project will improve optical tracking capability to observe and record performance (including TSPI) of aircraft or surface-launched missiles and munitions.
- Aircraft Survivability. The sophistication and technology of surface-to-air missiles and air defense weapons, as well as ground fire systems, continue to be a significant threat to aircraft. The ongoing Joint Distributed IRCM Ground-Test System (JDIGS) JIM project enables high-fidelity, low-cost ground testing of installed missile warning systems and IRCM systems. The test capabilities already delivered by JDIGS have supported Navy ISTF missile warning systems and control processor testing and supported Air Force IRCM testing. The Multi-Spectral Sea and Land Target Simulator (MSALTS) REP project provided portable, mobile open-air missile plume simulators to test IRCM systems against land- and sea-based threats. The follow-on MSALTS Ultraviolet Emitter Enhancement project further improves missile plume emulation. The

ongoing Joint Standard Instrumentation Suite REP project measures and collects signature, TSPI, and related data of threat missile and hostile fire munitions firings, and the completed Hostile Fire Indicator Site REP project provided additional shooter sites, Doppler radar, and rotary-wing control. CTEIP also completed the Ascot Wren and Ascot Falcon TSP projects that provided high-fidelity, real-time threat simulation capability for high-volume launch-to-intercept aircraft survivability testing.

- Unmanned Autonomous System (UAS) Testing. Continuing advances in UAS capabilities, coupled with their proliferation across a wide variety of uses, necessitate appropriate T&E investment to ensure that UASs meet expected performance requirements. CTEIP is improving DoD ability to test the performance and safety of modern UASs flying in both contested (e.g., combat) and uncontested (e.g., Federal Aviation Administration-managed airspace) environments. In 2015, CTEIP will conclude its Joint Unmanned Aircraft Systems Mission Environment JIM project that provides test capability for testing and evaluating unmanned aircraft systems. It will deliver a full operational capability to all three Military Departments for T&E of unmanned aircraft systems along with selected sensors, weapons, and command and control systems.

5.6 Joint Mission Environment Test Capability (JMETC) Program

The JMETC Program continued to serve as the DoD corporate infrastructure for linking distributed facilities and enabling customers to test and evaluate systems and SoS warfighting capabilities in a joint context, while realizing significant savings in time and costs. Currently in the ninth year since inception, the program has provided the T&E community with an infrastructure that supports testing across the full spectrum of the acquisition life cycle. JMETC has supported DT, OT, interoperability certification, cybersecurity, and joint mission capability portfolio testing. The JMETC Program has increased its focus on the support of T&E of interoperability and cyberspace requirements at the mission-effectiveness level. In response to the Department's emerging requirement to conduct interoperability testing in a cyber-contested environment, the JMETC Program continues to grow and sustain significant infrastructure enhancements required to accommodate higher levels of classification, special access, and coalition requirements.

During FY 2015, the JMETC Program made significant strides toward accomplishing the goals and objectives of the Testing in a Joint Environment Roadmap, which included building and sustaining the infrastructure to support current and future interoperability and cyberspace T&E requirements. Summarized below are some of the JMETC FY 2015 highlights:

- Supported 66 distinct customers in their distributed LVC test activities, including interoperability testing, cyber testing, training, and experimentation activities.
- Continued participation in four major thrust areas of cyber: T&E policy, T&E methodologies, T&E infrastructure, and workforce qualifications. In the area of T&E methodologies, JMETC made significant contributions to the development and execution of a Cyber Table Top (CTT) prototype methodology in support of the P-8A acquisition program. The CTT methodology is being documented as a Best Practice for Cyber T&E.

- Sponsored continued activities of the Cyber Range Interoperability Standards (CRIS) effort. Through development of standard architectures, tools, and processes, CRIS will ensure the interoperability of cyber range resources within the cyber T&E infrastructure. In FY 2015, the CRIS effort began defining the requirements to modify an existing NCR-specific tool (Test Specification Tool (TST)) into a common tool compatible with numerous sites. The modified TST specifies the desired test network environment, in variable output formats, which would allow the rapid build-out of functionality at any cyber range.
- Continued development and deployment of Regional Service Delivery Points (RSDPs), which will provide increased capacity for cyber test and training. During FY 2015, two RSDPs became operational, with three additional RSDPs planned for deployment.
- Continued the growth and maturity of the JMETC Multiple Independent Levels of Security (MILS) Network (JMN) that supports multiple, concurrent testing for interoperability and cybersecurity at higher classification including Top Secret (TS)/Sensitive Compartmented Information (SCI) and Special Access Programs/Special Access Required.
- Leveraged the RSDP capabilities and incorporated kinetic and non-kinetic assets to address growing interoperability and cyber T&E requirements. During FY 2015, the first deployed RSDP successfully completed test execution in support of scalability testing for the Army's Command Post of the Future (CPOF) hardware and software computing environment with significant cost savings to the product manager. The test support to CPOF substantially exercised the resources of the RSDP, demonstrating the efficiency of the RSDP architecture and associated technical personnel to replicate complex virtual environments. Support to the CPOF program also demonstrated the robust capabilities of the RSDP to support conventional and cyberspace T&E. JMETC initiated planning activities to increase the existing capacity of the RSDPs, which included provisioning the RSDPs to provide cloud-based tools and services (e.g., planning, traffic generation, instrumentation, visualization, integrated event management, collaboration).
- Expanded JMETC participation in DoD EW and cyber convergence activities, including the development of distributed connectivity and cyber resource requirements in support of emerging experimentation activities.
- Supported senior-level decision makers in defining the responsibilities and roles of the Executive Agent for Cyber Test and Training in accordance with congressional mandates.
- Led a study of candidate site locations for hosting an additional cyber range, to be patterned after the NCR and provide additional capacity to satisfy the requirements for cyber T&E and training.

The JMETC Program has matured to a robust hybrid infrastructure consisting of the following:

- A persistent infrastructure of 78 sites on the JMETC Secret network, with an additional eight sites planned to support T&E in an LVC environment.
- An event-driven infrastructure of eight sites on the JMN, with an additional 14 sites planned to support cyber testing, training, and experimentation.
- Sites (as stated above) that are distributed across the country and include DoD/MRTFB range/lab facilities, academia, and industry sites.

- Collective resources that support interoperability testing in a cyber-contested environment.

5.7 National Cyber Range (NCR)

In FY 2015, the NCR supported 47 events for MDAPs, training, and operational exercises, as shown in Figure 5-1, which was a more than 100 percent increase over FY 2014. The NCR is unique in that it can simultaneously execute up to four multiple independent tests of differing security levels from unclassified to TS/SCI on its securely partitioned test beds. In June 2015, the NCR added an additional test bed and capacity to support a dedicated test and training environment for mission rehearsal. The NCR also has the ability to represent the scale and diversity at fidelity detailed enough to realistically portray current and anticipated attack strategies (e.g., malware, distributed denial-of-service attacks, and cross-site scripting). Throughout 2015, the NCR consistently provided the highest quality of customized support that successfully fulfilled a wide range of customer requirements. The scope of cyberspace capability assessment included architectural analysis, product evaluations, system and target emulation, risk reduction activities, research and development testing, and malware and forensic analysis.

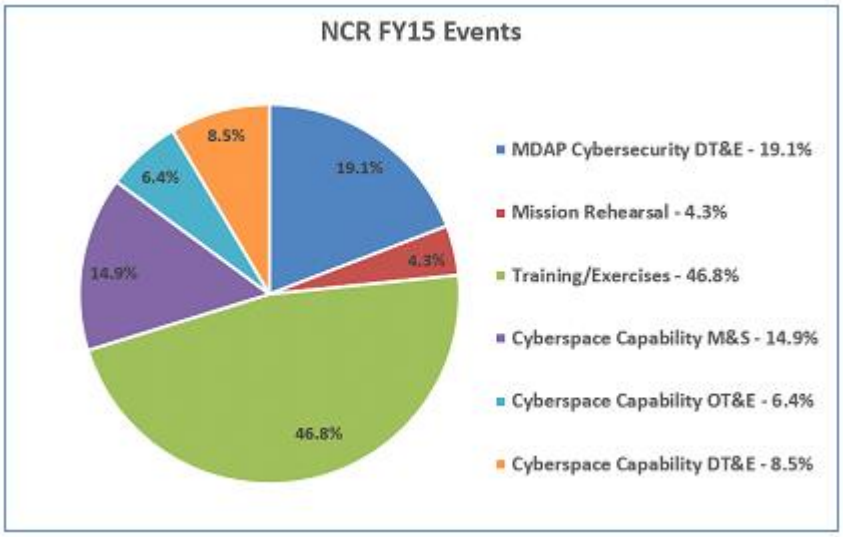


Figure 5-1. NCR FY 2015 Events

During training exercises, the NCR demonstrated the capability to rapidly configure complex network topologies varying in scale from hundreds to 15,000 high-fidelity nodes, connecting with 51 logical ranges, supporting 160+ enclaves; 3,800+ nodes; 2,000+ users; dozens of operating system variants; eight unique types of wireless assets; 10+ new pieces of hardware; and 150+ unique websites. The NCR provided realistic emulations of Secret Internet Protocol Router Network enclaves with highly detailed and realistic supporting Web and e-mail servers and clients. It also provided high-fidelity representations of public internet infrastructure with thousands of websites. The NCR was used by an MDAP for a security architecture evaluation. The NCR provides a world-class cyber test team to assist customers in planning and executing cybersecurity T&E and training events. The cyber test team works hand in hand with customers to demonstrate findings and review mitigation techniques. In turn, the participants have benefited from the workforce training aspect.

The NCR is fully accredited to operate at the TS/SCI level based upon Intelligence Community Directive 503 certification and accreditation requirements.

Highlights of NCR accomplishments in FY 2015 include the following:

- The NCR successfully continued to support distributed cyber training events sponsored by DOT&E and U.S. Cyber Command. The NCR has conducted these events as one of the DoD Enterprise Cyber Range Environment Partner ranges using the Joint Information Operations Range (JIOR) to provide external network connectivity.
- Several MDAPs that have benefited from NCR test events have now specified NCR testing in their TEMPs as a way of more formally incorporating cybersecurity testing into program out-years. MDAP test events conducted in FY 2015 spanned across the Navy, Air Force, and Army and included P-8A, TacMobile, JMS, Aviation Data Management and Control System, and Command Post Computing Environment.
- The NCR successfully supported cybersecurity risk reduction and T&E events for major defense acquisition programs from across multiple Services.
- The NCR supports end-to-end training events to encompass combatant command exercise perspectives that span from mission-level impact to cyber mission forces.
- The NCR Team completed an analysis and trade study that identified life cycle replacements for critical equipment that has reached the end of life/end of support. The analysis and trade study have also been used to inform planning for a second NCR facility.
- In FY 2015, the NCR Team integrated additional capabilities including the following:
    - Added a dedicated testing and training test bed to support mission rehearsal, which included a high-fidelity environment available on demand.
    - Upgraded the JIOR Service Delivery Point and Defense Research and Engineering Network connections to increase range communication bandwidth capacity to 1 gigabit per second and installed a 1-gigabit-per-second-capable JMN Pico Service Delivery Point.
    - Incorporated enhanced simulated internet services and reusable content including e-commerce; social media; forums; media sharing; payment processing; and fault-tolerant, load-balanced webmail.

The NCR currently supports a carefully prioritized workload balance of training and acquisition requirements. However, the TRMC predicts that in the very near future, acquisition requirements will easily demand more than 200 percent of the current NCR capacity. The Department is funding planned expansion of both acquisition (test) and training cyber range capability to meet these predicted requirements.

5.8 Range Sustainability

5.8.1 Open-Air Range Encroachment

Test range sustainability issues have evolved from environmental conservation matters such as endangered species protection to impacts from large renewable energy projects such as wind farm developments, electric transmission line placement, and massive solar farms or towers. In FY 2015, a growing group of projects required detailed review and analysis by more than one Service and the oversight organizations within DoD, including the TRMC. The threat to test range capabilities has increased because of the proliferation of these developments and the support they receive from other departments within the Federal Government. The TRMC is an advocate for the Services in matters related to range sustainability and ensures that impacts to test capabilities because of sustainability issues are examined from the view of the DoD test community as a whole. The TRMC continued to spend a significant amount of time on the SunZia project that proposes to place high-power electrical transmission lines across the Northern Extension Area of White Sands Missile Range (WSMR), New Mexico, to transfer renewable energy from north-central New Mexico to southern Arizona. The transmission lines present an obstruction to low-altitude flight tests involving threat-representative cruise missile target drones. The TRMC worked closely with the Army (and Navy programs that test at WSMR) to preserve some low-flight testing capability by establishing four conditions that the developer must meet for the project to be developed. Work to finalize the agreements concerning the conditions is still under way.

The TRMC continues to protect test range capabilities by funding technology efforts to provide mitigation options and technological solutions. The Great Bay Wind I energy project was found to result in an unacceptable risk to national security. This project's proposed wind turbines would significantly impair and degrade the Advanced Dynamic Aircraft Measurement System located at Naval Air Station Patuxent River, Maryland. The TRMC is funding a Massachusetts Institute of Technology Lincoln Laboratory study evaluating the most promising mitigation options to preserve the capability while supporting the national initiative to expand the use of renewable energy. The study will complete in 2016.

5.8.2 Spectrum Encroachment

In 2015, the TRMC, through its ongoing spectrum stewardship initiative, contributed substantially to the goal of ensuring access to the RF spectrum for use in T&E at DoD test ranges.

- **DoD EMS Strategy Roadmap and Action Plan (RM&AP)**. The TRMC, in conjunction with the DoD CIO and the Services, began implementation of the DoD EMS Strategy RM&AP.
    - In June 2015, the DoD CIO released the DoD EMS Strategy RM&AP, which describes a framework that DoD established to maintain continued access to the EMS needed to achieve mission success.
    - The TRMC, in concert with the Service T&E community, drafted the DoD T&E EMS Common Operating Picture, which is a complementary strategic plan describing the actions necessary to support and guide future endeavors to protect the DoD T&E mission from increasing and evolving EMS encroachment threats. The vision of the strategy is to ensure

"spectrum access when and where needed to achieve mission success" by expediting the development of spectrum-dependent system capabilities with increased spectrum efficiency, flexibility, and adaptability; increasing the agility of DoD spectrum operations; and sharpening the responsiveness to ongoing spectrum regulatory and policy changes.

  - As part of the strategy, the TRMC, in conjunction with the Office of the Under Secretary of Defense for Personnel and Readiness/Joint Training and Ranges, the DoD CIO, and the Defense Spectrum Organization, initiated an activity to regularly collect spectrum usage data at 50 percent of contiguous U.S.-based test range and training activities by 2020.

- **Loss of 1755–1780 Megahertz Band**. The TRMC took a lead role in the T&E response to the loss of 25 megahertz of critical aeronautical mobile telemetry spectrum as a result of the Advanced Wireless Services-3 auction.

  - As part of the DoD Spectrum Access Research and Development Program (SAR&DP) governance structure, the TRMC chaired the T&E Assessment Working Group that evaluated spectrum-sharing project proposals. The DoD CIO established the SAR&DP with the Office of Management and Budget to advance research and development to aid DoD spectrum sharing and relocation efforts using the Spectrum Relocation Fund (SRF). The SRF was established by the Department of the Treasury from the proceeds of spectrum auctions to pay relocation or sharing costs of eligible Federal entities impacted by the auctions.

- **Tri-Service C-Band Requirements**. The TRMC has completed the study of technical and technology requirements needed to fully implement the use of three frequency bands allocated for air traffic management at the 2007 World Radiocommunication Conference (WRC). The bands are 4400–4940 megahertz, 5091–5150 megahertz, and 5925–6700 megahertz. The first two bands are approved for use in the United States, and the third is pending approval by the Federal Communications Commission.

  - The Tri-Service C-band Roadmap Study (TSCRS) identified 18 technologies that the test ranges need to be able to fully use the new frequency bands. Currently, practical use of the bands in general is limited to the testing of manned aircraft. Development of TSCRS-identified technologies will allow use of the bands within all four T&E mission domains (aircraft, missiles, surface-to-air and surface-to-surface rockets, and surface weapons). The TRMC is engaged with the DoD CIO and the Services to explore potential fielding strategies for technologies needed to operate in all four T&E domains consistent with DoD priorities.

- **International Regulatory Process**. The TRMC continued its participation in the international regulatory process, in coordination with the Office of the DoD CIO, to protect the bands used by DoD test ranges for weapon systems testing from encroachment caused by changes to the international radio regulations.

  - Working closely with the U.S. delegation at the 2015 WRC, the TRMC was successful in preserving international rules that accord flight test telemetry priority in the key telemetry band of 1435–1525 megahertz. This position will help ensure that neighboring administrations (Canada and Mexico) will coordinate use of the 1427–1518 megahertz band for wireless broadband by those administrations near the U.S. border.

5.9 MRTFB Workforce Development

Hiring and Retention

As part of congressional direction to assess hiring authorities for personnel at MRTFB sites, the TRMC initiated a study to determine the feasibility of applying the Lab Demo Program (LDP) or similar AcqDemo program to MTRFB sites. The LDP provides flexibility in hiring highly specialized S&T personnel to meet unique mission requirements. In accordance with HASC guidance, the TRMC conducted a CBA of this program to identify the MRTFBs that would most benefit. A briefing was provided to Congress on November 30, 2015.

Community Outreach

The TRMC continues to interact with undergraduate and graduate students pursuing technical T&E-related degrees at historically black colleges and universities and minority-serving institutions and provide the students with exposure to career opportunities in T&E. Additionally, in 2015, the TRMC initiated an Adopt-a-School volunteer program with Barcroft Elementary School in Arlington, Virginia. The TRMC and DASD(DT&E) volunteers served as mentors to improve boys' capabilities and confidence in reading through the Cool Boys Book Club and provided creative and fun ways for girls to learn about technology and gain confidence through the Girls for Engineering, Math, and Science program.

T&E is not a widely known career path, nor is it a separate field of study for degree-granting institutions. However, the profession does require careful selection of courses during a science or engineering curriculum. Also, a significant portion of the T&E workforce does not have or require a 4-year degree (i.e., technicians). Therefore, the TRMC is developing targeted (in location) T&E-oriented workforce outreach programs for high school and middle school students to help maintain a vibrant T&E workforce.

To facilitate the TRMC priority to be a strong advocate for the T&E workforce, the TRMC will strengthen its workforce initiatives through community outreach and by collaborating with ASD(R&E) on workforce initiatives.

5.10 Budget Certification

The TRMC produced a Budget Certification Report (BCR) containing the Director's analysis of the major FY 2016 T&E budget submissions as well as the Director's determination as to whether these proposed budgets are adequate and provide balanced support for the Strategic Plan. The Department supported TRMC submission of an FY 2016 Army T&E budget certification issue. The BCR satisfied the reporting requirements of section 196(e)(2) of Title 10, U.S.C., for assessment of the MRTFB and designated non-MRTFB T&E capabilities, finding them to be adequate and providing balanced support with respect to the Strategic Plan. The TRMC also began analysis of the major FY 2017 budget submissions. The analysis led to the TRMC submitting two FY 2017 budget issues. Only one of the two issues is a budget certification issue.

- Issue 1: In accordance with law and the DoD Resource Management Decision, the DoD CIO coordinated the DISA-JITC POM 17 budget with the TRMC before submission to the Under Secretary of Defense (Comptroller). The submission reflected an FY 2017 funding reduction and

subsequent reductions that were not adequately explained as required by DoDI 3200.18, "Management and Operation of the Major Range and Test Facility Base (MRTFB)." The coordination document showed FY 2017 funding reduced by 8.1 percent ($5.25 million) from FY 2016 funding. At the subsequent TRMC-hosted T&E infrastructure review, DISA JITC T&E funding reflected further reduction for a total of 11.1 percent ($7.26 million) from FY 2016 funding. Neither reduction was adequately explained in terms of projected impacts on acquisition program customers or to the assigned T&E infrastructure. In FY 2019–FY 2021, the proposed account was programmed below the FY 2016 funding level. Discussions between the DoD CIO/DISA and the TRMC led to an agreement that $4.0 million is to be restored in FY 2017 and that FY 2018–FY 2021 required funding will be addressed during the Department's FY 2018 budget-building process. Subsequent to the agreement, the DoD CIO/DISA again reduced the account by $1.9 million without providing the TRMC with an explanation. The Department directed the DoD CIO/DISA to restore the funding.

- Issue 2: The TRMC and the Office of the ASD(R&E) assessed a need for new test infrastructure development to support hypersonic vehicle weapons development and testing and submitted a budget issue for FY 2017–FY 2021 funding. The foundation for the request was established in a report completed in response to a request in the FY 2013 NDAA and the Department's Power Projection Strategic Portfolio Review. The Department strongly supported the budget issue. The details are classified.

For FY 2016, the total institutional (operation and investment) funding assessed by the TRMC was approximately $1.9 billion and is forecasted to remain near this level for FY 2017. The total customer funding received by the activities/capabilities assessed was approximately $1.8 billion and is forecasted to remain near this level for FY 2017.

The composite DoD Component funding trends observed during the FY 2006 to FY 2017 time period include the following:

- Total cost of operating the MRTFB, measured in constant FY 2015 dollars, was relatively stable through FY 2011; however, the funding has been declining since FY 2012. This decline occurred initially in the institutional component of operations funding, with direct (customer) funding starting to decline in FY 2013, with significant variations among the Services through FY 2017.
- Total work years spent operating the MRTFB activities declined by about 15 percent from FY 2006 to FY 2015 and is forecasted to remain near this decline for FY 2016 to FY 2017. Although all Services evidenced a decline, the decline is sharpest for the Army. The manpower mix has significantly changed, with military and contractor work years dropping by about 20 and 26 percent, respectively, over this period. Civilian work years have increased by 8 percent over the period. The manpower changes reflect the impact of the Department's civilian in-sourcing efforts and the continuation of a long-term trend of moving military manpower out of the test infrastructure.
- Investment in the MRTFB, other than Military Construction projects, was approximately $650 million per year through FY 2009 but declined to near $400 million per year in FY 2013. Total investment funding held at or above $500 million per year until FY 2012 but has declined to near $400 million since FY 2013. Military Construction, which tends to be project specific and more variable than I&M, has dropped significantly over the period.

Although these trends are of concern, the TRMC, the Office of the Under Secretary of Defense (Comptroller), and the Office of Cost Assessment and Program Evaluation have worked together to ensure that all critical impacts were successfully mitigated with adequate funding.

The T&E enterprise continues to face budget, policy, environmental, modernization, workforce, and new test technology development challenges. These demands place intense pressure on the community to ensure that T&E capability is in place when and where it is needed.

Test workload continues to be very robust across the Department. Analysis of budget documentation for RDT&E programs indicates that the number of programs planning to conduct T&E has grown from approximately 400 programs in FY 2006 to more than 450 programs since FY 2010, and the number of programs is forecast to continue at or above that level. Nonetheless, the institutional funding available to support customers at the MRTFB has declined about 15 percent since 2006, while customer T&E spending has remained essentially flat. Also, it is unclear whether customer testing at the MRTFB has declined since the FY 2010 peak because smaller institutional budgets constrained the amount of work that could be performed; whether the programs are testing less for programmatic reasons, including budget reductions; or whether efficiencies have permitted the MRTFB activities to earn essentially flat reimbursements while reducing institutional costs. In addition, test investment funding has declined significantly. Although Service data indicate that FY 2015–FY 2017 will see some recovery, the investment accounts will still be well below the level of FY 2006 to FY 2010. With few exceptions, T&E-related Military Construction projects have all but disappeared. Construction projects are driven by specific needs rather than by some related level of activity. However, their near-total absence since 2010 may suggest that "brick and mortar" sorts of test resources are being used, of necessity, well beyond their expected useful life.

The TRMC has no evidence that the general downtrends in test resources have adversely affected necessary T&E, although a small number of anecdotal reports suggest that some programs could not be supported when they desired. However, the funding trends, especially in investment and construction accounts, are concerning because the ability of the MRTFB to support testing of high-technology weapons of the future could be adversely affected. As the Services struggle with maintaining and modernizing existing capability, new T&E capability investment must continue in order to stay ahead of emerging technologies and the needs of acquisition programs.

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6 PROGRAM ENGAGEMENT AND ASSESSMENTS

The FY 2015 Annual Report highlights the engagement activities and assessments of 37 programs (MDAPs, MAIS programs, USD(AT&L)-designated special interest programs) that have reached a significant milestone or had significant DT&E activities. Significant activities include DASD(DT&E) program assessments, first test flight, completed system integration lab testing, completed ground testing, and dedicated Government DT&E. For those programs that received a DASD(DT&E) program assessment during the fiscal year, a separate paragraph highlighting the findings and recommendations of that assessment is included. None of the 37 programs assessed in this report requested a deviation from requirements in the TEMP.

Assessments are as of the end of FY 2015 (September 30, 2015); however, some assessments may include information on program status beyond that date.

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6.1 DoD Programs

This section includes summaries of the following 6 programs:

- Assembled Chemical Weapons Alternatives (ACWA)
- Ballistic Missile Defense System (BMDS)
- Defense Agencies Initiative (DAI) Increment 2
- Department of Defense Healthcare Management System Modernization (DHMSM)
- F-35 Lightning II
- Joint Light Tactical Vehicle (JLTV)

Assembled Chemical Weapons Alternatives (ACWA)

Executive Summary: The ACWA program is responsible for managing the destruction of the final U.S. chemical weapons stockpile in support of the congressionally mandated Chemical Demilitarization Program to eliminate all chemical warfare and related materiel. DoD selected two systems contractor teams to design, build, systemize, pilot test, operate, and close the two program destruction plants: the Bechtel Parsons Blue Grass joint venture for the Blue Grass Chemical Agent-Destruction Pilot Plant (BGCAPP) at the Blue Grass Army Depot, Kentucky, and the Bechtel Pueblo Team for the Pueblo Chemical Agent-Destruction Pilot Plant (PCAPP) at the Pueblo Chemical Depot, Colorado. The plants are first-of-a-kind facilities designed to destroy chemical agents by use of low-temperature, low-pressure neutralization processes. Both plants selected explosive destruction technology systems to safely destroy leaking and/or reject mustard chemical munitions that cannot be easily processed through the main plants.

Lead DT&E Organization: AMSAA

Summary of FY 2015 DT&E Activities

- October 1, 2014–September 30, 2015. The systems contractor teams conducted systemization activities at both main plants.
- October 1–December 6, 2014. AMSAA evaluated PCAPP explosive destruction system (EDS) site setup, systemization, and training activities in preparation for EDS live-agent operations; verified the installation of the system per design; and verified that the equipment was operational and the system met the minimum acceptance criteria.
- November 17–18, 2014. Polestar Technologies, Inc./Telos Corporation conducted a cybersecurity follow-up vulnerability test with the fully operational EDS IT network on-site and all networking equipment in the production configuration. DASD(DT&E) and AMSAA cybersecurity representatives witnessed the testing.
- December 8–11, 2014, and February 23–26, 2015. The Recovered Chemical Materiel Directorate and the Joint Project Manager for Elimination (Provisional) conducted an EDS pre-operations survey to demonstrate readiness to begin live-agent operations. The survey focused on demonstrating normal EDS operations, medical response exercises, and records review. DASD(DT&E) and AMSAA participated in the survey.
- April 22–23, 2015. Sandia National Laboratories conducted qualification testing for the new multi-round 155-millimeter munition holder/linear-shaped charge (LSC) configuration in support of the EDS.
- May 25–June 4, 2015. The BGCAPP static detonation chamber (SDC) vendor, UXB International, conducted SDC factory acceptance testing at its facility in Sweden.
- June 15–25, 2015. Bechtel conducted a cybersecurity blue team assessment of the PCAPP laboratory information system and reviewed security controls for compliance. The program office and AMSAA participated.
- September 14–24, 2015. The U.S. Army Research Laboratory Survivability/Lethality Analysis Directorate conducted a cybersecurity cooperative vulnerability and penetration assessment (CVPA) of the PCAPP industrial control system and external systems, approached from the outsider, near-insider, and insider threat perspective. DASD(DT&E) and AMSAA cybersecurity representatives witnessed the testing.

Summary of FY 2015 DT&E Engagement and Assessments

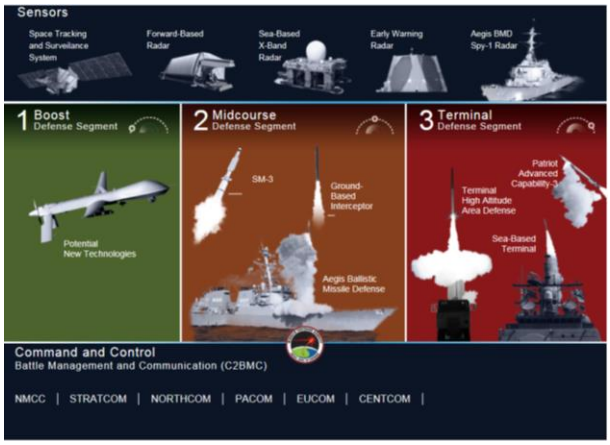
- Systemization is on track at both main plants.
- PCAPP met all required entrance criteria to start EDS destruction operations; EDS started operations on March 18, 2015.
- The new multi-round 155-millimeter munition holder/LSC configuration successfully completed qualification testing; EDS operations with the new holder started on July 16, 2015.
- The SDC completed factory acceptance testing and is currently on-site at BGCAPP.
- Bechtel and the program office are currently working on actions to correct PCAPP cybersecurity vulnerabilities discovered during the CVPA; the Threat Systems Management Office plans to conduct an adversarial assessment of the PCAPP systems in November 2015.

DASD(DT&E) Program Assessment

- DASD(DT&E) conducted a DT&E assessment of the PCAPP EDS in March 2015 to support the start of agent operations. The summary of the DASD(DT&E) evaluation follows:
  - Performance/Supportability. EDS equipment employs proven technology, successfully demonstrated in combined developmental/operational testing and in previous chemical munition destruction operations. The new munition holder designed for multiple 105-/155-millimeter and 155-millimeter munition destruction operations has not successfully passed qualification testing. This circumstance will limit these multiple munition operations until the holder passes qualification testing conducted by Sandia National Laboratories. This restriction does not preclude PCAPP from beginning EDS destruction operations utilizing existing qualified munition holders. PCAPP must close pre-operations survey Category 1 findings and pass the electronic security system (ESS) endurance test prior to the start of agent operations.
  - Cybersecurity. The vendor-provided IT services network supports the PCAPP EDS operation only by recording and archiving data, video, and audio associated with the EDS operation. The network provides no operational control of the EDS. The operators manually operate the EDS with no connection to any network. The PEO conducted two vulnerability assessments of the EDS IT network. The PEO mitigated all high residual risks and is appropriately addressing all remaining medium risks.
  - Recommendation. DASD(DT&E) supported the start of PCAPP EDS agent operations contingent upon PEO ACWA providing the following:
    - Verification that PCAPP placed a limitation on conducting multiple 105-/155-millimeter or 155-millimeter munition destruction operations until the new munition holder passes qualification testing.
    - Verification that PCAPP closed out remaining Category 1 pre-operations survey findings.
    - Verification that the EDS site ESS passed the 30-day endurance test.
- Update: PCAPP met all the contingent verification requirements and started EDS destruction operations on March 18, 2015. The new 155-millimeter munitions holder passed qualification testing on April 23, 2015.

Conclusion: Based on systemization activities to date, DASD(DT&E) assesses the program's ability to meet start-of-operation thresholds for PCAPP and BGCAPP main plants as low risk.

Ballistic Missile Defense System (BMDS)



Executive Summary: The BMDS is intended to counter ballistic missiles of all ranges—short, medium, intermediate, and intercontinental. The BMDS is an integrated, layered architecture that provides multiple opportunities to destroy missiles and their warheads before they can reach their targets. The system includes networked overhead persistent infrared sensors and ground- and sea-based radars for target detection and tracking, and ground- and sea-based interceptor missiles for destroying ballistic missiles. These elements are coupled via a command and control, battle management, and communications system that networks, integrates, and synchronizes missile defense systems operations, providing the Warfighter with the needed links between the sensors and weapon systems.

The January 2, 2002, Secretary of Defense memorandum, "Missile Defense Program Direction," directed that BMDS elements will enter the formal DoD acquisition cycle at MS C, concurrent with procurement responsibility transfer to a Service. The memorandum also directed the following:

- The BMDS program will not be subject to the traditional requirements generation process of Chairman of the Joint Chiefs of Staff Instruction 3170.
- The Director, MDA will establish a process that sets initial capability standards.
- MDA will baseline capabilities and configurations during the transition phase.
- The Services will develop capability-based operational requirements documentation that becomes operative upon transfer.

Since release of the Secretary of Defense memorandum, only Terminal High-Altitude Area Defense and Aegis Ballistic Missile Defense (BMD) components have transitioned to a Service for procurement. The DASD(DT&E) focus is on ensuring that the DT&E planned and conducted will fully inform MS C decisions for future systems.

Lead DT&E Organization: MDA Directorate for Test

Summary of FY 2015 DT&E Activities

- October 17, 2014, Aegis BMD conducted a simulated exoatmospheric engagement of a separating medium-range ballistic missile (MRBM) target using Aegis Baseline 9.C1 and a simulated Standard Missile (SM)-3 Block IB missile.
- October 22–23, 2014, Aegis BMD cancelled an intercept flight test using an Aegis Baseline 9.C1 destroyer intended to detect, track, and lethally intercept an MRBM target using an SM-3 Block IB threat upgrade missile.
- November 6, 2014, Aegis BMD conducted an intercept flight test using an Aegis Baseline 9.C1 destroyer in integrated air and missile defense mode with an SM-3 Block IB missile to lethally intercept a short-range ballistic missile (SRBM) target while near-simultaneously conducting an anti-aircraft warfare raid exercise against two cruise missile targets with SM-2 Block IIIA missiles.

- December 4–6, 2014, and January 12–30, 2015, MDA completed BMDS distributed ground testing involving the Army Navy/Transportable Radar Surveillance radar in Japan, ground-based midcourse defense (GMD) fire control, Aegis BMD, and the sea-based X-band radar.
- February 24, 2015, Aegis BMD conducted a simulated engagement of three Aegis Readiness Assessment Vehicle targets in a raid using two Aegis ships, digital engagement coordination, and simulated SM-3 Block IB missiles.
- April 13–May 8, 2015, MDA completed hardware-in-the-loop (HWIL) ground testing to support European Phased Adaptive Approach Phase 2.
- July 7–16, 2015, MDA completed HWIL ground testing involving the Aegis BMD and the Beale radar upgrades.
- July 28, 2015, Aegis BMD conducted an intercept flight test using Aegis Baseline 9.C1 (5.0 Capability Upgrade (CU)) and an SM-6 Dual I (BMD initialized) missile to intercept a non-separating SRBM target.
- July 29, 2015, Aegis BMD conducted an intercept flight test using Aegis Baseline 9.C1 (5.0 CU) and an SM-2 Block IV missile to intercept a non-separating SRBM target.
- July 31, 2015, Aegis BMD conducted an intercept flight test using Aegis Baseline 9.C1 (5.0 CU) and an SM-6 Dual I (air warfare (AW) initialized) missile to intercept an AW target.
- August 1, 2015, Aegis BMD conducted an intercept flight test using an Aegis Baseline 9.C1 (5.0 CU) and an SM-6 Dual I (AW initialized) missile to intercept an AW target.

Summary of FY 2015 DT&E Engagement and Assessments

- Aegis BMD successfully demonstrated capability to perform endoatmospheric intercepts of SRBM targets in the terminal phase with SM-6 Dual I (BMD initialized) and SM-2 Block IV missiles and retain AW capability with SM-6 Dual I (AW initialized) missiles.
- Distributed ground test and evaluation provided evidence of increased capability in support of theater and regional BMD and defense of homeland (DOH) using Northeast and Southwest Asia scenarios against SRBM, MRBM, intermediate-range ballistic missile (IRBM), and intercontinental threats.
- HWIL ground test and evaluation provided information to inform Warfighter tactics, techniques, and procedures, concentrating on SRBM, MRBM, IRBM, and ICBM threats, and cybersecurity.
- HWIL ground test and evaluation assessed increased BMDS element/sensor coordination and interoperability between Aegis BMD and GMD in support of DOH using strategic scenarios.
- MDA identified minimal impact resulting from the cancellation of one major event and the reduction in complexity of another. Further development and application of the Integrated Master Assessment Plan, Flight Test Strategic Plan, and DEFs for new programs to drive the test program should better identify the impact of lost or reduced test objectives.
- In addition to its primary mission, MDA oversees the design, development, manufacture, integration, and delivery of ballistic missile targets and countermeasures for BMDS T&E. There are multiple Government Accountability Office and DoD Inspector General reports, dating back to FY 2008, that identified areas of improvement required in target development and acquisition. During FY 2015, MDA experienced target issues resulting in either less than planned or no test data collected during the execution of four flight test events. In light of these ongoing problems, DASD(DT&E) recommends investigating and implementing alternative options to design, develop, and launch targets used for BMDS T&E.
- MDA initiated an acquisition program to develop a redesigned kill vehicle (RKV). Critical to RKV DT&E are the coordinated MDA and DASD(DT&E) DEF and a Government integration facility. The DEF identifies the necessary information from DT&E to inform decision making, and the integration facility should provide the additional DT&E rigor that DASD(DT&E)

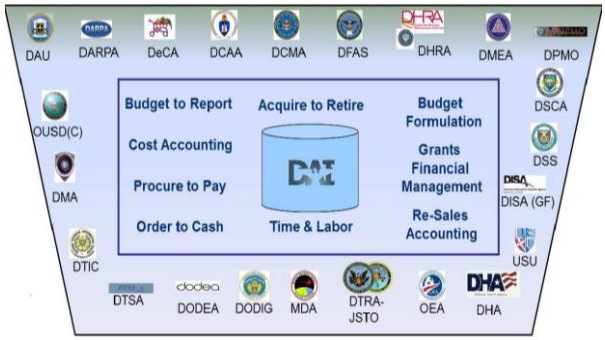
recommended in the FY 2014 Annual Report. If DT&E is executed according to the DEF, the resulting evaluation should identify whether the RKV development and design are likely to achieve the desired outcome.

- MDA is not required to have a TEMP at the BMDS level, because MDA is not subject to DoDI 5000.02, and therefore did not request any waivers or deviations from requirements in the TEMP.

DASD(DT&E) Program Assessment: DASD(DT&E) provided a DASD(DT&E) program assessment in support of the SM-3 Block IB multiyear production decision. The assessment identified issues concerning the third-stage rocket motor (TSRM) design maturity and reliability estimates. DASD(DT&E) recommended that the procurement decision be delayed until the TSRM design is proven through appropriate ground and flight test and evaluation. Attributes of appropriate T&E were provided.

Conclusion: MDA continues to make noticeable progress in the development of evaluation plans to drive testing. Close attention is warranted to ensure that the plans are executed and that additional new programs and redesign activities use DEFs and TEMP-like documents. MDA's request for proposal (RFP) effort has limited the development of evaluation strategies.

Defense Agencies Initiative (DAI) Increment 2



Executive Summary: The DAI program modernizes the Defense Agencies' financial management processes by streamlining financial management capabilities, addressing financial reporting material weaknesses, and supporting financial statement auditability for the majority of Defense Agencies and DoD Field Activities. The Defense Logistics Agency (DLA) is deploying Increment 2 in four releases. Release 1 was a technical upgrade from Oracle Release 11i to Oracle Release 12.3 and incorporated procure-to-pay efficiency and time and labor process automation that was fielded in the 3rd quarter FY 2015. The requirements for Increment 2, Release 2 comprise nearly 93 percent of total system functionality. Release 2 adds the capability of grants financial management and governance, risk, and compliance measures, which will aid in achieving financial auditability. The program plans to field Release 2 in the 1st quarter FY 2016 and will bring DAI full financials capability to four additional Defense Agencies. Releases 3 and 4 will provide the remaining capability while transitioning additional Defense Agencies to DAI. The program plans full deployment for the 4th quarter FY 2018, followed by Increment 2 entering sustainment.

Lead DT&E Organization: JITC

Summary of FY 2015 DT&E Activities

- January 2, 2014–February 6, 2015. The PMO conducted a contractor/Government Release 1 development integration test (DIT) over a series of seven additive capability mock-up data deliveries. The purpose of DIT was to validate that the configuration done by the business process areas yields the desired outcomes and that the reports, interfaces, conversions, extensions, forms, and workflow developed for the release work as an integrated part of the solution and perform as expected in a production-like environment.
- February 9–March 25, 2015. The PMO conducted a Government system integration test (SIT) of Release 1 to verify key technical and functional system characteristics. JITC DT&E technical personnel executed the SIT and were augmented by functional community users at their respective agency's discretion and availability.
- March 30–April 17, 2015. The PMO conducted a user acceptance test (UAT) of Release 1 to assess system performance in a representative end-user environment. UAT was facilitated by JITC DT&E and performed primarily by functional community users.
- April 13–July 1, 2015. The PMO conducted DIT of Release 2.
- July 13–August 7, 2015. The PMO conducted SIT of Release 2.
- August 17–September 11, 2015. The PMO conducted UAT of Release 2.

Summary of FY 2015 DT&E Engagement and Assessments

- The program carried out planned FY 2015 DT&E activities according to its approved TEMP and did not request a waiver or deviation from requirements in the TEMP.
- DASD(DT&E) participated in SIT and UAT test readiness reviews and production readiness reviews (PRRs) for Releases 1 and 2 to ensure that entrance criteria were met. No unresolved

Severity 1 or Severity 2 defects and no clusters of Severity 3 defects were present at PRR for either release.

- DASD(DT&E) assisted the program in revising the acquisition and test strategy for the Increment 2, Release 3 update of the DAI TEMP including the DEF.
- DASD(DT&E) provided a DT&E program assessment in support of the Increment 2, Release 2 limited fielding decision (LFD).

DASD(DT&E) Program Assessment

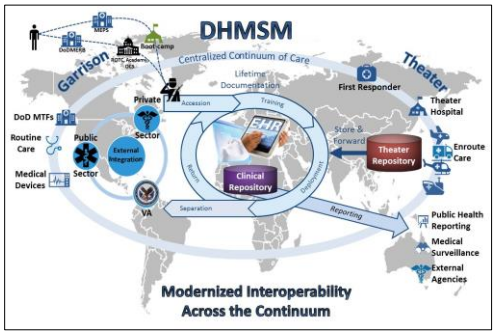
- DASD(DT&E) conducted a DT&E assessment of DAI Increment 2 in September 2015 to support the Increment 2, Release 2 LFD. The program's ability to meet technical requirements was evaluated to be low risk. A summary of the evaluation follows:
  - Performance. The program met threshold values available for two of the three key performance parameters (KPPs) and was on track to meet the third KPP based on performance demonstrated by Increment 2, Release 1 production data and the Increment 2, Release 2 DT&E DIT and SIT results. Four NR KPP characteristics pertaining to being managed in the network could not be fully assessed for lack of specified thresholds. Three of six applicable key system attributes (KSAs) met threshold values, two KSAs were on track to be met, and one lacked sufficient data to evaluate—all hire-to-retire KSA attributes were deferred for assessment as a whole in UAT.
  - Reliability. The software-intensive program has been effectively tracking and addressing software faults. Reliability growth is monitored by tracking hardware and software defects, documented as problem reports, over time. Problem report resolution is gauged by using the mean time for problem report resolution to incorporation in production as a metric. Thresholds for resolving Severity 1 and 2 problem reports are 14 days and 60 days, respectively. During the first 3 months of Increment 2, Release 1 deployment, the average time to resolve Severity 1 and 2 reports was 4.5 days and 14.6 days, respectively.
  - Interoperability. The ability to effectively establish new Release 2 interfaces was assessed as low risk based on SIT results and planned testing during UAT. JITC exercised 15 interfaces and simulated 12 others. Fifty-two of 64 total test cases were executed in SIT and 12 were deferred to UAT. All of the executed test cases passed their requirements. The program had an interim certificate to operate for Increment 2, Release 1 with plans for joint interoperability certification for Release 2 by November 30, 2015.
  - Cybersecurity. The DLA computer emergency readiness team conducted a cooperative vulnerability for DAI in February 2015 on Increment 1, Release 3 in accordance with the DISA Assured Compliance Assessment Solution (ACAS). DAI prepared a plan of action and milestones to resolve findings; there were no major findings. Beginning in May 2015, an ACAS scan began occurring monthly. The PMO conducted a continuity of operations tabletop exercise on Increment 2, Release 1 in June 2015 and no cybersecurity actions were generated. JITC plans to conduct a vulnerability and penetration assessment on Release 2 during the operational assessment scheduled for January 2016. The program had an approved authority to operate effective until September 15, 2015, with a certification and accreditation package in process for renewal.
  - Recommendation. Based on Increment 2, Release 2 SIT results at the time of the assessment, DASD(DT&E) recommended that the release be authorized for limited fielding to current and new agencies contingent upon the program implementing and validating Severity 2 SIT defect fixes and meeting LFD unfulfilled criteria. DASD(DT&E) also recommended that the PMO and functional lead, and the Under Secretary of Defense (Comptroller), establish

threshold metrics for all NR KPP requirements to allow complete verification that the program meets user needs.

- Related activities or results that occurred after publication of the DT&E assessment include the following:
  - The program received an approved authority to operate on September 8, 2015, effective until August 1, 2017.
  - All Severity 2 SIT defects were validated as resolved.
  - Unfulfilled LFD criteria were deemed met at PRR: There were no unresolved Severity 1, Severity 2, or clusters of Severity 3 UAT defects; the 12 interoperability test cases deferred to UAT had passed; and the on-track or deferred KPP and KSA attributes met their thresholds. Ninety-six percent of all test cases executed had passed based on a quick look of test results.

Conclusion: The program completed Increment 2, Release 1 testing and deployment. Increment 2, Release 2 DT results evaluated through SIT and UAT supported an assessment of low risk for the LFD and October 2015 deployment.

Department of Defense Healthcare Management System Modernization (DHMSM)



Executive Summary: DHMSM is a highly tailored MAIS program to acquire and field a modernized configurable and scalable electronic health record (EHR) system. DHMSM will support the availability of longitudinal health records for more than 9.6 million DoD beneficiaries and more than 153,000 Military Health System personnel globally. DoD procured a commercial best-of-suite (BoS) EHR system, augmented by best-of-breed products for requirements unmet by the BoS. DHMSM will focus on replacing DoD legacy healthcare systems for fixed-facility (FF) medical treatment facilities. DoD awarded the multi-contractor team of Leidos, Cerner, Accenture, Henry Schein, and 31 other companies with an indefinite-delivery/indefinite-quantity contract with firm-fixed-price, cost-plus-fixed-fee, cost-plus-incentive-fee, and fixed-price-incentive pricing arrangements in August 2015.

Lead DT&E Organization: SPAWAR T&E

Summary of FY 2015 DT&E Activities

- October 1, 2014–June 2015. The PMO developed the program's initial TEMP to support the contract award authority to proceed (ATP).
- November 2014–September 30, 2015. The PMO established Government-approved laboratories (GALs) to support DT&E.
  - The FF GAL is in the Auburn, Washington, General Services Administration site located in the vicinity of initial operational capability (IOC) sites; basic medical devices are in place to simulate 15 key IOC-site enclaves for medical processes.
  - The operational medicine GAL leverages the Air Force Medical Evaluation Support Activity facility at Fort Detrick, Maryland; DHMSM stood up the GAL and then transferred it to the Joint Operational Medicine Information Systems PMO to support theater testing during each testing phase to replicate the deployed medical environments for all Services.
  - The Allegany Ballistics Laboratory is located in Rocket Center, West Virginia; the PEO established a data center that emulates the infrastructure required for the IT components of the Defense Health Agency domain and its connectivity to the DHMSM EHR system.
- November 2014–September 2015. The PMO developed test cases designed to test the nine functional business process management scenarios provided by the Military Health Services Functional Advisory Council, the functional proponent, to support DHMSM T&E.
- September 14–17, 2015. The PMO sponsored a 4-day contract kickoff meeting; the contractor reported on pre-contract award T&E activities and presented plans for DT&E, data management, and interoperability and cybersecurity T&E.

Summary of FY 2015 DT&E Engagement and Assessments

- The program developed a TEMP to support the program's contract award ATP decision; DASD(DT&E) approved the DT&E plan within the TEMP on June 18, 2015.
- The program plans to use a robust set of automated test tools to support DT activities.

- The program did not deliver the Detailed Test Plan for DT&E as planned in the 1st quarter FY 2016 and is replanning the T&E schedule to include newly concurrent activities that may create execution issues in the future.
- The DHMSM program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- DASD(DT&E) conducted a DT&E program assessment of DHMSM in June 2015 to support the contract award ATP decision. The assessment concluded that the program's DT&E planning adequately supported the RFP release. The summary of the DASD(DT&E) evaluation follows:
  - Planning. The TEMP provides an adequate DT plan to support contract award. The PM plans to update the TEMP after contract award to support succeeding ATPs.
  - Schedule. The schedule is very aggressive to meet the IOC. The PM appropriately identified schedule risk, developed risk mitigation measures, and is tracking the schedule in the program's risk registry. The TEMP adequately supports contractor and Government DT events before the FF limited fielding IOC ATP.
  - Resources. The program adequately identified known key T&E resource requirements. The program is on track for establishing the GALs to support contractor testing in the 1st quarter FY 2016. The laboratories are critical to the DT&E plan.
  - Recommendation. Based on the adequacy of DT&E planning to date, DASD(DT&E) recommended that the USD(AT&L) authorize the program to award the contract.

Conclusion: The program developed a comprehensive TEMP to support the program's contract award decision.

F-35 Lightning II

Executive Summary: The F-35 is the next fifth-generation Air Force, Navy, and Marine Corps fighter providing stealth capability with unprecedented sensor fusion. The F-35 is in the sixth year of a 7.5-year DT program. Eighteen test aircraft are conducting DT at two test sites: six F-35A conventional takeoff and landing (CTOL) variants, two F-35B short takeoff and vertical landing (STOVL) variants, and one carrier variant (CV) at the Air Force Test Center located at Edwards Air Force Base, California, and five F-35B STOVL variants and four F-35C CVs at the Naval Air Warfare Center, Patuxent River, Maryland.

The program has completed nearly three-fourths of F-35 DT, executing roughly 80 percent of the nearly 60,000 planned flight test points. The majority of these test points were flown in the Block 2/ Block 3 envelope and Block 2B/Block 3i/early stages of Block 3F mission systems testing. Overall, Block 3F mission systems test point execution is notably behind the baseline schedule because of late deliveries of Block 2B and Block 3i software to flight test. Mission systems testing during 2015 is slightly behind the planned schedule primarily because of additional testing requirements for Block 2B and Block 3i. Flight sciences test point execution is nearly at the planned 2015 schedule. The F-35 program completed Block 2B mission systems DT in May 2015; Block 2B was released to the fleet in July 2015. The F-35 program completed Block 3i mission systems DT in September 2015 and is currently awaiting final Block 3i fix/regression testing for fuel modification. The DT integrated test force (ITF) is currently executing Block 3FR4 mission systems testing; Block 3FR4 was delivered more than a month later than the July 2015 Re-plan. The final Block 3F mission systems software drop (3FR8) is scheduled for delivery to flight test in July 2016. Although nearly all of the major technical issues examined in separate Department assessments have an identified way ahead, all remain behind in their originally projected verification through test.

Lead DT&E Organization: 412th Test Wing; Air Test and Evaluation Squadron Twenty-Three (VX-23)

Summary of CY 2015 DT&E Activities

- During CY 2015, the test program accomplished the following:
  - March 31, 2015, the F-35 program completed aircraft climatic chamber testing with a STOVL aircraft (BF-5); additional testing is required for maintenance and aircraft support equipment.
  - March 2015, the F-35 ITF completed "rub-in" or pre-trench rotor installation activities enacted as a result of the June 2014 fleet engine mishap.
  - May 28, 2015, the F-35 ITF completed all Block 2B testing; Block 2B was released to the fleet in July 2015.
  - June 9, 2015, the F-35 ITF completed the first F-35A gun ground firing test event.
  - June 12, 2015, the F-35 ITF completed the first F-35B Paveway IV weapons separations.
  - June 19, 2015, the F-35 ITF completed the first F-35B ski jump flights.

  - July 2015, the F-35 ITF, after completing Block 2B and initial Block 3i testing, resumed Block 3F testing.
  - August 10, 2015, Lockheed Martin suspended STOVL durability testing (at 48.9 percent of second lifetime). Known cracks were being closely monitored and had grown sufficiently, prompting the decision to commence bulkhead repairs. Additional cracks were found during the inspection; DASD(DT&E) estimates that testing will restart in February 2016.
  - September 9, 2015, the F-35 ITF completed F-35A refueling tests from an Italian tanker (KC-767).
  - September 10, 2015, the F-35 ITF completed Block 3i weapons delivery accuracy (WDA) test events; two WDA events were deferred to Block 3F.
  - September 24, 2015, the F-35 ITF completed Block 3i functionality testing and is awaiting final fix/regression testing for fuel modification to complete Block 3i tests.
  - October 10, 2015, the F-35 ITF completed the second carrier F-35C shipboard test period (DT-II) onboard USS DWIGHT D.EISENHOWER (CVN 69).
  - October 2015, Lockheed Martin completed CTOL second-lifetime durability testing and 62.5 percent of CV second-lifetime durability testing.
  - October 2015, the F-35 ITF completed Autonomic Logistics Information System (ALIS) 2.0.2 logistics T&E.
  - October 29, 2015, the F-35 ITF completed the first F-35A refueling tests from an Australian tanker (KC-30A).
  - October 30, 2015, the F-35 ITF completed the first F-35 gun airborne firing test event.
- A total of 1,731 flight science and 762 mission systems planned test points have been eliminated based on the review of DT&E to date, which was vetted through the F-35 program office stakeholder review.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) has been thoroughly engaged with the F-35 Program Office, the Services, and OSD staff in increasing insight into system maturity and test progress and ensuring that adequate test resources are planned to test F-35 against current and planned threats. Specific DASD(DT&E) engagement in FY 2015 included the following:
  - Engaged and involved in the STOVL durability test article bulkhead failure analysis and test article repair and setting conditions for the restart of testing.
  - With DOT&E and the TRMC, continued the development and execution of a plan to provide urgently needed electronic warfare (EW) resources to Air Force and Navy test chambers and open-air ranges. These resources are needed to support adequate testing of the F-35 as well as all future fighters and EW systems.
- The program is meeting mission systems projected fly rates, but mission systems testing incrementally leading to the final Block 3F configuration is notably behind the baseline schedule primarily because of late software deliveries and additional testing requirements for Block 2B and Block 3i. Overall, roughly 80 percent of the nearly 60,000 planned flight test points have been flown; test points in 2015 were mainly in the Block 2/Block 3 envelope and Block 2B/ Block 3i/early stages of Block 3F mission systems testing.
- Although flight test execution at the two primary test sites for 2015 is meeting or exceeding planned fly rates, Block 3F mission systems test point execution, test point closure, and capability verification are behind the planned schedule. The key factors are additional test requirements for Block 2B and Block 3i and late Block 3i and Block 3F software delivery to flight test. For example, Block 3iR5 software was delivered more than 5 months late to flight

test and Block 3FR4 was delivered more than a month late, resulting in a commensurate slip in test.

- DASD(DT&E) estimates that the completion of Block 3F mission systems flight test and test point closure is 10 to 11 months behind the Block 3F baseline plan. Lethality testing is the critical path to completing Block 3F test points. Risk to Block 3F DT execution is expected to rise in 2016 as the complexity of mission systems testing increases.
- Nearly all of the major technical issues examined in separate Department assessments have an identified way ahead, though all remain behind in their originally projected verification through test.
- Full-scale ground durability testing is in various stages of completion with F-35A at 16,000 hours (second lifetime complete); F-35B suspended at 11,915 hours (48.9 percent second lifetime complete) because of major bulkhead cracks; and F-35C at 13,000 hours (62.5 percent second lifetime complete) with structural spar and bulkhead deficiencies being uncovered; discovery rates to date are as follows:
  - CTOL – 13 realized of 22 projected; 5 major versus 8 projected.
  - STOVL – 29 realized of 43 projected; 11 major versus 8 projected.
  - CV – 33 realized of 43 projected; 8 major versus 8 projected.
- The root cause of the F-35B test article's major bulkhead failures was determined to be primarily from anodizing and etching processes; laser shock peening (LSP) has been identified as one of the mitigation strategies for Bulkheads 496 and 472, in combination with other conventional strategies. LSP is currently under development, verification, and qualification. Additional conventional mitigation strategies have been identified for the other bulkheads.
- The F-35 program is conducting a STOVL durability gap analysis to determine the requirement to fully certify the STOVL aircraft to 8,000 hours lifetime. DASD(DT&E)'s assessment is that the F-35 program will require another test article vice a partial test article to fully certify the STOVL aircraft.
- Reliability: Although still very early in meeting the 200,000 flight hour Operational Requirements Document (ORD) reliability requirement (9 percent to 24 percent depending on variant), performance across all variants is below the planned ORD reliability growth curves established for this phase of testing. Reliability ORD metrics have shown significant improvement over the past 2 years and the contract specification mean flight hours between failure (design controllable) performance exceeds the reliability growth plan for this phase of testing. Aircraft reliability has been a manageable factor for flight test execution.
- ALIS is currently behind in development; meeting a July/August 2016 ALIS 2.0.2 operational capability and Air Force IOC is medium to high risk. DASD(DT&E) assesses the security cross-domain solutions planned to coordinate classified data flow through ALIS as medium to high risk. Stable ALIS operability with commensurate spare parts availability is a significant factor in maintaining efficient flight test execution.
- The program conducted its 2015 DT&E activities in accordance with the approved TEMP; no waivers were requested.

Conclusion: Additional Block 2B/Block 3i DT requirements and the late delivery of Block 2B, Block 3i, and Block 3F software drops to flight test have added about 10 to 11 months to the baseline schedule for completion of Block 3F testing. DASD(DT&E) is estimating a December 2017/early 2018 completion of Block 3F DT&E with mission systems lethality and weapon integration/ certification testing as the driving factors.

Joint Light Tactical Vehicle (JLTV)

Executive Summary: The JLTV family of vehicles (FoV) is expected to modernize a portion of the Army and Marine Corps light tactical vehicle fleet and provide the joint Warfighter with a mobile, lightweight tactical vehicle capable of being transported by rotary-wing aircraft and other lift assets. The JLTV should provide increased force protection over the current up-armored high-mobility multipurpose wheeled vehicle. The JLTV FoV is based on a common vehicle automotive platform and consists of a Combat Support Vehicle (CSV) two-seat variant and a Combat Tactical Vehicle (CTV) four-seat variant. The two-seat variant has one base vehicle: the Utility/Shelter Carrier with a payload capacity of 5,100 pounds. The four-seat variant has two vehicle configurations: the General Purpose (GP) and the Close Combat Weapons Carrier with a payload capacity of 3,500 pounds. The GP can be configured as a Heavy Guns Carrier with the addition of a Gunner's Protection Kit (GPK). All configurations are capable of using additional armor protection kits depending on their individual mission requirements.

The JLTV is intended to support rapid deployment and offensive operations across the full spectrum of Army and Marine Corps military operations. The JLTV is designed to interoperate in units with other vehicles and weapon systems to provide maneuver, combat power, support, and sustainment. It is expected to provide increased force protection, reliability, maintainability, availability, payload, and fuel efficiency compared with current light tactical wheeled vehicles, while providing similar mobility, net-centricity, and transportability with reduced logistical footprint.

The JLTV has eight KPPs (mobility, sustainment, transportability, net-ready (including information assurance), force protection, system survivability, payload, and system training) and four KSAs (reliability, energy (fuel efficiency), unit cost, and operating and support (ownership) costs).

Following a successful TD phase, the program entered the EMD phase in August 2012 and the Army awarded contracts to AM General, Lockheed Martin, and Oshkosh Corporation. Before DT&E, each vendor delivered armor coupons and vehicle hulls to support testing of force protection. In September 2013, each vendor delivered 22 vehicles (16 CSVs and 6 CTVs) to undergo DT&E.

In December 2014, the program completed EMD DT&E. In August 2015, the Army completed source selection activities culminating in the selection of Oshkosh Corporation for low-rate initial production (LRIP). In August 2015, the USD(AT&L) conducted a MS C review and authorized the program to enter the Production and Deployment (P&D) phase and begin LRIP. LRIP vehicles will be evaluated during production qualification testing (PQT) followed by multi-Service operational test and evaluation (MOT&E). However, shortly after MS C and contract award, a competing vendor filed a protest contesting the selection, delaying planning and coordination between the Government test agencies and the winning vendor. In February 2016, the protest was withdrawn. LRIP vehicles will be evaluated during PQT.

Lead DT&E Organization: ATEC MSED

Summary of FY 2015 DT&E Activities

- In December 2014, the program completed DT&E in accordance with the approved MS B TEMP.
- After the conclusion of EMD DT&E, each vendor had the opportunity to update its vehicle designs and performed specific tests to evaluate changes and support development of its LRIP proposals. This testing was planned and directed by each vendor and in some cases, conducted by Government test agencies on Government test sites. Results of this testing were included with vendor information for each vendor's P&D phase proposal.

Summary of FY 2015 DT&E Engagement and Assessments

- In preparation for MS C, DASD(DT&E) participated as a member of the JLTV T&E Working Integrated Product Team (WIPT) to develop a MS C TEMP that documents the P&D phase test strategy including PQT and MOT&E.
- Before the MS C DAB, the USD(AT&L) approved the Army's request to delay submission of the P&D phase TEMP until after MS C to capture design changes from the winning vendor.
- Following MS C and LRIP contract award, DASD(DT&E) participated as a member of the JLTV T&E WIPT to update the P&D phase test strategy based on the winning vendor's design with the intent of making maximum use of EMD test data and test data developed as part of the winning vendor's LRIP proposal. This effort resulted in some reduction in test scope. To ensure a complete evaluation, this planning effort considered testing that is normally included in EMD but was deferred to P&D to reduce the cost of EMD testing (i.e., three vendors during EMD versus one vendor in P&D). This planning effort also considered reliability testing to verify the winning vendor's reliability assertions above and beyond the Capability Production Document (CPD) requirement. The effort resulted in a comprehensive and efficient test strategy that completed the evaluation of the winning vendor's vehicle and delivered the data needed to support a full-rate production (FRP) decision.
- After reviewing this updated strategy, Army leadership directed the PM to take further test reductions to reduce costs. As a result, the PM is evaluating the need to conduct extreme natural environment testing in cold and tropic regions, fuel efficiency testing, soft soil testing, sand slope testing, and corrosion testing. The PM is also considering changes to reduce live-fire test and evaluation (LFT&E), reliability testing, and MOT&E. DASD(DT&E) is working with the Army to develop a test strategy that identifies current test data gaps, leverages available data, and then identifies the minimum testing to evaluate system performance and compliance with KPPs/KSAs.
- DASD(DT&E) participated as a member of the OSD Defense Procurement and Acquisition Policy phases 2 and 3 peer review teams to review source selection artifacts and ensure that the Army conducted the evaluation consistent with the documented source selection criteria.
- In August 2015, DASD(DT&E) published a DASD(DT&E) program assessment to support the MS C DAB. Based on DT conducted at the time of the assessment, DASD(DT&E) recommended proceeding to LRIP.
- The JLTV program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- In August 2015, DASD(DT&E) published a DASD(DT&E) program assessment with specific focus on the following KPPs and KSAs.
  - Mobility. The mobility KPP requires the JLTV to traverse fine-grained soils (mud) and ascend/descend dry, coarse soil (sand) slopes.

- DT&E showed that there were no significant mobility concerns across all vendors. However, testing did not address sand slope descents, and DASD(DT&E) recommended that the program conduct this testing during P&D.

- Transportability. The transportability KPP requires the JLTV to be transportable by the CH-47F (a single sling-loaded vehicle for 50 nautical miles) and the CH-53K (two sling-loaded vehicles for 40 nautical miles) and by sealift to support strategic deployment and operational maneuver in accordance with Service concepts and programs.
  - For the CH-47F, DT identified transportability issues across all vendors that would need resolution before airlift certification.
  - For the CH-53K, the program completed static crane shotgun (two vehicles carried abreast) lift testing because the CH-53K is still in development. All vendors experienced problems with static crane shotgun lift testing. For the CH-53E, all vendors demonstrated some level of transportability, but none of the vendors completed the certification process.
  - For maritime prepositioning ship sealift, vehicle size and tie-down methods reduce sealift vessel capacity, and several key sealift maintenance and long-term supportability functions were not performed.
- Payload. The payload KPP requires the JLTV to transport payloads, including essential mission role equipment, weapons and mounts, and vehicle occupants and their associated sustainment loads.
  - DT&E showed that all vendors had the capability to carry the required payloads; however, some of the vehicles exceeded axle and tire loads, and the current shelters carried by legacy vehicles will require some minor modifications for JLTV carriage.
- System Survivability. The survivability KPP requires the JLTV to maintain structural integrity during a rollover event.
  - DT&E showed that all vendors met this requirement, but no testing was conducted with the GPK. DASD(DT&E) recommended that this testing be completed during P&D.
- Availability. The sustainment KPP defines required JLTV operational availability and materiel availability, taking into account reliability, maintainability, and logistics delay time.
  - DT&E showed that one vendor was on the reliability growth curve (RGC) at the end of EMD and therefore would likely meet the availability requirement. DT data showed that the other two vendors were not on the RGC at the end of EMD; of those two, one vendor had the potential to meet the availability requirement.
- Net-Ready. The Net-Ready KPP requires the JLTV to provide survivable, interoperable, and secure information exchanges to enable a net-centric military capability.
  - DT&E showed that all vendors experienced significant problems with command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) integration and electromagnetic compatibility/electromagnetic interference. Information exchanges demonstrated in testing were very limited and not realistic. Cybersecurity software scans identified a shortcoming across all vendors, and the program completed no cooperative vulnerability assessment or threat penetration testing.
- Energy (Fuel Efficiency). The fuel efficiency KSA requires the JLTV to achieve 10 payload ton-miles per gallon at gross vehicle weight over representative terrain and attain a maximum of a 1.6-gallons-per-hour idle fuel consumption rate while providing 10-kilowatt total power to onboard systems.
  - The JLTV requirement for fuel efficiency is a fleet requirement. All vendors met the requirement when averaging fuel efficiencies across all variants, even though each vendor's four-seat variant did not individually meet the fuel efficiency requirement.

  - Reliability. The reliability KSA requires the JLTV to achieve a 90 percent probability of completing a 250-mile mission.
    - DT&E showed that reliability was a significant performance discriminator and only one vendor was on the RGC.
- Based on DT&E conducted, DASD(DT&E) made the following recommendations:
  - If the winning vendor is not on the RGC, the program should adjust the program schedule to include sufficient time to conduct additional reliability growth testing before reliability qualification testing.
  - The program should update the MS C TEMP based on the design of the winning vendor and submit the TEMP to OSD for approval before the start of Government DT&E.

Conclusion: The program conducted a rigorous EMD test program in accordance with the MS B TEMP to inform the source selection and MS C production review. However, more testing is needed to fully assess system performance and compliance with KPPs/KSAs. DASD(DT&E) is concerned that any potential test reductions will result in a system that has not been evaluated across its full operational environment, deferring any issues until production and fielding.

6.2 Army Programs

This section includes summaries of the following 8 programs:

- Abrams M1A2 System Enhancement Package Version 3 (SEPv3) Engineering Change Proposal (ECP) 1a
- Army Integrated Air and Missile Defense (IAMD)
- Integrated Personnel and Pay System–Army (IPPS-A) Increment II
- Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) Rifleman Radio (RR)
- Joint Air-to-Ground Missile (JAGM)
- M109A7 Family of Vehicles (FoV), Paladin Integrated Management (PIM) Self-Propelled Howitzer (SPH) and Carrier, Ammunition, Tracked (CAT) Vehicle
- Mid-Tier Networking Vehicular Radio (MNVR) (AN/VRC-118(v)1)
- Warfighter Information Network–Tactical (WIN-T) Increment 2

Abrams M1A2 System Enhancement Package Version 3 (SEPv3) Engineering Change Proposal (ECP) 1a

Executive Summary: The M1A2 SEPv3 ECP1 main battle tank (MBT) is a full-tracked, low-profile land combat assault weapon system possessing significant survivability, shoot-on-the-move fire power, joint interoperability (for the exchange of tactical and support information), and a high degree of maneuverability and tactical agility. The crew has the capability to engage the full spectrum of enemy ground targets with a variety of accurate point and area fire weapons in urban and open terrain, as well as to defend against helicopter threats. The primary mission area for the M1A2 SEPv3 MBT is force application-engagement. The M1A2 SEPv3 ECP1a MBT will be used as the principal weapon system of the U.S. Army's armored brigade combat team and will enable the joint force to maneuver to dismantle an adversary's system of offense and defense, assist in preempting an adversary's freedom of action, defeat or destroy the threat, and protect joint and coalition forces. The Abrams M1A2 SEPv3 MBT must be able to defeat/suppress enemy tanks, reconnaissance vehicles, infantry fighting vehicles, armored personnel carriers, anti-tank guns, guided missile launchers (ground and vehicle mounted), bunkers, dismounted infantry, and helicopters.

The Abrams M1A2 SEPv3 ECP 1a program will maintain combat effectiveness of the Abrams tank fleet through 2050 and integrate the following technologies: Joint Tactical Radio System (JTRS), Joint Battle Command–Platform, battery monitoring system, improved generator, upgraded slip ring assembly, enhanced hull power distribution unit and common remote switching modules, line-replaceable modules, ammunition data link, integration kit for counter remote-controlled improvised explosive device electronic warfare Duke V3, next evolution armor upgrade, high-definition displays, mine-blast survivability improvements, and an auxiliary power unit (APU).

The Army Acquisition Executive delegated decision authority for Abrams upgrades to the PEO Ground Combat Systems. The acquisition strategy relies on three separate production decision points (PDPs) to assess system performance and determine readiness for production. The test program is structured to inform each PDP.

- PDP 1, planned for March 2016, authorizes the initial long-lead material purchase for 45 tanks. This smaller purchase limits risk as the program is still in the early stages of testing. Original equipment manufacturer (OEM) contractor test data as well as emerging production proveout test (PPT) data will support PDP 1.
- PDP 2, planned for March 2017, authorizes long-lead material buys for 180 tanks.
- PDP 3, planned for March 2020, will support the final long-lead material decision and a decision to upgrade the remaining 1,386 tanks.

Lead DT&E Organization: ATEC MSED

Summary of FY 2015 DT&E Activities

- In December 2014, the Army conducted a developmental test readiness review (DTRR) supporting a decision to begin the contractor testing phase of the PPT in March 2015.

- In February 2015, the DASD(DT&E) approved the DT&E strategy of the Abrams M1A2 SEPv3 ECP 1a TEMP.
- Contractor DT&E began in March 2015 in accordance with the approved TEMP.
- In July and September 2015, the Army conducted a series of two DTRRs, with the first DTRR resulting in the need to hold the September 2015 DTRR. The September 2015 DTRR supported the decision to begin the Government phase of the PPT in October 2015.
- In September 2015, the contractor completed software qualification testing on prototype software initially employed on PPT test articles.
- As of October 1, 2015, 15 of 20 line-replaceable units (LRUs) completed OEM component qualification testing.

Summary of FY 2015 DT&E Engagement and Assessments

- In February 2015, the DASD(DT&E) approved the DT&E strategy of the TEMP. The TEMP adequately documents testing required to support ECP1a engineering development and acquisition decision making. The program is executing a medium risk DT&E schedule driven by highly concurrent test activities. During development of the DT&E strategy, DASD(DT&E) raised concerns about the Army's desire to limit tropics natural environment testing to continental U.S.-based test chambers. In response, and as documented in the TEMP, the program will conduct a review after completion of PPT to determine the need for tropical testing in the natural environment during Follow-on Production Test 2. This review will be updated after completion of production qualification testing.
- A Government DTRR conducted in July 2015 resulted in a program decision to hold a follow-on DTRR in approximately 6 weeks. This decision was driven by the need to complete analysis and corrective actions on hardware and software issues identified during the contractor testing phase as well as the need for additional time to complete detailed Government test planning. DASD(DT&E) concurred in the program's decision as it would reduce risk to execution of Government DT&E.
- The follow-on DTRR was successfully completed in September 2015. All stakeholders concurred that all significant issues identified during the previous DTRR had been addressed and the program was ready to begin Government testing.
- OEM component qualification testing is now scheduled for completion in June 2016. Originally planned for completion on or about June 2015 and before PPT, testing on five LRUs continues concurrently with PPT. If component qualification testing requires design changes to the LRUs, it could impact PPT.
- The contractor updated the vehicle software in November 2015 to incorporate corrective actions. The program successfully adjusted the Government testing schedule to ensure that this configuration change did not impact test data collected before the modification.
- The Abrams M1A2 program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The PM is effectively managing a medium-risk DT&E strategy due to concurrency in test execution. The DT schedule has experienced minor delays, but DT scope is in accordance with the approved TEMP. The PM delayed the start of the Government phase of DT&E because of delays in OEM component qualification testing, correction of deficiencies identified by OEM testing, and incomplete Government test planning. The delay in completion of OEM component-level testing could negatively impact completion of Government DT&E and the amount of Government test data available to support PDP 1.

Army Integrated Air and Missile Defense (IAMD)

Executive Summary: Army IAMD is structured to develop an overarching SoS capability with participating air and missile defense (AMD) components functioning interdependently to provide operational capabilities not achievable by the individual element systems. The program achieves this objective by establishing the Army IAMD architecture and developing the IAMD battle command system (IBCS) to provide common command and control capability. The program components are the engagement operations center (EOC), integrated fire control network (IFCN), IFCN relays, IBCS software, and sensor/shooter adaption kits. Associated AMD components are Patriot launchers, radars and radar interface units (RIUs), Sentinel radars, indirect fire protection capability, and Avenger.

The program is in the EMD acquisition phase; a MS C decision is scheduled for the 4th quarter FY 2016.

Lead DT&E Organization: ATEC AFED

Summary of FY 2015 DT&E Activities

- November 2014–September 2015, the Army IAMD program office conducted integration and DT&E activities at the Government software-in-the-loop (GSIL) and White Sands Missile Range (WSMR), New Mexico.
- May 28, 2015, the Army IAMD program office conducted the initial flight test to demonstrate integration of IAMD components onto the IFCN.

Summary of FY 2015 DT&E Engagement and Assessments

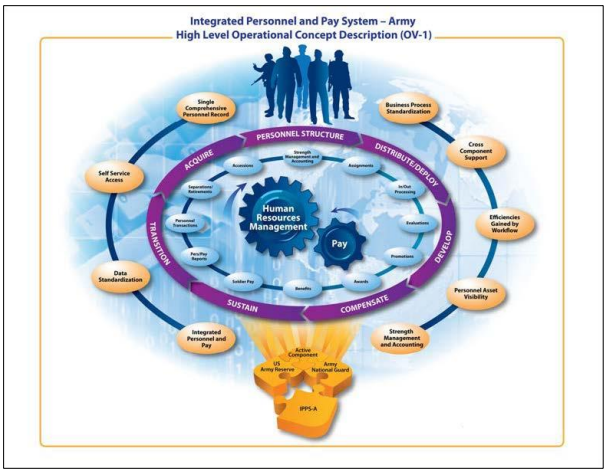
- Integration activities at the GSIL identified a large number of software issues requiring contractor rework. The inability to identify and repair software issues at the contractor's facility has lengthened the integration time and resulted in DT&E schedule delays. The current schedule lacks time for corrective action, and software defects are not expected to be resolved and fully evaluated before the MS C decision.
- The reliability estimate is significantly lower than planned. The TEMP reliability growth planning curve identifies a planned reliability of 130 hours mean time between system abort (MTBSA) upon entering DT&E. Reliability scoring of FY 2015 activities did not support reliability estimates greater than 10 hours MTBSA. DASD(DT&E) recommends that the program milestones be delayed until reliability estimates reflect higher component maturity and availability requirements are achievable.
- The Army IAMD program successfully integrated components of AMD. A flight test connected battalion and battery EOCs, an IFCN relay, IBCS software, a Patriot RIU and radar, and adapted Patriot launchers onto an IFCN. The components combined to detect, track, engage, launch, and intercept a short-range tactical ballistic missile target with a Patriot guidance enhanced missile.

- The Army IAMD program successfully executed risk reduction DT&E through the use of a second IFCN connecting a battery EOC, an IFCN relay, IBCS software, a Patriot RIU and radar, and a simulated Patriot Advanced Capability-3 missile. The objective was not met, but critical information concerning future T&E execution was collected.
- Because of configuration issues and development delays, hardware components and software functionality are expected to change significantly after the scheduled MS C decision. The expected hardware changes are a new shelter, a new IFCN relay trailer, and an updated RIU. The software functionality that was planned but not delivered in time for evaluation includes joint interoperability and diagnostics.
- The current IBCS IFCN loading exceeds the capability of the network. If not resolved, track issues are expected. DASD(DT&E) recommends that the IBCS be operated continuously for extended time periods, evaluated, and deemed acceptable before the MS C decision.
- The current IBCS software configuration lacks the functionality to provide full capability. IBCS software version 3.1.1 is not scheduled to be delivered in time to be evaluated in the GSIL and at WSMR. DASD(DT&E) recommends that unless the GSIL and WSMR T&E results correlate, the delivered functional content of software version 3.1.1 should not be used to support the MS C decision.
- The Army IAMD program removed DT&E search and track (S&T) missions identified by the program's TEMP experimental test design approach. To incorporate S&T missions back into DT&E, a flight test was postponed, with concurrence by DASD(DT&E) and ATEC. The S&T missions provide the opportunity to assess additional system performance measures and variations as compared to a single flight test. However, DASD(DT&E) is concerned that adequate assessment across the system performance measures and specifically enemy electromagnetic threats will not be accomplished before the scheduled MS C decision.
- The TEMP requirements associated with the Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System (JLENS) are no longer required. The JLENS program ceased development and if the remaining JLENS assets are to be integrated onto the IFCN, then the T&E will have to be replanned and executed.
- Functional, schedule, and resource dependencies between Army IAMD and other AMD acquisition programs are not fully addressed. DASD(DT&E) recommends that the Army PEO Missiles and Space develop a long-term strategy to identify SoS integration requirements and evaluate the sensors, weapon, IBCS, and IFCN components of the AMD portfolio.

Conclusion: The Army IAMD system is not expected to demonstrate hardware and software design maturity and stability. DASD(DT&E) recognizes the risk associated with meeting the schedule.

Integrated Personnel and Pay System–Army (IPPS-A) Increment II

Executive Summary: IPPS-A Increment II is the implementation of a fully integrated personnel and pay service for the Active Army, Army National Guard, and Army Reserve components, building on the trusted database delivered by IPPS-A Increment I. The program addresses major deficiencies in the delivery of military personnel and pay services and provides internal controls and audit procedures designed to prevent erroneous payments and loss of funds. The program provides a Web-based tool, available 24 hours a day, accessible to Soldiers, human resources professionals, combatant commanders, personnel and pay managers, and other authorized users throughout the Army.



The Army plans to deliver Increment II functionality in four releases with each release incrementally building upon the design and capability of the prior release. Upon full deployment, the program intends to either fully or partially subsume the functionalities of more than 40 legacy personnel and pay systems and to meet the full financial statement audit requirements as identified in the FY 2015 Statement of Budgetary Resources and the FY 2018 Full Financial Statement Audit Readiness Assertion.

The Defense Acquisition Executive approved the program's MS B on December 18, 2014, which authorized the Army to proceed with its planned contract award for system integration support and development of Release 2 functionality. The Army awarded an EMD system integrator contract to CACI – Integrated Security Solutions on December 29, 2014. In January 2015, the Army received a contract award protest that resulted in a delay of 4 months. CACI started work on the contract in May 2015.

Lead DT&E Organization: ATEC C4ISRED

Summary of FY 2015 DT&E Activities

- October 1, 2014–January 20, 2015, the PMO finalized the MS B TEMP and obtained DASD(DT&E) approval of the DT&E plan within the TEMP.
- March 26–September 30, 2015, the Reliability Working Group developed initial plans for the Reliability Growth Plan, growth curve, Failure Definition and Scoring Criteria, and facilitating Design for Reliability activities.
- May 1–September 30, 2015, the PMO and system integrator conducted blueprinting for Release 2, which replaces the Army National Guard personnel system.
- August 25–September 30, 2015, the PMO and system integrator updated the T&E strategy to support the program's System Requirements Review planned for October 2015.

Summary of FY 2015 DT&E Engagement and Assessments

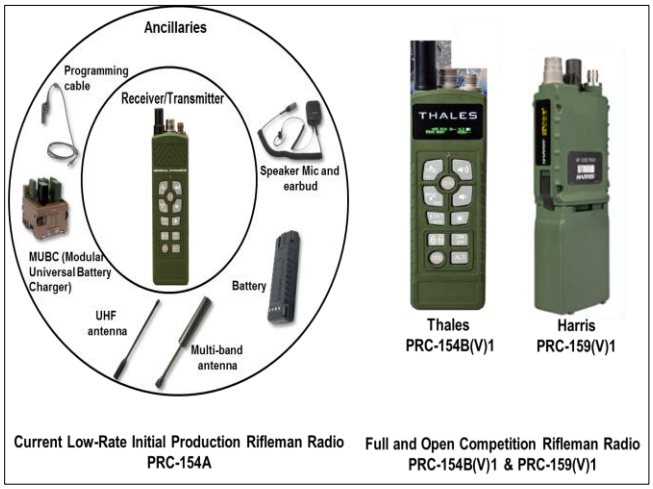
- The program successfully developed a DT&E plan to support the program's MS B decision; the DASD(DT&E) approved the DT&E plan within the TEMP on January 13, 2015.
- The TEMP adequately supports the program schedule to meet the first Government DT&E planned for the 2nd quarter FY 2017.
- The TEMP satisfactorily addresses known key T&E resource requirements.
- The IPPS-A program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- DASD(DT&E) conducted a DASD(DT&E) program assessment of IPPS-A Increment II in November 2014 to support the MS B decision. The assessment concluded that the program's DT&E planning adequately supported the MS B decision. The summary of the DASD(DT&E) evaluation follows:
  - Planning. The T&E strategy outlined in the Increment II draft TEMP sufficiently supported the program described in the draft Business Case, draft Systems Engineering Plan, and draft Program Protection Plan.
  - Schedule. The T&E schedule appropriately provided for the testing strategy designed to measure performance against the requirements for Release 2. The PM mitigated the schedule risk caused by developing releases concurrently by adding 14 to 16 months to the schedule, plus adding two pay demonstrations to provide early insight into the accuracy of Release 4 pay-generation capabilities.
  - Resources. The program allocated sufficient resources to execute the DT&E plan.
  - Recommendation. DASD(DT&E) recommended that the Acquisition Decision Memorandum (ADM) include a requirement to submit a final TEMP within 90 days of contract award.
    Update note: The program submitted the TEMP to OSD for approval before contract award; the DASD(DT&E) approved the DT&E plan within the TEMP on January 13, 2015.

Conclusion: The program successfully developed a comprehensive DT&E plan to support the program's MS B decision. Based on DT&E planning to date, DASD(DT&E) assesses the program's ability to execute the approved DT&E strategy as low risk.

Joint Tactical Radio System (JTRS) Handheld, Manpack, and Small Form Fit (HMS) Rifleman Radio (RR)



Executive Summary: The U.S. Army Tactical Radios Project Management Office (TR PMO) has responsibility for development of the RR. The JTRS HMS RR is an ACAT 1D MDAP. Increment 1 of the JTRS HMS RR, the AN/PRC-154, is a Type 2, unclassified voice and data software definable radio that operates the Soldier Radio Waveform (SRW). It is employed at battalion and below levels, down to the individual Soldier echelon. The Defense Acquisition Executive approved an LRIP for 6,250 RRs and a second LRIP for an additional quantity of 13,077. The U.S. Army is currently fielding the radio to brigade combat teams in accordance with the Capability Set (CS) fielding strategy. The Army completed planned DT for the LRIP versions in the 2nd quarter FY 2014.

The 2012 NDAA directed the U.S. Army to conduct full and open competition (FOC) before procuring FRP radios. In January 2015, the U.S. Army initiated FOC for non-developmental items to satisfy the RR requirements. On April 29, 2015, the U.S. Army awarded indefinite-delivery/ indefinite-quantity contracts for the radios. The FOC RRs are designed to provide tactical military commanders with the flexibility to command, control, and communicate with platoons and squads, both mounted and dismounted, via voice, video, and data media.

Lead DT&E Organization: ATEC C4ISRED

Summary of FY 2015 DT&E Activities

- January–April 2015, the U.S. Army Contracting Command and the TR PMO conducted competitive FOC source selection activities. Each competing vendor was evaluated to determine whether its materiel solutions met the minimum technical requirements. The evaluation included a product demonstration, a documentation review, and technical discussions. Vendors provided self-certification of the Performance Requirement Document (PRD) requirements, National Security Agency (NSA) certification, and JITC certification.
- June–July 2015, the Mission Command and Network Systems Division (MCNSD) conducted qualification testing (QT) at the Electronic Proving Ground (EPG), Fort Huachuca, Arizona. The QT was developmental-like in scope and facilitated the selection of radios to participate in the next phase of DT before OTs. Each vendor supplied 15 FOC RRs for the QT. QT DT scope included KPP 1, Intra-Squad Communication; KPP 2, Soldier Location; and KSA 3, size and weight requirements. Vendor FOC RRs that successfully demonstrated the key capabilities and minimum requirements of the PRD during the QT had their delivery order option exercised for the customer test (CT) and OT events.
- August–November 2015, ATEC initiated the Unified Lab for Tactical Radios–Army (ULTRA) risk reduction testing for the first vendor undergoing the DT CT. Testing continued for both vendors through December 2015 at Aberdeen Proving Ground, Maryland, to evaluate baseline

system-level performance of each vendor's FOC RR. Testing utilizes approved and fielded U.S. Army CS 15/16 mission plan configurations to ensure that operationally relevant scenarios are tested (e.g., power levels, frequencies, call groups).

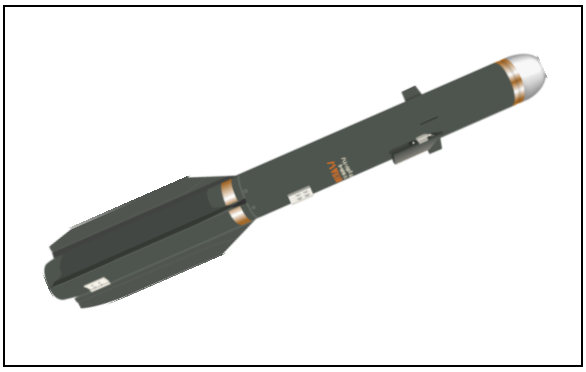
- August–December 2015, the EPG MCNSD at Fort Huachuca, Arizona, initiated DT CT for the first vendor. Both vendors will be evaluated against the DT objectives that assess the performance and functionality of each vendor's FOC RRs when used in a controlled field environment; provide range and technical performance data using SRW and corresponding operating modes; and ensure technical, performance, and reliability assessments by conducting performance-based testing. DT includes threat penetration and vulnerability testing. A Nett Warrior interoperability test excursion is conducted at the end of performance and functionality test cases.

Summary of FY 2015 DT&E Engagement and Assessments

- January–October 2015, DASD(DT&E) engaged with the Product Manager (Pdm) HMS to draft, edit, and incorporate a DEF into the RR FOC phase TEMP.
- January–April 2015, Pdm HMS conducted competitive FOC source selection activities. DASD(DT&E) reviewed the RFP and provided critical inputs for the source selection evaluation criteria. On April 29, 2015, two vendors were selected (Thales Defense & Security, Inc. and Harris RF Communications Corporation) after the competitive source selection phase. Both vendors demonstrated acceptable results in the source selection phase, which validated production-representative test articles against select contract performance requirements. Post-source selection, DASD(DT&E) reviews the vendors' performance data and NSA and JITC certifications for independent assessment purposes.
- June–July 2015, MCNSD conducted QT at EPG, Fort Huachuca, Arizona. DASD(DT&E) reviewed the QT data for both vendors. DASD(DT&E) analysis indicates that both vendors demonstrated KPP 1, KPP 2, and KSA 3 required performance parameters. The U.S. Army selected both vendors to participate in the next phase of DT before OTs.
- August–November 2015, ATEC conducted the ULTRA risk reduction testing for Vendor B undergoing the DT CT. DASD(DT&E) participated in the developmental test readiness review and provided an assessment of readiness to start record test. Final DT assessments for both vendors will be provided to the U.S. Army at the conclusion of the risk reduction testing phase.
- August–December 2015, MCNSD in conjunction with Pdm HMS conducted DT CT for Vendor B FOC RRs. DASD(DT&E) evaluates the data for performance, interoperability, cybersecurity, and reliability against the KPPs and KSAs. A final DT assessment for Vendor B will be provided to the U.S. Army at the conclusion of the DT CT event.
- The HMS RR program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The HMS program DT&E events are on track. The U.S. Army is executing the FOC RR T&E as outlined in the TEMP. DT&E strategy execution risk is low for planned activities.

Joint Air-to-Ground Missile (JAGM)



Executive Summary: The JAGM system is a U.S. Army-led, joint interest, ACAT 1D program with common requirements shared with the U.S. Navy (USN) and U.S. Marine Corps (USMC). The JAGM system is the next generation of air-to-surface precise, standoff strike capable missiles designed to replace Hellfire laser Longbow and air-launched, tube-launched, optically tracked, wire-guided (TOW) missiles, addressing an impending Army missile inventory expiration. The system will initially be integrated by the U.S. Army onto Apache (AH-64E) helicopters, and then later by the USN/USMC onto Viper (AH-1Z) helicopters. JAGM will fill a critical gap in capability to engage targets in adverse weather and countermeasure environments, equipping the Warfighter with fire-and-forget capability and enabling the Warfighter to attack critical, high-value, fixed and mobile/relocatable land and maritime targets in day and night battlefield limited-visibility conditions from significant standoff ranges during full-spectrum operations.

The JAGM program was divided into three increments, with Increment 1 placing a dual-mode seeker, semiactive laser, and millimeter-wave radar on an existing Hellfire motor to engage light vehicles and armor, maritime, and "soft" targets out to a range of 8 kilometers, providing point designation, active fire-and-forget, and laser-cueing targeting modes. Each targeting mode is designed to allow the missile to lock-on before launch or lock-on after launch and also allow the operator to command low-, direct-, or high-attack missile trajectories before launch.

The Army was granted MS B approval for the JAGM program in the 4th quarter FY 2015, authorizing the program to enter into EMD. The JAGM PM owns the Interface Control Documents, which places the burden of system integration on the developer, and full capability will be demonstrated in test from ground-launched and instrumented test aircraft. The bulk of DT is scheduled to begin in April 2016.

Lead DT&E Organization: ATEC AFED

Summary of FY 2015 DT&E Activities

- February 17–March 9, 2015, UH-1 captive flight test and tower test at Redstone Test Center, Alabama, Test Area 3 for the formal countermeasures tests with the Center for Countermeasures supporting with captive flight continuing into mid-April 2015.
- February 19, 2015, commenced electromagnetic environmental effects system qualification test, which started after the test readiness review on February 18, 2015.
- April 2015, conducted two TD phase Government ground-launched tests at the Gulf Test Range, Eglin Air Force Base (AFB), Florida, with both tests meeting their test objectives.
- May 2015, commenced environmental system qualification test.
- June 16, 2015, JAGM MS B pre-MDAP TEMP Increment 1 approved.
- July 7, 2015, DASD(DT&E) provided an assessment of the JAGM Increment 1 program, supporting the MS B decision and recommending entry into EMD.

- August 2015, conducted a risk reduction ground-launched test at the Gulf Test Range, Eglin AFB, Florida, meeting the test objectives.

Summary of FY 2015 DT&E Engagement and Assessments

- May 26, 2015, the DASD(DT&E) approved the DT plan within the JAGM MS B TEMP and advised the program to update the DEF outlined in the TEMP to show the linkage between decisions, the information needed to inform those decisions as gained from the system evaluation, the test, and the M&S events that will generate data for the evaluation. The DASD(DT&E) also advised that the program, before proceeding with LRIP 1, conduct a JAGM compatibility event with AH-1Z to demonstrate a low risk of major redesign.
- July 2015, DASD(DT&E) conducted a DASD(DT&E) program assessment of the Increment 1 TD phase activities as they relate to performance, reliability, interoperability, and cybersecurity.
- The JAGM program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- DASD(DT&E) provided a DASD(DT&E) program assessment in July 2015 of JAGM Increment 1 to support the MS B decision. Based on DT conducted at the time of the assessment, the DASD(DT&E) assessed that JAGM had shown sufficient maturity to enter EMD and recommended approval of MS B. The summary of the DASD(DT&E) evaluation follows:
  - Performance. DASD(DT&E) assessed that JAGM Increment 1 had demonstrated sufficient performance in the TD phase to minimize risk in EMD. Weapons integration laboratory testing, flight simulations, ground and captive flight test, as well as four flight tests using production-representative hardware were completed in the TD phase. Testing has demonstrated seeker functioning in the laser and millimeter-wave radar modes in clear air and in the presence of countermeasures. The seeker provided sufficient guidance to the legacy Hellfire components to achieve a direct hit on static and dynamic targets in all four flight tests.
  - Reliability. Results from the TD phase are insufficient to support a conclusion regarding reliability. Component testing has identified failure modes that have been remediated without recurrence. The RGP is optimistic in the assumption that initial reliability will be 0.92 and grow to 0.958 by the end of EMD.
  - Interoperability. Interoperability is assessed as low risk as JAGM does not connect with the Global Information Grid. The weapon is integrated on the M299 launcher and communicates in pre-launch mode via the Hellfire data bus and is autonomous once launched. JAGM integration on the AH-64E and AH-lZ helicopters is facilitated through the existing M299/Hellfire integration.
  - Cybersecurity. DASD(DT&E) assessed cybersecurity as a low risk to JAGM survivability. JAGM is designed with minimal cyber interfaces and connects with its host aircraft weapons data bus only in the powered pre-launch configuration. A Government assessment of contractor software testing identified no major vulnerabilities.

Conclusion: The program continues testing in accordance with the approved TEMP. DASD(DT&E) assesses current performance risk to be medium.

M109A7 Family of Vehicles (FoV), Paladin Integrated Management (PIM) Self-Propelled Howitzer (SPH) and Carrier, Ammunition, Tracked (CAT) Vehicle

Executive Summary: The M109A7 FoV program consists of two individual platforms: an SPH and a CAT vehicle. The SPH is an aluminum armored, full-tracked, 155-millimeter vehicle, capable of carrying a minimum of 39 projectiles and a minimum of 26 modular artillery charge system canisters. The CAT vehicle supplies the SPH with ammunition as it provides tactical and operational fires during both offensive and defensive operations. The CAT vehicle will be capable of carrying a 12,000-pound ammunition payload and can be configured for various ammunition needs and specifications. Both the SPH and CAT vehicle incorporate a newly designed hull, a modified Bradley fighting vehicle (BFV) power train and suspension system, the future BFV track, a modernized 600-volt electrical system, and a microclimatic conditioning system intended to improve sustainability over the current Paladin/field artillery ammunition support vehicle fleet. The SPH also includes an automated fire control system.

The primary mission area for the M109A7 FoV is force application-engagement. The M109A7 FoV supports combined arms maneuver, wide-area security, and other full-spectrum operations as part of the land component of a joint task force. The M109A7 FoV is planned to be employed as part of a fires battalion in the armored brigade combat team and the fires brigades, but it will be fully capable of supporting any brigade combat team. Targets include the full range of materiel, personnel, and structures.

As an ACAT II program, the Army Acquisition Executive approved entry into EMD in the 4th quarter FY 2009. As a result of program restructure and cost increases, the USD(AT&L) designated M109A7 as an ACAT ID program in June 2011. DT&E started in May 2011 at Yuma Proving Ground, Arizona, and Aberdeen Proving Ground, Maryland, in accordance with the draft TEMP and ATEC detailed test plans. During FY 2011 and FY 2012, the program began the production proveout test (PPT), completing the first phase and entering into the second phase of a three-phase DT plan. During FY 2013, the program completed PPT, software verification efforts, a logistics demonstration, the second segment of the SPH reliability growth program, SPH firing performance, automotive performance, and a 1,100-mile RAM demonstration on the CAT vehicle. In October 2013, the USD(AT&L) conducted a MS C review and authorized the program to enter the P&D phase and begin LRIP.

During FY 2014, Phase 3 testing included post-MS C testing to verify corrective action, producibility improvement, and obsolescence (CPO) changes; first article testing (FAT); software developmental qualification testing; component-level live-fire (LF) testing; a logistics technical manual review; and software formal qualification test (FQT). In July 2015, the program slipped the full-rate production

decision as well as conditional materiel release, first unit equipped, and IOC milestones by 2 months to minimize overall program risk. Production qualification testing (PQT) is scheduled through the July/August 2016 time frame. Planned testing during PQT consists of firing and automotive performance; automotive durability miles; the third segment of SPH RAM testing, consisting of 19 RAM missions (58.8 miles/104 rounds per mission); counter radio-controlled improvised explosive device electronic warfare system integration; continental U.S.-based environmental chamber testing; arctic region testing at the Cold Regions Test Center, Alaska; interoperability testing; electromagnetic interference and electromagnetic compatibility survivability testing; cybersecurity testing; and full-up system-level survivability testing. In September 2015, the USD(AT&L) designated the program as an ACAT IC program and delegated the Army Acquisition Executive as the Milestone Decision Authority.

Lead DT&E Organization: ATEC AFED

Summary of FY 2015 DT&E Activities

- The PMO completed verification of CPO changes aimed at evaluating changes to LRIP subsystems and components to meet requirements before system-level testing in PQT.
- Per DASD(DT&E) request, the PM developed and coordinated TEMP updates regarding cybersecurity and environmental testing and submitted change pages to DASD(DT&E) for final approval before the start of PQT.
- In September 2014, the PMO began line-replaceable unit (LRU) FAT. The FAT was originally scheduled to end in December 2014. Of the 18 updated LRUs requiring FAT before integration into vehicles to support PQT, 11 have completed FAT, 5 are undergoing FAT, and 2 have a stop-work order (as of February 22, 2016).
- Baseline LRIP software version (SV) 3.1 FQT was completed in April 2015. The program is currently conducting an FQT on SV 3.3.3 aimed primarily at addressing cybersecurity, vehicle diagnostics, and other issues identified during early PQT.
- A cybersecurity vulnerability assessment was conducted as part of the PQT in April–May 2015.
- In June 2015, the program entered into Phase 3 DT using LRIP vehicles for PQT, involving eight SPHs (six PQT/two LF) and six CAT vehicles (five PQT/one LF).
- The Government phase of PQT began in early September 2015, approximately 3 months behind the MS C TEMP schedule.

Summary of FY 2015 DT&E Engagement and Assessments

- The program is executing a medium-risk DT&E schedule driven by highly concurrent test activities and production-related quality control issues described below.
- The FAT originally scheduled to end in December 2014 is now projected to end in January 2016. The FQT for SV 3.1, originally scheduled to end in January 2015, ended in April 2015 for the SPH and in June 2015 for the CAT vehicle. Delays in FQT and FAT increase the concurrency of component/software qualification, PQT, and the build of LRIP vehicles. Problems discovered in FQT on SV 3.3.3 and FAT drove vehicle hardware/software changes to PQT test vehicles and lead to regression testing of SV 3.3.4 planned for April 2016.
- The Government phase of PQT originally planned to begin in June 2015 began in September 2015 and is scheduled through July/August 2016. Delays were attributed to original equipment manufacturer production as well as supplier quality assurance/quality control issues. Retrofits are being conducted on almost all PQT test vehicles after delivery to test sites, delaying Government PQT test activities as well as complicating test article configuration management.

- The PM for Self-Propelled Howitzer Systems (SPHS) is implementing new removal tools for stuck and ruptured primers. These tools will help mitigate the impact of stuck or ruptured primers on meeting KPP 5 (Rate of Fire) performance. The PM SPHS is also working with the PM for Combat Ammunition Systems to develop a path ahead to incorporate improvements in the M82 primer in time for verification during the latter part of PQT and before IOT&E.
- The program has identified fixes to address the two critical and five high-risk issues identified during the PQT cybersecurity vulnerability assessment conducted in April–May 2015 and is planning to implement those fixes in SV 3.3.3/4 in time to support IOT&E cybersecurity testing.
- The program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: Multiple manufacturing process issues caused PQT delays; however, once the vehicles were modified to the correct LRIP configuration, the program conducted FY 2015 DT&E activities in accordance with the approved TEMP. DT&E conducted to date shows that the program is on a path to meeting its KPPs/KSAs with the exception of KPP 5, Rate of Fire. The program is conducting the FAT and FQT SV 3.3.3 to support the LRIP build and PQT with medium risk due to an aggressive schedule and concurrency.

Mid-Tier Networking Vehicular Radio (MNVR)
(AN/VRC-118(v)1)

NSN: 5820-01-624-6246 | ZLIN: Z05335

Contractor: Harris Corp

Executive Summary: The MNVR is an ACAT 1D, special interest program managed by the U.S. Army's Project Manager for Tactical Radios under the PEO for Command, Control, and Communications–Tactical. The program is on schedule for the MS C LRIP decision in the 1st quarter FY 2016. The next major milestone decision point is FRP planned for the 4th quarter FY 2016. The MNVR provides the Soldier with a software-programmable, two-channel, 50-watt maximum, and non-developmental item radio, manufactured by the Harris Corporation. The MNVR is designed to provide on-the-move internet protocol capability through simultaneous secure voice and data communications using two threshold-required, Government-provided waveforms: (1) Soldier Radio Waveform (SRW) including combat communications (CC) mode of operation and (2) Wideband Networking Waveform (WNW), a new mid-tier networking capability that includes an orthogonal frequency-division multiplexing (OFDM) mode and an anti-jam mode. The photo above shows a two-channel MNVR installation using the single-channel ground and airborne radio system (SINCGARS) mount.

Lead DT&E Organization: ATEC C4ISRED

Summary of FY 2015 DT&E Activities

- October–November 2014. The ATEC Electronic Proving Ground (EPG) Mission Command and Network Systems Division (MCNSD) conducted a Government integration test (GIT) over-the-air (OTA) DT field event to evaluate MNVR capability as well as WNW and SRW modes of operation and performance against the CPD KPPs threshold requirements. GIT OTA was conducted at EPG, Fort Huachuca, Arizona.
- October–December 2014. The MNVR product management (PdM) office conducted a GIT laboratory-based DT that served as a risk reduction event and as a precursor to the OTA field event. GIT was conducted at Aberdeen Proving Ground, Maryland, in the C4ISR Systems Integration Lab.
- October 2014–January 2015. The Communications-Electronics Research, Development, and Engineering Center (CERDEC) conducted counter radio-controlled improvised explosive device (RCIED) electronic warfare (CREW) interoperability testing. The testing was conducted for analysis of the potential impact on the MNVR system resulting from blue force electronic warfare systems. The laboratory-based CREW DT was conducted at Aberdeen Proving Ground, Maryland, and the OTA CREW DT was conducted at Yuma Proving Ground (YPG), Arizona.
- January–February 2015. ATEC EPG MCNSD conducted Government Regression Testing (GRT) Phase 1 at EPG, Fort Huachuca, Arizona. GRT Phase 1 was conducted to validate fixes for performance, reliability, interoperability, and cybersecurity issues from lab and field DT events.
- January–November 2015. ATEC YPG conducted tropic region testing of the MNVR system at the U.S. Army Tropic Regions Test Center, Panama.

- April–May 2015. ATEC Operational Test Command conducted an MNVR limited user test (LUT) at Fort Bliss, Texas, and White Sands Missile Range (WSMR), New Mexico.
- May 27–June 5, 2015. ATEC YPG conducted high-altitude electromagnetic pulse and near-strike lightning testing at WSMR, New Mexico.
- June–December 2015. ATEC EPG MCNSD conducted GRT Phase 2 at EPG, Fort Huachuca, Arizona. GRT Phase 2 was conducted to validate fixes for performance, reliability, interoperability, and cybersecurity issues from the LUT.

Summary of FY 2015 DT&E Engagement and Assessments

- October 2014–March 2015. DASD(DT&E) provided detailed test plan scope inputs, observed testing, and analyzed test data for all DT events conducted by the MNVR program.
- March 2015. DASD(DT&E) provided a DT&E assessment of operational test readiness for the MNVR LUT based on analysis and assessment of DT events that preceded the LUT. The DT&E assessment verified fixes by the vendor and Pdm MNVR for performance, reliability, interoperability, and cybersecurity issues from lab and field Technology Development events. The DT&E assessment supported entry into the MNVR LUT.
- DASD(DT&E) will provide a DT&E program assessment to support the MNVR program MS C LRIP decision (planned for FY 2016) to authorize entry into the Production and Deployment phase. A current DASD(DT&E) summary evaluation follows:
  - Performance
    - In GIT and GRT, MNVR demonstrated above-threshold range capabilities of the WNW and SRW in static and mobile operations. MNVR demonstrated internet protocol data bridging and routing between the waveforms, basic WNW (data) and SRW (voice and data) voice call completion and quality, and network mobile ad-hoc networking. For WNW data in a 30-node multiple subnet network, the threshold requirement for message completion rate (MCR) and throughput for static and mobile conditions is 90 percent/ 200 kilobits per second; the MNVR demonstrated that it met the requirement. In LUT, WNW did not demonstrate above-threshold range capability and did not meet the MCR threshold requirement. The SRW 40-node single subnet network for ultrahigh frequency and L-band frequencies did not demonstrate the MCR and throughput threshold of 90 percent/50 kilobits per second (static) or 85 percent/25 kilobits per second (mobile). In LUT, the results for MNVR operating SRW were similar to the results in GIT and GRT.
    - The Joint Enterprise Network Manager software could not load the MNVRs with the WNW and SRW threshold waveforms, radio mission data sets (RMDSs), and radio configuration files without significant software updates.
  - Reliability. In GIT, the mean time between essential function failures (MTBEFF) for the MNVR channels did not meet the threshold requirement of 477 hours. For the two channels combined, there was a 44 percent probability that a unit would complete a 72-hour mission without an essential function failure (EFF). In the LUT, MNVR reliability (MTBEFF) showed significant improvement over the reliability demonstrated in the OTA DT. MTBEFF for both channels exceeded the 477-hour threshold criterion by more than 60 percent. Software faults were responsible for more than 90 percent of EFFs in previous T&E events. In general, GIT was conducted with a structured methodology to ensure that each test case was executed with a fully operational network at the outset. Reliability data were gathered under these controlled conditions, which optimized accurate collection. LUT results imply several conditions that require further explanation including major software quality

improvement and/or redesign, LUT test limitations, and network design optimization to overcome GIT-identified performance limitations.

- Interoperability. MNVR demonstrated interoperability with U.S. Army CREW devices. MNVR demonstrated WNW and SRW channel simultaneous operations. In GIT, MNVR did not demonstrate multichannel functionality (cross-banding) for WNW-SRW. In LUT, MNVR did demonstrate multichannel functionality for WNW-SRW after correcting the RMDS for the brigade network architecture. In GIT, U.S. Army mission command systems interoperability and adequacy were demonstrated for a static multiple subnet brigade combat team representative network. MNVR position location information performance for WNW was below the threshold requirement of 90 percent MCR under static operating conditions in GIT and LUT.
- Cybersecurity Testing. The MNVR program is implementing the DoD Information Assurance Certification and Accreditation Process. The Threat Computer Network Operations team conducted penetration testing of the MNVR operating WNW OFDM and SRW CC modes and identified vulnerabilities. MNVR subnet reconnaissance scans were attempted using both waveforms. In GIT and LUT, a critical vulnerability risk was identified. The MNVR program has implemented a fix that was demonstrated in GRT at EPG in November 2015. Additional testing is needed to fully verify the fix for the vulnerability before future OT is conducted.
- Human-Factors Engineering. Soldiers provided feedback indicating high acceptability for the MNVR system. All Soldiers rated MNVR excellent for ease of use, adequate to support the mission, and sufficient to meet tactical conditions and environments. LUT qualitative survey results indicate a neutral to positive acceptance by Soldiers for operating and maintaining the MNVR system. For voice communications, Soldiers displayed a predisposition to use the SINCGARS radio rather than the MNVR operating SRW.

- The MNVR program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: DASD(DT&E) assesses the MNVR program's ability to meet its technical requirements as medium risk for LRIP and IOT&E. DT results indicate that threshold requirements have not been fully demonstrated in the areas of performance, interoperability, reliability, and cybersecurity.

Note: Data as of December 31, 2015. Recent data are currently being evaluated, which may change the FY 2015 DT&E assessment. Future DT&E Annual Reports will update the assessments.

Warfighter Information Network–Tactical (WIN-T) Increment 2

Executive Summary: WIN-T is the primary backbone communications system linking divisions, brigades, battalions, and companies. It provides voice, data, and video to the tactical edge of the battlefield. Increment 2 provides initial on-the-move capabilities and network planning, monitoring, and control tools. It utilizes a combination of satellite (military and commercial) and line-of-sight (LOS) transmission systems using the highband networking waveform (HNW) for LOS and the network-centric waveform (NCW) for satellite. WIN-T Increment 2 consists of multiple vehicle configuration items including the Tactical Communications Node (pictured), Network Operations and Security Center, Point of Presence (PoP), Tactical Relay–Tower, and Soldier Network Extension (SNE), among others.

WIN-T Increment 2 is an ACAT ID program in FRP. It completed follow-on operational test and evaluation (FOT&E) as part of the Army's Network Integration Evaluation 15.1 based at White Sands Missile Range (WSMR), New Mexico, in October 2014. The USD(AT&L) approved FRP in June 2015.

Lead DT&E Organization: ATEC C4ISRED

Summary of FY 2015 DT&E Activities

- December 2014, the PM conducted a 100-node NCW test at the contractor facility in Taunton, Massachusetts, to demonstrate the scalability of the satellite network. The Stryker brigades will have 74 satellite nodes and the 100-node test was to identify an upper limit. The test inferred that the Stryker brigades can be supported with additional margin for growth.

Summary of FY 2015 DT&E Engagement and Assessments

- April–May 2015, DASD(DT&E) reviewed HNW throughput test data and confirmed that the highband networking radio met the CPD requirements.
- The WIN-T program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- DASD(DT&E) provided a DT&E assessment in April 2015 in support of the FRP decision. The assessment was based on the DT events conducted in FY 2014. Because the program had previously met all of its KPP and KSA requirements, except reliability and maintainability of some configuration items, the assessment focused on reliability and maintainability and the specific issues identified by DOT&E from the previous milestone decision. Specific assessment areas were as follows:
  - Performance. The PM corrected human factors deficiencies identified in the previous OT reports. The complexity of system operation was significantly reduced through additional human factors engineering (HFE). The combat net radio gateway performed well with more than 150 completed calls and subjectively reported good call quality. User surveys indicated

satisfaction with the usability of the system. The LOS network operated as designed, limited by terrain and foliage obstructions.

- Reliability. The PoP demonstrated 179 hours mean time between essential function failure (MTBEFF) (Threshold = 144 hours). The SNE exceeded the 184-hour MTBEFF threshold at the point estimate (222 hours) but not at the required confidence level (152 hours). Because of limited test resources, the Stryker variants of the PoP and SNE did not have sufficient time to compute MTBEFF with confidence. There were insufficient item failures for items under test to meet the mean time to repair (MTTR) with confidence. Additional testing focused on MTTR was needed.
- Interoperability. The system had achieved all of its interoperability requirements and received a Joint Interoperability Certification in 2012. Interoperability was not reassessed during DT conducted in FY 2014.
- Cybersecurity Testing. The Johns Hopkins University Applied Physics Laboratory cooperative vulnerability and penetration assessment and the Army Research Laboratory Survivability/Lethality Analysis Directorate adversarial assessment during DT revealed vulnerabilities that are common to large-scale networks and require continuous attention. The PM performed necessary mitigation steps to be confirmed during FOT&E #2.
- Recommendation. The program was ready for the FRP decision.

Conclusion: Movement to fielding and full operational capability is low risk. The assessment highlighted the need for Soldier operators during DT to assess HFE during mission-oriented testing. The use of Soldiers during this DT was instrumental toward the successful subsequent OT.

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6.3 Navy Programs

This section includes summaries of the following 13 programs:

- CH-53K Heavy-Lift Replacement Helicopter
- Common Aviation Command and Control System (CAC2S) Increment 1
- GERALD R. FORD Class Nuclear Aircraft Carrier (CVN 78)
- Littoral Combat Ship (LCS) and Mission Packages (MPs)
- Mobile User Objective System (MUOS)
- MQ-4C Triton Unmanned Aircraft System (UAS)
- Multi-Mission Maritime Aircraft (P-8A Poseidon)
- OHIO-Class Submarine Replacement (OHIO Replacement)
- Presidential Helicopter Fleet Replacement (VH-92A)
- Trident II Life Extension (D5LE)
- U.S. Navy Integrated Air and Missile Defense (IAMD) and Naval Integrated Fire Control–Counter Air (NIFC-CA) Capabilities
- VIRGINIA-Class Submarine
- ZUMWALT-Class Destroyer (DDG 1000)

CH-53K Heavy-Lift Replacement Helicopter

Executive Summary: The CH-53K is intended to replace the CH-53E to meet the Marine Corps heavy-lift requirements beyond 2025. The CH-53K incorporates composite material construction, a new engine design, digital instrument and gauge displays (a "glass" cockpit), and fly-by-wire flight controls among other advanced technologies designed to improve performance within the same overall aircraft footprint. It is intended to provide improvements in operational capability, interoperability, reliability, and maintainability while reducing total ownership costs. The CH-53K assault transport helicopter will be a dual-piloted, multiengine helicopter designed to meet the emerging Marine air-ground task force vertical heavy-lift, warfighting requirements.

In December 2005, OSD approved MS B and authorized the CH-53K program to begin system development and demonstration. The program conducted a critical design review in July 2010. In January 2012, OSD approved Revision 1 to the CH-53K Acquisition Strategy. This revision shifted the four RDT&E-funded aircraft in the first LRIP lot to the EMD phase as system demonstration test articles (SDTAs) to demonstrate manufacturing processes and support integrated T&E. This revision also increased the total procurement from 156 to 200 aircraft and aligned the program with changes to the schedule and budget that had occurred since the start of the program in 2005. In response to recent budget changes, the program submitted Revision 2 to the Acquisition Strategy (currently in coordination). This revision moves MS C from the 4th quarter FY 2015 to the 4th quarter FY 2016 and restructures the LRIP plan, reducing the number of LRIP articles from 27 to 20 but adding two more RDT&E-funded SDTA assets during EMD. The program is projected to breach its Acquisition Program Baseline MS C threshold date of August 2016 as a result of discoveries during test on the ground test vehicle (GTV) and qualification testing. The current PM estimate for MS C is February 2017 (Objective) to August 2017 (Threshold).

The test strategy relies on four engineering development model (EDM) aircraft to support DT&E and the SDTA aircraft that will support later DT efforts and IOT&E. The contractor completed the first of four EDM aircraft (EDM-1) in October 2014, and after undergoing acceptance testing, required updates to systems, and preparation for the flight test program had its first flight on October 27, 2015. EDM-3 went through the same process and had its first flight on January 22, 2016. The CH-53K program should be up to its full pace of testing with all four EDM aircraft by mid-2016.

Lead DT&E Organization: NAWCAD HX-21

Summary of FY 2015 DT&E Activities

- In FY 2015, DT&E continued to focus on monitoring system-level testing using the CH-53K GTV. The GTV is a full-up aircraft, fixed to the ground, which allows the test team to "fly" the aircraft at high power levels while not leaving the ground. Using the GTV is a prudent risk reduction measure that will enable the program to make early discovery of major issues in advance of the flight test program, which started in October 2015.

- EDM-1 aircraft completed production, acceptance testing, and test team prep, achieving first flight on October 27, 2015.
- EDM-3 aircraft completed production, acceptance testing, and test team prep, achieving first flight on January 22, 2016.
- EDM-2 and EDM-4 are on schedule to be delivered in FY 2016.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) and the Deputy Assistant Secretary of Defense for Tactical Warfare Systems conducted a program review in October 2014 to assess program development progress and risk. This review was followed by another review in March 2015 and less formal reviews in the summer and fall of 2015.
- Following a major issue with the main gearbox discovered in January 2015, the CH-53K DT flight test program was put on hold. Testing with the GTV restarted in June 2015, but first flight was slipped to October 2015. The Navy is conducting testing of the GTV to demonstrate system readiness to start flight testing. However, this testing has identified significant developmental issues with the system (nose gearbox temperature, main gearbox drive, tail rotor driveshaft vibration, etc.) that indicate that the design is not yet stable and design changes may be needed. The program has identified corrective actions for some of these problems, but these corrective actions have caused some slip to the test schedule, and any additional testing required because of these issues may add time to the total testing schedule.
- Due to major discoveries, developmental issues, and schedule slippages the PM issued a Program Deviation Report in July 2015.
- As of September 15, 2015, the program had completed about 22 percent of the currently required test points that need to be conducted on the GTV before first flight. The program is about 12 months behind the plan that was approved in the January 2012 Acquisition Strategy and about 3 months behind the revised plan of April 2014.
- Based on progress to date and the likelihood that GTV and EMD testing will continue to identify technical issues impacting the EMD flight test schedule, DASD(DT&E) believes that some delay to the planned February 2017 MS C is likely.
- Despite schedule pressures, the Integrated Test Team is determined to fly all critical planned pre-MS C test points, which could impact the MS C date. DASD(DT&E) recommends that the Navy execute an event-based schedule that conducts all planned testing and avoid deferring critical testing or capability beyond MS C to maintain schedule.
- The approved TEMP was adequate to start DT but no longer reflects the current test plan, and some testing has been deferred beyond MS C. In addition, the approved TEMP does not include a plan to conduct cybersecurity testing before MS C. The PMO submitted a letter in February 2015 to DASD(DT&E) and DOT&E that documents changes to the approved plan, including the plan to assess cybersecurity vulnerabilities before MS C, and identifies when deferred testing will be complete.
- The CH-53K program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The program conducted FY 2015 DT&E activities in accordance with the approved TEMP, despite many delays due to developmental issues. DT&E has identified significant developmental issues with the system, and DT continued to lag significantly behind plan. The program has identified corrective actions for most of these problems, but implementation has caused some slip to the test schedule, and any additional testing required because of these issues may add time to the total testing schedule. Following a Program Deviation Report in July 2015, the new dates for MS C are February 2017 (Objective), and August 2017 (Threshold), respectively.

Common Aviation Command and Control System (CAC2S) Increment 1

Executive Summary: The Marine Corps CAC2S Increment 1 is replacing direct air support center (DASC), tactical air operations center (TAOC), and tactical air command center (TACC) functionality. CAC2S will provide a common suite of tactical facilities, equipment, and software in a system that will replace the majority of legacy command and control equipment currently associated with the DASC, TAOC, and TACC. Additionally, CAC2S will provide improved automated decision aids for an enhanced aviation combat element battle command capability.

CAC2S Increment 1 contains two phases. Phase I was fielded in 2012. During the 2nd quarter FY 2015, the Assistant Secretary of the Navy for Research, Development, and Acquisition, as the Milestone Decision Authority, conducted a MS C review for CAC2S, which resulted in approval to procure limited deployment units (LDUs) to support LRIP DT and IOT&E. Consequently, this report focuses on Phase II.

Lead DT&E Organization: NSWC PHD

Summary of FY 2015 DT&E Activities

- EMD DT: The PMO conducted and DASD(DT&E) oversaw DT between September 11 and October 5, 2014, at the Yuma, Arizona, ranges before the Marine Corps Weapons and Tactics Instructor (WTI) exercise. The Marine Corps changed the TEMP test venue from the Marine Corps Tactical Systems Support Activity (MCTSSA) tactical lab facilities and Marine Corps Air Station Miramar, California, to consolidate resources required for the test. The operational assessment (OA) was conducted immediately following EMD DT during the live-flight phase of the WTI exercise at the same Yuma locations. The PMO conducted the final EMD DT and the OA using three engineering development models (EDMs) in DASC, TAOC, and TACC roles.
- The PMO conducted system regression testing throughout FY 2015 to uncover and resolve new software bugs in existing functional and nonfunctional areas of the system.
- DASD(DT&E) prepared a February 2015 DASD(DT&E) program assessment based on EMD DT and other testing that supported the Navy's decision to enter the P&D phase. The CAC2S PMO completed the scheduled EMD DT events, which required the PMO to evaluate 236 CPD requirements across 20 functional areas.
- The PMO scheduled two additional DT events following the MS C decision to validate fixes based on FY 2014 EMD DT events and to ensure that the CAC2S units that will be used for IOT&E are fully functional and production representative.
- Post-MS C DT: The PM used the event to burn down performance and reliability risk. During the first post-MS C DT, the PMO conducted air command and control system EDM post-MS C testing during May and June 2015 at MCTSSA and the Surface Combat Systems Center, Wallops Island, Virginia. This event required three EDM systems and an appropriate number of communication systems (CSs). All systems were configured for DASC and/or TAOC operations. Additional data link testing and data fusion testing were conducted at MCTSSA after completion of the first post-MS C DT through July 2015.

- Final post-MS C DT: The PMO conducted and DASD(DT&E) oversaw this test during September 2015 at Yuma, Arizona, ranges before the WTI exercise. This event required three air command and control system LRIP LDU systems and an appropriate number of CSs. All systems were configured for DASC, TACC, and/or TAOC operations. During this DT, the program office also conducted integrated testing in two areas: 72-hour endurance operations and a TACC density test to determine whether the system could support the required number of operator workstations. The PMO plans to use data from the integrated testing period to satisfy OT data requirements for these two areas. The PMO began additional data link and data fusion testing during September 2015.

Summary of FY 2015 DT&E Engagement and Assessments

- Because the Marine Corps allowed the PM to move the final EMD DT to Yuma, Arizona, test facilities, there was very little time between DT and the OA. DASD(DT&E), however, observed no degradation during EMD DT or the transition to the OA. The DT to OA transition was facilitated by the move because the Yuma test sites did not change.
- Final EMD DT results indicated that the PMO collected all required test data and was able to demonstrate all planned objectives for the test. Additionally, the planned number of hours for reliability testing was surpassed.
- The first post-MS C DT provided a venue that allowed the PMO to evaluate CPD requirements that were not previously tested and to verify corrections for several requirements that were not previously met. After the first post-MS C DT, there remained six unverified requirements; two require identification, friend or foe capabilities that currently are not available, three will be developed after DT, and one required clarification on logistical footprint requirements. It is notable that all previous Priority 1 Trouble Reports (TRs) and a majority of Priority 2 TRs were fixed and then verified.
- In the second and final post-MS C DT, CAC2S supported all DASC, TAOC, and TACC missions and was considered operationally effective and suitable; specifically, all threshold values were met. When comparing the results in the TACC, TAOC, and DASC from the last LRIP DT event to the previous EDM DT results, CAC2S has shown vast improvements over time. The operators' ability to conduct their mission and CAC2S performance have remained consistently high while the CAC2S experienced fewer failures.
- The CAC2S program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment: In February 2015, DASD(DT&E) provided a program assessment of CAC2S to support the Navy's decision to enter the P&D phase. The PMO successfully completed the scheduled FY 2014 CAC2S Phase II EMD DT events. Similarly, post-MS C events conducted in FY 2015 led to verification of meeting program threshold technical requirements.

Conclusion: CAC2S has demonstrated readiness to perform its scheduled IOT&E. Although the final formal post-MS C DT report has not been received, tentative FY 2015 DT results indicate that CAC2S has demonstrated the ability to provide data fusion of real-time, near-real-time, and non-real-time information onto a single tactical display and to do so in an operational threat scenario within the test venue. All KPPs have been demonstrated to threshold levels, and other CPD requirements are on track to meet threshold levels before the 3rd quarter FY 2016 IOT&E.

GERALD R. FORD Class Nuclear Aircraft Carrier (CVN 78)

Executive Summary: The future aircraft carrier GERALD R. FORD class (CVN 78) is the planned successor to the NIMITZ-class (CVN 68) aircraft carrier. It is a large-deck, nuclear-powered aircraft carrier designed to increase the sortie generation capability of embarked aircraft, improve weapon handling efficiency, and increase self-defense capabilities. This report contains an overview of mission-critical systems across the air operations; combat systems; as well as command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) mission areas.

DASD(DT&E) has expressed concerns with the execution of the shipboard test program, which is the principal construction risk on CVN 78 when new design systems are energized for the first time. The estimated delivery date of the ship was March 31, 2016; however, the Navy identified a slight deterioration in required progress on the CVN 78 shipboard test program. As a result, the sea trial schedule will be delayed about 6 to 8 weeks. The exact impact on ship delivery will be determined based on the results of sea trials.

Lead DT&E Organization: PMS 378T

Summary of FY 2015 DT&E Activities

- CVN 78 construction testing continued at Huntington Ingalls Industries in Newport News, Virginia. Delivery and commissioning scheduled for March and April 2016, respectively, have slipped to late 3rd quarter FY 2016 because of deterioration in the shipboard testing program.
- The focus of the Electromagnetic Aircraft Launch System (EMALS) program in FY 2015 was on shipboard commissioning efforts of the four launchers aboard CVN 78. Installation and checkout have made significant progress and limited testing has begun, including the first dead-load shot from the ship on June 5, 2015. The Advanced Arresting Gear (AAG) program is less mature than EMALS due to unexpected component failures earlier in the program and software control problems, especially for some off-center and skewed arrestments. In FY 2015, the program addressed key developmental issues and was able to enter formal land-based performance testing on July 22, 2015. Testing with actual aircraft, which is crucial to DT, is scheduled to begin in the near future at the Runway Arrested Landing Site (RALS) at the Naval Air Warfare Center, Lakehurst, New Jersey.
- CVN 78 conducted land-based engineering tests (LBETs) and design agent systems integration testing (DA SIT) for the combat system on the following dates: LBET-3, February 17 to March 19, 2015; DA SIT-8, June 1 to June 26, 2015; LBET-4, June 29 to July 24, 2015; and LBET-5, August 31 to September 25, 2015; DA SIT-9 is scheduled for November 2 to November 20, 2015; LBET-6 is scheduled for November 23 to December 18, 2015. Live land-based tracking exercises interfaced with the dual-band radar (DBR) occurred January 20–23, 2015; March 16–20, 2015; June 10–12, 2015; and September 8–11, 2015; and are scheduled for December 14–18, 2015.

Summary of FY 2015 DT&E Engagement and Assessments

Air Operations

- Sortie Generation Rate (SGR). Modeling and simulation results indicate that the ship, its redesigned flight deck, and improved ordnance storage and handling systems have the physical capability to meet the SGR KPP if supporting systems meet their performance and operational availability (Ao) requirements and if the crew is proficient. The ship is unlikely to meet the full SGR KPP at IOC but will grow toward that capability as the crew gains experience and as system reliability and Ao improve.
- EMALS Performance. Land-based testing previously demonstrated that the major EMALS components can meet performance specifications. The FY 2015 effort focused on installing the four launchers aboard CVN 78. Installation and checkout have made significant progress and limited testing has begun, including the first dead-load shot from the ship on June 5, 2015. On July 10, 2015, bow launcher dead-load launches were completed for Energy Storage Groups 1 and 2 per the commissioning procedure. As of October 20, 2015, the team has conducted a bow combination 724 armature motions including 109 dead loads. Shipboard testing in FY 2016 will be crucial to confirming that the single launcher land-based test results are applicable to the four-launcher shipboard system.
- EMALS Reliability and Ao. The statistical reliability demonstrated in land-based testing was well below the system's contractual technical specification. Ao depends not only on component reliabilities but also on repair and logistics delay times. Certain EMALS electronic components appear amenable to rapid repair or rapid software fault reset, which could offset a significant portion of the less-than-expected component reliability according to analysis by NAVAIR. Data from shipboard testing in FY 2016, follow-on land-based testing, and the ongoing maintenance demonstration activity at Lakehurst, New Jersey, will enable a more definitive estimate of Ao in FY 2016.
- AAG. The AAG program is less mature than EMALS due to unexpected component failures earlier in the program and software control problems, especially for some off-center and skewed arrestments. In FY 2015, the program addressed key developmental issues and was able to enter formal land-based performance testing on July 22, 2015. Testing with actual aircraft, which is crucial to DT, will begin in the near future at the RALS. The program still faces significant challenges in completing all planned DT within the current development period, especially if any new major issues surface during aircraft testing.
- Advanced Weapons Elevator (AWE) System. There are 11 AWEs on CVN 78. Three have been installed and are undergoing shipbuilder's industrial testing to verify proper shipboard operation. The remaining eight are in various stages of installation and grooming. As outlined in TEMP 1610, reliability data on AWEs will not be collected until ship delivery.
- Air Traffic Control (ATC). CVN 78 ATC is performed using the AN/TPX-42A(V)15 Carrier Air Traffic Control Center Direct Altitude and Identity Readout system integrated with the DBR; ATC dedicated OE-120/UPX identification, friend or foe antenna; dual ATC dedicated AN/UPX-41(C) digital interrogators; and the navigation data network. This configuration is unique, as legacy AN/TPX-42A(V) systems use a dedicated AN/SPN-43 radar. CVN 78 ATC capabilities were demonstrated during land-based tracking exercises at Wallops Island, Virginia, March 16–20, 2015; June 10–12, 2015; and September 8–11, 2015. Although tracking quality improved through FY 2015, the latest events still exhibited spurious short-range false tracks and dual tracks in which only one target was present. Root cause analysis is under way for DBR performance to improve the radar picture to support the ATC mission.

Combat Systems

- Combat systems testing in FY 2015 was conducted at the land-based test site in Wallops Island, Virginia, and demonstrated simulated engagements of increasingly stressing targets and maneuvers. In addition to self-defense, some test profiles demonstrated ATC capability.
- Although the Ship Self-Defense System (SSDS) was built on the single-source software library developed on legacy carriers and amphibious ships, DBR is only on CVN 78. Although tracking quality improved through FY 2015, the latest events still exhibited spurious short-range false tracks, dual tracks in which only one target was present, and track jumps from one position to another. Root cause analysis is under way to improve the interaction between DBR, SSDS, and Cooperative Engagement Capability (CEC).
- January 20–23, 2015, CVN 78 performed a land-based tracking exercise using two Lear Jets as targets. The aircraft flew basic anti-ship cruise missile (ASCM) flight profiles.
- March 16–20, 2015, CVN 78 performed a land-based tracking exercise using helicopters and surface craft to demonstrate ATC and self-defense against attacking helicopters and small boats.
- June 10–12, 2015, CVN 78 conducted a tracking exercise using two high-subsonic tactical aircraft flying both ASCM and ATC profiles of friendly aircraft engaging hostile aircraft.
- September 8–11, 2015, CVN 78 performed a land-based tracking exercise using two Lear Jets flying both ATC and single and dual ASCM profiles, helicopter and propeller-driven aircraft performing normal battle group air operations as well as hostile targeting and attack profiles, high-speed surface craft performing attack profiles, and high-subsonic aircraft performing single and dual ASCM profiles.
- All LBET and tracking exercise events discovered integration and performance issues that were submitted to the program's deficiency reporting and correction process. According to priority and scope, many issues will be corrected and verified during land-based testing, and some may be verified during mission systems activation and post-delivery test and trials. The program will continue developmental and integration testing in accordance with the published T&E schedule.

C4ISR

- CVN 78 cybersecurity DT plans include assistance from operational testers (Commander, Operational Test and Evaluation Force) but are limited to technical protect and detect cybersecurity functions. Operator involvement for react and restore functions will be deferred to post-delivery.

- The CVN 78 program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: CVN 78 is a very complex weapon SoS; it is the first of the FORD class and includes numerous new critical systems (EMALS, AAG, AWE) that replaced legacy steam and hydraulic systems. The shipboard test program, including the above-mentioned systems, has progressed slower than planned, which has led to a 6- to 8-month delay in the delivery of the ship. DASD(DT&E) is closely monitoring the shipboard test program for any additional impacts on ship schedule.

Littoral Combat Ship (LCS) and Mission Packages (MPs)

Executive Summary: LCS consists of three major programs: Seaframes (PMS 501), Mission Modules (MMs) (PMS 420), and Logistics/Sustainment (PMS 505). The Seaframes (ships) program consists of two high-speed hull variants: the USS FREEDOM (LCS-1) variants are steel monohulls with aluminum superstructures, and the USS INDEPENDENCE (LCS-2) variants are an all-aluminum tri-hull design. Combined diesel and gas turbine waterjets propel each ship. The MMs program is responsible for procuring, integrating, testing, and delivering three mission payloads: mine countermeasures (MCM), surface warfare (SUW), and antisubmarine warfare (ASW). Mission payloads are interchangeable with either seaframe variant as dictated by fleet requirements. When a mission payload is married with its corresponding crew and aviation detachment, it is known as an MP. The Logistics/Sustainment program is a dedicated LCS organization to provide worldwide maintenance, repair parts, technical specialists, storage facilities, transportation, configuration management, contracting, software and hardware changes, and LCS-specific support for both hull variants (16 each) and 64 MMs. The MCM and SUW MMs will be fielded in four increments; the ASW MM will be fielded in a single increment. Each increment will add capability to the respective MM, with total MM capability met once the final increment is fielded.

A primary component of the MCM MP is the remote minehunting system (RMS). RMS is composed of the remote multi-mission vehicle (RMMV), the AN/AQS-20 minehunting sonar, and associated support equipment. The RMMV was upgraded in 2014 to the current version 6.0 configuration. The current AQS-20A sonar is scheduled to be fielded in small numbers, with an upgraded AQS-20C under development. The RMMV version 6.0/AQS-20A represents the current RMS baseline, which completed DT in early FY 2015 and supported MCM MP testing in late FY 2015. The RMS program office is contracting for new RMMV and AQS-20 vehicles, based on the existing RMMV and AQS-20 performance specifications. This new RMS baseline is expected to complete development and begin DT in 2019.

Lead DT&E Organizations: NSWC PHD

Summary of FY 2015 DT&E Activities

- USS FREEDOM (LCS-1) completed seakeeping and structural loads trials (rough-water trials) in late March 2015; machinery plant and auxiliaries all performed well during sustained operations at sea. USS FREEDOM conducted concurrent DT operations for manned and unmanned helicopters April 25–May 16, 2015; the event was a pretest for initial deployment of the two aircraft—a multi-mission MH-60R Seahawk and an MQ-8B Fire Scout, a vertical take-off unmanned aerial vehicle—operating together.
- USS INDEPENDENCE (LCS-2) conducted MCM MP DT in September–October 2014 off Southern California. In January 2015, LCS-2 transited to Panama City, Florida, and conducted MCM MP DT and technical evaluation (TECHEVAL) in February–August 2015.

- USS FORT WORTH (LCS-3), after implementing practices and procedures, became the first LCS to deploy during FY 2015 with manned and unmanned aircraft in support of fleet operations. LCS-3 became the first ship to deploy under the 3-2-1 manning concept. USS FORT WORTH has required much less corrective maintenance (91 percent less) than USS FREEDOM during comparable deployment periods.
- USS CORONADO (LCS-4) completed dynamic interface testing with the MQ-8B Fire Scout in October 2014 to expand its launch and recovery envelope. LCS-3 embarked the SUW Increment 2 MP in May 2015 to conduct seaframe and SUW MP DT and TECHEVAL in preparation for seaframe/MP IOT&E in September 2015.
- Cybersecurity testing for LCS-2 variants will complete following upgrades to the seaframe Total Ship Computing Environment (TSCE) in FY 2016.
- MCM MP: Major RMS DT events included testing in December 2014–January 2015 and again in March 2015 off Riviera Beach, Florida. MCM MP Increment 1 embarked on LCS-2 to conduct TECHEVAL off Pensacola, Florida, in February–August 2015.
- SUW MP: Increment 2 was embarked on LCS-4 in May 2015 to conduct DT/IOT&E. Final test reports are still pending, but TECHEVAL results were favorable.
- ASW MP: The ASW MM conducted early integration testing onboard USS FREEDOM in late FY 2014. The MP continues developmental activity. Government DT was expected to commence onboard USS FREEDOM in FY 2016, but funding issues will likely delay ASW MP DT and TECHEVAL until FY 2017.

Summary of FY 2015 DT&E Engagement and Assessments

- LCS TEMP: DASD(DT&E) reviewed and approved the current LCS Program TEMP (Revision A) in August 2013. The LCS TEMP is currently under revision, with the next update (Revision B) expected to be submitted in mid-FY 2016. DASD(DT&E) is working closely with PEO LCS, the LCS program offices, and various Navy and OSD stakeholders to ensure that updated testing requirements are balanced with schedule and resource constraints. DASD(DT&E) focus areas include system performance and reliability, system interoperability, and cybersecurity testing.
- RMS TEMP: The RMS program office is updating the TEMP, last approved in 2012, to address programmatic changes, including the new design for the RMMV and AQS-20 systems. DASD(DT&E) is working closely with the RMS program office to ensure that both the existing and updated RMS baselines are adequately tested and can support LCS MCM operations. DASD(DT&E) focus areas include system performance and reliability, system interoperability, and cybersecurity testing.
- DASD(DT&E) continues to engage with PEO LCS program offices to ensure that MPs are adequately tested and exhibit necessary performance and reliability to support TECHEVAL. These objectives support fleet introduction of LCS seaframes and MPs.
    - MCM MP Increment 1, consisting of the RMS, the airborne mine neutralization system (AMNS), and the airborne laser mine detection system, conducted DT and TECHEVAL from LCS-2 in February–August 2015. Preliminary test results suggest that the MCM MP is effective in locating, identifying, and neutralizing mines. Originally scheduled to complete in June 2015, TECHEVAL was extended to mid-August 2015 because of reliability issues with several LCS-2 mission systems, as well as RMS.
        - Casualties to key LCS-2 systems, including 400-hertz power converters, diesel and gas turbine generators, boat davit, twin-boom extensible crane, and Mobicon straddle-lift carrier, resulted in interruptions to TECHEVAL that required LCS-2 to return to (or extend time in) port for repairs. Although these casualties were not directly attributable

to the MCM MP, all had a detrimental effect on the overall ability of LCS to conduct MCM operations.
    - RMS encountered 16 operational mission failures during this test, of which 14 involved the RMMV. These failures included five instances in which the RMMV could not be recovered onboard LCS-2 and support craft had to tow the RMMV back to port. These RMMV casualties required a significantly higher level of shore support and replacement RMMVs to complete TECHEVAL than originally planned. If not remedied, low RMMV reliability will prove detrimental during the upcoming IOT&E and in fleet operations. Until RMMV reliability is improved to a level that supports required MCM clearance rates, DASD(DT&E) is recommending that the MCM MP not proceed to IOT&E.
    - LCS program offices are developing mitigation plans to minimize low RMMV reliability on overall MCM MP performance; nevertheless, there is a high risk that the MCM MP/ LCS-2 IOT&E will fall short because of RMMV reliability.
  - Upgrades to AQS-20B (a preplanned product improvement) were delayed in early 2015 because of problems encountered during early Government testing. As a result, RMS supported the MCM MP TECHEVAL with the existing AQS-20A-9 sonar. These issues are to be addressed through upgrades to the RMMV and the AQS-20, which have completed development and are entering system-level testing. However, updated tactics have somewhat mitigated the primary shortcomings of the AQS-20A-9 sonar (false classification density and vertical localization).
  - As reported previously, fiber-optic cable issues remain present in AMNS. However, tactics changes have mitigated this issue until a permanent design change can be implemented.
  - Four increments are planned for the MCM MP. Future increments will bring new systems and/or improvements to existing MCM MP components, including beach-zone mine detection, near-surface mine neutralization, sustained influence minesweeping, and buried mine detection.
  - USS CORONADO (LCS-4), with the SUW Increment 2 MP embarked, conducted tracking and live-fire DT/TECHEVAL in July and August 2015. Tracking performance was nominal and often exceeded requirements for air and surface attacks. Firing results improved as gunners gained experience, targeting high-speed attack boats nearly always outside minimum range requirements. The integrated combat management system continues to be refined to improve accuracy and latency issues. One remaining problem area is the recovery of 11-meter rigid-hull inflatable boats following visit, board, search, and seizure operations, which at times averaged twice as long as required. MH-60R helicopter operations were highly effective, providing data and photos for reconnaissance, as well as executing early attacks against small-boat threats.
- Although RMMV version 4.2 demonstrated sufficient reliability growth to satisfy Nunn-McCurdy requirements in 2013, overall RMS performance and reliability issues persist with the current version 6.0 baseline. RMMV version 4.2 had a 75.3 hour (at 80 percent confidence) mean time between operational mission failures (MTBOMF) during contractor testing and early Government testing in 2013. Four RMMVs were upgraded to the version 6.0 configuration, which incorporated reliability improvements from the version 4.2 testing as well as launch and recovery improvements. RMMV version 6.0 reliability was evaluated during several RMS and MCM MP tests in FY 2015, with a resulting MTBOMF of 18.1 hours at 80 percent confidence. RMMV version 6.0 reliability is significantly below earlier version 4.2 estimates and adversely impacted the MCM MP area clearance rate sustained during TECHEVAL in April–August 2015.
  - The Chief of Naval Operations and the Assistant Secretary of the Navy for Research, Development, and Acquisition have commissioned an Independent Review Team (IRT) to

review RMS reliability and capability. This flag-level panel is focusing on RMS requirements, performance and reliability, reliability growth programs, future RMMV developments and improvements, and alternatives to RMS. The IRT results are expected in the 2nd quarter FY 2016.

- Cybersecurity Testing: Cybersecurity shortcomings in the Independence-variant TSCE and scheduling issues precluded the implementation of fixes and updates before the USS INDEPENDENCE seaframe TECHEVAL, the associated SUW MP TECHEVAL, or the MCM MP TECHEVAL in FY 2015. These updates are expected to be installed and tested in late 2015 and will be verified by a dedicated IOT&E onboard USS CORONADO in early 2016.
- DASD(DT&E) continues to engage with PEO LCS to ensure that test schedules are adequately spaced to allow analysis of test results before the next test phase. Also, DASD(DT&E) is working closely with LCS programs to ensure that cybersecurity testing is complete before entrance into seaframe and MM IOT&E events.
- The LCS program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

- DASD(DT&E) provided an assessment of the LCS family of programs in support of the USD(AT&L) annual in-progress review in April 2015. DASD(DT&E) assessed test results of testing to that point in time of each seaframe as well as MP.
- DASD(DT&E) noted several areas of concern, including compressed testing timelines, seaframe availability for testing, schedule-driven MP test schedules, cybersecurity testing, and the need for an updated TEMP.

Conclusion: LCS completed USS INDEPENDENCE seaframe DT&E, SUW Increment 2, and MCM MP Increment 1 DT in accordance with the approved TEMP in FY 2015. System reliability issues in the USS INDEPENDENCE seaframe and the MCM MP continue to present challenges to LCS and MM programs going forward. Obtaining LCS test assets remains a challenge in crafting a robust DT program during future MP testing.

Mobile User Objective System (MUOS)

Executive Summary: MUOS provides worldwide ultrahigh frequency (UHF) beyond line-of-sight tactical satellite communications (SATCOM) services to joint, allied, and coalition forces via mobile terminals. MUOS adapts the basic architecture of a commercial third-generation (3G) wideband code division multiple access (WCDMA) cellular phone system to military UHF SATCOM by using geosynchronous satellites in place of cell towers. MUOS will provide users with more than 10 times the system capacity of the current UHF capability and will also provide improved communications on the move (COTM), higher data rates, and access to the Defense Information System Network.

The MUOS program has two MUOS satellites on orbit, providing legacy UHF SATCOM support. MUOS-1 is on orbit over the Pacific Ocean and MUOS-2 is on orbit over the continental United States supporting UHF operations. MUOS-3 has completed on-orbit testing and is anticipated to provide UHF support by the 2nd quarter FY 2016. MUOS-4 was launched on September 2, 2015, and is now positioned for satellite on-orbit testing. MUOS-5 launch preparations remain on track for launch by May 2016.

Assigned with the overall responsibility to deliver a MUOS end-to-end (E2E) system capability, the program managed contractor completion of the E2E integration and test with the Army's AN/PRC-155 Manpack terminal, the first program-of-record terminal to use the MUOS WCDMA waveform. Basic WCDMA call functions and service types have been demonstrated. The program continues to isolate and resolve E2E performance issues related to integration of the waveform, ground system, and terminal software and configurations discovered from contractor testing, Government assessments, and formal Government system TECHEVAL. Concurrently, the program led the operational and integration working group, composed of all components and users of MUOS, to continue to refine the MUOS concept of operations and operational procedures that impact system reliability, availability, and maintainability.

Lead DT&E Organization: SSC PAC

Summary of FY 2015 DT&E Activities

- January 2015, the contractor completed E2E integration tests to characterize call completion rate for prioritized services.
- January 2015, the Government and contractor conducted Part 1 of the integrated scenario-based day-in-the-life (DITL) testing to characterize waveform maturity for formal Government test—TECHEVAL-2 and MOT&E-2. The program office selected operationally aligned scenarios and problematic scenarios derived from the initial capability assessment (ICA) conducted by the Government in September 2014.
- January 2015, MUOS-3 launched from Cape Canaveral, Florida.

- February 2015, the Government and contractor completed DITL Phase 2 testing.
- March 2015, the Government and contractor completed DITL Phase 3 testing and continued to find and fix integration issues before the formal Government system tests.
- March–May 2015, the Government conducted final capability assessment testing.
- April 2015, the contractor completed MUOS-3 on-orbit testing and operational handoff to the Navy.
- May 2015, the Government conducted a readiness review to proceed to TECHEVAL-2, which is the final system-level DT&E before MOT&E-2.
- June 2015, the Government-contractor completed the readiness review to ship MUOS-4 payload to Cape Canaveral, Florida, for integration and testing.
- June 2015, the Government completed TECHEVAL-2 testing with MUOS-capable terminals located at Fort Drum, New York; Fort Bragg, North Carolina; and Fort Lewis, Washington.
- July 2015, the contractors completed Phase 1 of IB015 regression testing to resolve 84 waveform issues that required 47 terminal reboots, with 13 waveform fatal errors.
- August 2015, the contractors completed Phase 2 of IB015 regression testing.
- September 2015, MUOS-4 launch. On-orbit testing was completed in October 2015.

Summary of FY 2015 DT&E Engagement and Assessments

- December 2014, DASD(DT&E) engaged in the exit review of contractor E2E testing demonstration of call completion improvements and functionality on first-priority services (point-to-point (P2P) voice, point-to-net (P2N), P2P data). DASD(DT&E) assessed that MUOS needs improvements in group services, COTM, and call completion reliability.
- January 2015, DASD(DT&E) observed DITL Part 1 from the Navy Communications Satellite Program Office (PMW 146) Joint Expeditionary Digital Information lab to validate call completion and data completion rates. Results were consistent with contractor E2E findings. Service stability and waveform/terminal performance improved from ICA.
- March 2015, DASD(DT&E) observed DITL Parts 2 and 3, which were similar to prior DITL testing, with new discoveries. Ground system stability issues impacted services. Once connected, the voice quality of calls was mostly excellent and data transfers were reliable. Mission flow was significantly impacted by radio reboot issues.
- May 2015, DASD(DT&E) assessed system readiness to proceed to formal Government E2E system TECHEVAL-2, with system technical risks associated with ground system stability and call reliability.
- June–July 2015, DASD(DT&E) observed TECHEVAL-2 testing. P2P and P2N call completion rates improved. However, group communications rates were much lower. Management of a dispersed ground system continues to prove challenging.
- August 2015, DASD(DT&E) reviewed and concurred in the program's request to reschedule geolocation requirement testing to FY 2017.
- September 2015, DASD(DT&E) engaged in preparations for the Navy PEO for Space Systems certification of MUOS readiness to proceed to MOT&E-2. DASD(DT&E) reviewed software updates to improve group services, reduce memory corruption, and improve call reliability and assessed readiness to proceed to MOT&E-2 with known risks.
- The MUOS program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: With an additional 12 months, the MUOS program completed its phased DT&E strategy outlined in the TEMP. The additional DITL testing and capability assessments allowed the program to extend integration of the MUOS waveform with a MUOS-capable terminal. The results

indicate improvements to WCDMA call functions and types, although WCDMA capability will need to continue to mature to allow fielding of MUOS-capable terminals and fully utilize MUOS capabilities.

MQ-4C Triton Unmanned Aircraft System (UAS)

Executive Summary: The MQ-4C Triton UAS provides persistent maritime intelligence, surveillance, and reconnaissance (ISR) as part of the Navy maritime patrol and reconnaissance family of systems.

The Triton UAS consists of the high-altitude, long-endurance MQ-4C Triton aircraft; sensor payloads; line-of-sight and beyond line-of-sight communications; a mission control station; and support elements. The MQ-4C aircraft design is based on the Air Force RQ-4B Global Hawk with modifications that strengthen the structure and provide a capability for limited flight in icing conditions. The MQ-4C is equipped with the multifunction active sensor (MFAS) maritime surveillance radar to detect, identify, and track surface targets and produce high-resolution imagery. Electro-optical and infrared (EO/IR) sensors provide full-motion video and still imagery of surface targets. Other sensors provide a capability to detect, identify, and locate threats and cooperative ships. The MQ-4C continued DT&E in 2015 with a focus on sensor integration and electromagnetic emissions testing.

Lead DT&E Organization: NAWCAD VX-20

Summary of FY 2015 DT&E Activities

- Sensor integration initial flight testing was completed, with 23 flights conducted for 121 flight hours in FY 2015.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) engaged with the Triton UAS program to assess DT&E and program progress and support T&E strategy updates ahead of a planned FY 2016 production decision.
- Initial safety-of-flight and flight envelope expansion testing has been completed, and the results indicate a nominal level of aircraft maturity for this early stage of DT&E. The ferry flight of the second test aircraft to Naval Air Station Patuxent River, Maryland, was accomplished in October 2014, and the third in December 2014. Three of the five developmental test aircraft are now at the primary flight test location.
- Development of baseline performance is progressing slower than planned, and schedule risk to completion remains high because of delays in delivering system capabilities for T&E. Full baseline capability was originally scheduled to begin flight testing in FY 2014, and the latest schedule indicates the start will be in FY 2017. Flight test progress to date is slower than planned in the TEMP because of routine issues discovered in flight test and sensor integration issues.
- Sensor testing has begun with limited results in FY 2015 because of system stability issues with both the MFAS radar and EO/IR system.
- Electromagnetic effects ground testing was completed on the third test aircraft, enabling removal of restrictions for normal flight operations at Patuxent River, Maryland, and gaining knowledge for continued development of sense-and-avoid and multi-intelligence capabilities on Triton.

- The program has established a significant development and test capability for system interoperability, using actual components and test networking capabilities.
- The MQ-4C Triton program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The MQ-4C Triton is in the early stage of DT&E with results indicating a medium risk for ISR technical performance at this time.

Multi-Mission Maritime Aircraft (P-8A Poseidon)

Executive Summary: The P-8A is a derivative of existing Boeing aircraft with design changes to support the Navy's maritime patrol mission. The P-8A is designed to have sufficient cabin volume, load-carrying capacity, attendant electrical power, and environmental control to accommodate six tactical aircrew and five workstations. The test program has been structured to address the balance necessary between a modified commercial aircraft variant and military mission systems. The baseline P-8A is structured to be a replacement for the aging P-3C, while planned increments address expanding its role to broader-area antisubmarine warfare (ASW) and high-altitude antisubmarine warfare (HAASW) weapon capability.

The P-8A completed its first phase of DT&E to address basic P-3C replacement in August 2012 and was approved for FRP on January 3, 2014.

Lead DT&E Organization: NAWCAD VX-20

Summary of FY 2015 DT&E Activities

- The program completed Increment 2, Engineering Change Proposal (ECP) 1 DT&E, which concentrated on the initial multi-static active coherent (MAC) ASW capability.
  - Matching the DT&E test team assessment, the Commander, Operational Test and Evaluation Force follow-on operational test and evaluation found the system effective and suitable.
- Increment 2, ECP 2 testing began, including the next preplanned MAC capability release, the automatic identification system, acoustic system updates, and HAASW sensors.
- The program conducted DT&E for the electronic warfare self-protection system; quick reaction capability modifications; the low-cost acoustic processor system; GPS drop vector algorithm development to support HAASW; the fleet urgent operational need Project 360, Phase I; and captive carry and safe separation of an interim search and rescue kit from the weapons bay.

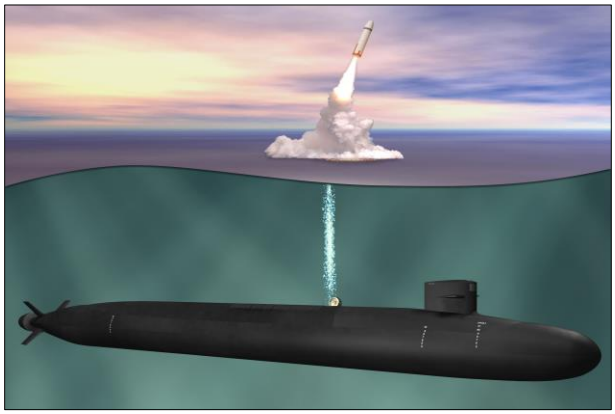
Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) engaged in numerous data assessments with the Navy to support increment testing with no restrictions to data access.
- DASD(DT&E) worked with the program to build a draft Increment 3 TEMP, including a DEF.
- The program's technology and test plans for Increment 3 now include two blocks of testing; the first adds specific additional capabilities as available, and the second installs an open-architecture, service-oriented extension to the baseline tactical open mission software architecture, which will enable net-ready processing and more rapid future capability insertion, as well as improve sustainment. DASD(DT&E) believes that the Navy's approach is sound and mitigates the appropriate risks with deliberate actions.

- DASD(DT&E) provided informal assessments and recommendations at key test junctures.
- The P-8A program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The P-8A program continues to build, test, and field incremental capabilities to the fleet. The Navy closes prioritized open discrepancies discovered in prior testing in conjunction with ongoing testing. The program is assessed as low risk in working toward Increment 3.

OHIO-Class Submarine Replacement (OHIO Replacement)



Executive Summary: The OHIO Replacement (OR) program is the follow-on fleet ballistic missile submarine (SSBN) class of submarines designed to replace the OHIO-class SSBN and deploy the existing Trident II D5 life-extended submarine-launched ballistic missile. The OR program is a pre-MDAP. The OHIO-class SSBN fleet of 14 submarines will retire at the rate of one per year beginning in FY 2027, and the OR-class submarine will reach initial operational capability and conduct its first patrol in the 1st quarter FY 2031.

The mission of the OR-class SSBN force is to maintain an appropriate state of readiness to assist in deterring nuclear attack on the United States and its allies. The OR-class SSBN force of 12 submarines will provide a survivable sea-based strategic deterrent in the 2030 to 2080 time frame. The OR-class SSBN must be capable of launching missiles against preplanned or adaptively planned targets. It does not have a requirement for other missions or capabilities unrelated to survivable strategic nuclear deterrence.

In June 2015, the PM position was changed from a civilian SES Program Director to a Navy Captain.

The Joint Requirements Oversight Council (JROC) approved the Capability Development Document (CDD) for the OHIO-Class Replacement Submarine in August 2015. The CDD incorporates recommendations from the OR Early Operational Assessment OT-A1 completed in January 2014.

The United Kingdom (UK) is replacing its SSBN force in conjunction with the OR program. The OR program is leading a collaborative program to design a common missile compartment (CMC) for U.S. and UK SSBNs. The primary risk mitigation for this effort includes the Surface Launch Test Facility under construction at China Lake, California, and the Strategic Weapons System (SWS) Ashore Test Facility under construction at Cape Canaveral, Florida. These test facilities are scheduled to be operational in FY 2017 and FY 2020, respectively.

The USD(AT&L) approved the OR Acquisition Strategy in January 2016 to build 12 submarines in three block procurements of two, three, and seven. The first procurement buys long-lead materials with advanced procurement in FY 2019, the lead ship in FY 2021, and the second ship in FY 2024. This strategy is coordinated with the VIRGINIA-class Acquisition Strategy to align shipbuilding across the nuclear submarine shipbuilding enterprise.

The Navy utilizes a Flag Oversight Committee/Steering Group that meets monthly to provide executive oversight and coordination for the program.

Lead DT&E Organization: PMS 397

Summary of FY 2015 DT&E Activities

- The program continued shaft and propulsor bearing testing at the Naval Research Laboratory Center for Corrosion Science and Engineering located at the Marine Corrosion Facility, Key West, Florida.
- The program office issued a contract to procure the first 17 missile tubes in October 2014 to support building the U.S. first article CMC quad pack (four missile tubes), build the UK first CMC (12 missile tubes), and provide a missile tube for the SWS Ashore Test Facility.
- In January 2015, the program conducted the systems requirements review (SRR).
- In January 2015, the program office established the OR Cybersecurity Technical Advisory Board to advise the ship design manager on whole boat cybersecurity risks, issues, and concerns and oversee implementation and accreditation efforts. The OR Program Cybersecurity Strategy was approved in November 2015 to support the Development RFP Release DAB in December 2015.
- In February 2015, the program office completed the USD(AT&L) annual In-Process Review (IPR) DAB and obtained acquisition document tailoring approval for the Development RFP Release Decision Point DAB and MS B DAB in FY 2016.
- In May 2015, the PM approved the contractor and Government Reliability, Availability, and Maintainability (RAM) Program Plans (RAMPPs). OR RAM critical and reliability growth items will not be available in time to support the OR TEMP completion.
- In June 2015, the PM approved the Technology Development Plan (TDP) Version 4.
- In August 2015, the program completed the Ship Control System (SCS) Concept of Operations Exercise (COOPEX) Phase II. The SCS COOPEX supports verification of OR's SWS Support Strategic Missile Launch KPP and the design of the SCS human-machine interface using a simulated environment to test operational concepts, hardware, arrangements, and operator loading during normal, manual, and casualty conditions.
- In August 2015, the JROC approved the CDD for the OHIO-Class Replacement Submarine.
- In September 2015, Electric Boat occupied and started installing pressure hull and framing fixtures into the new CMC Quad Pack Manufacturing Facility at Quonset Point, Rhode Island.
- In October 2015, the Navy completed the technology readiness assessment (TRA) and forwarded it to ASD(R&E) to support the Development RFP Release DAB and MS B.
- In November 2015, the Navy conducted a Gate 4 review and approved the OR technical baseline. The program office demonstrated readiness and the programmatic measures necessary for controlling the OR technical baseline and reviewed OR program health to meet the U.S. Strategic Command's requirement for the first OR strategic deterrent patrol in FY 2031.
- In December 2015, the program office completed the USD(AT&L) annual IPR along with the Development RFP Release Decision Point DAB. The Navy was granted authority by the USD(AT&L) to release the Integrated Product and Process Development Detailed Design RFP to the prime contractor, General Dynamics Electric Boat, and anticipates awarding the contract by the end of September 2016.
- SSP continued construction of the SWS Ashore Test Facility in Cape Canaveral, Florida, and is on schedule to commence testing of test bay #1 in FY 2016.
- The program continued free-running model testing, captive model testing, and rotating arm testing at the Naval Surface Warfare Center, Carderock Division (NSWCCD) to support evaluation and final down-selection of OR X-stern and fairwater control surface configurations.
- The program continued resistance and powering tow tank testing at NSWCCD to measure OR total ship resistance, support revolutions per minute and torque predictions, and provide propulsor data to enable detailed design and production of the first OR propulsor configurations being tested at the NSWCCD Acoustic Research Detachment (ARD), Bayview, Idaho.

- The program commenced Very Large Test Apparatus propulsor testing at the Pennsylvania State University Applied Research Laboratory Garfield Thomas Water Tunnel, State College, Pennsylvania. Test data informs propulsor configurations that will be tested at the ARD, Bayview, Idaho.

Summary of FY 2015 DT&E Engagement and Assessments

- In May 2015, DASD(DT&E) participated in the first OR Program Office Acquisition WIPT and expressed concern about the Navy's strategy to develop the TEMP without OSD T&E stakeholders' involvement. The USD(AT&L) RFP Release DAB ADM directed that the draft TEMP be provided to OSD T&E stakeholders by January 30, 2016. DASD(DT&E) is reviewing the TEMP.
- In July and August 2015, the program conducted Phase II of the SCS COOPEX discussed above. Draft results were reported at the October 2015 T&E WIPT, with a Government-approved report expected in the 2nd quarter FY 2016. COOPEX Phase III is scheduled for the 3rd quarter FY 2016.
- In September 2015, DASD(DT&E), in conjunction with the Deputy Assistant Secretary of Defense for Systems Engineering and DOT&E, toured the Electric Boat (OR design contractor) manufacturing, integration, and test facilities in Groton, Connecticut, and Quonset Point, Rhode Island. Briefings were provided on Navy and contractor collaboration for the planning, design, and potential manufacturing of both VIRGINIA- and OR-class submarines.
- On October 15, 2015, the OR T&E WIPT met and provided a high-level review of the OR program focused on Technology Maturation and Risk Reduction (TMRR) efforts, T&E planning, and T&E-related MS B acquisition documents.
- In October 2015, the Navy completed the TRA and forwarded it to ASD(R&E). The Navy identified two critical technologies. The Navy also identified engineering and integration risks, manufacturing risks, a process risk, and a sustainment risk. DASD(DT&E) is assessing the critical technologies and monitoring the risks. DASD(DT&E) will document its OR assessment in the 3rd quarter FY 2016 to support MS B in August 2016.
- In December 2015, the PM initiated periodic status meetings with the T&E oversight community.
- In 2015, the program office completed the propulsor quick-disconnect duct (QDD) quarter-segment full-scale prototype fabrication that supports the full-scale QDD demonstration. The program office also completed the propulsor tapered rotor inner hub manufacturing demonstration.
- The program office continues to conduct classified TMRR-related DT events as outlined in the OR TDP Version 4 and presented at OR T&E WIPTs.
- The program office will return to conducting OR T&E WIPTs and/or smaller engagements with OSD T&E stakeholders at more frequent intervals with a goal of meeting at least every 6 months.
- DASD(DT&E) reviewed and commented on the following additional OR documents that anchor the program and support MS B: CDD for the OHIO-Class Replacement Submarine, OR RAMPP Revision 1, Integrated Evaluation Framework, SRR Report, TDP Version 4, OR Acquisition Strategy, Cybersecurity Strategy, Program Protection Plan, Systems Engineering Plan, Life Cycle Sustainment Plan, and Live-Fire Test and Evaluation Management Plan. Comments are being adjudicated and the documents were found to be adequate for MS B.
- The OR program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The OR program is on track to complete the TMRR phase of acquisition and support MS B in August 2016. The OR program has two critical technologies and manageable technical and schedule risks that are being closely managed by senior Navy leadership.

Presidential Helicopter Fleet Replacement (VH-92A)

Executive Summary: The Navy is acquiring the presidential helicopter fleet replacement (VH-92A) helicopter to support the needs of the White House Military Office; Marine Helicopter Squadron One (HMX-1) will exclusively operate the VH-92A. The primary mission is as an executive lift platform and the secondary mission is to support contingency operations. The VH-92A is a customized version of the commercial Sikorsky S-92 that incorporates vertical lift, survivability, and command and control communications technologies. The system includes a comprehensive and secure communications capability needed by the President and operates across a wide array of environments.

The VH-92A program entered EMD in April 2014 and awarded the contract to Sikorsky Aircraft Corporation soon after. The majority of aircraft customization and Federal Aviation Administration certification is the responsibility of Sikorsky; however, the development of the communications suite, the mission communications system (MCS), is the responsibility of the Government, with Sikorsky responsible for its integration. The program strategy is to complete the MCS subsystem before integration activity by Sikorsky. The MCS critical design review (CDR) was completed in January 2014, with ongoing development and testing of this subsystem. In December 2014, the first aircraft test article, Engineering Development Model (EDM)-0, was delivered for risk reduction testing. EDM-0 testing commenced in January 2015 and was completed in September 2015. The VH-92A system-level preliminary design review (PDR) was held in August 2015.

Lead DT&E Organization: NAWCAD HX-21

Summary of FY 2015 DT&E Activities

- October 1, 2014–September 30, 2015, the ground testing in the system integration lab (SIL) for the Government-developed MCS was conducted at St. Inigoes, Maryland, to mature the communications and monitoring software and the narrowband radio control software.
- November 11, 2014–September 30, 2015, VH-92A program engineering and T&E experts worked with the MITRE Corporation to develop a cybersecurity risk assessment and a cyber T&E approach.
- December 2014, EDM-0, the first aircraft test article, was delivered from the factory to Sikorsky for modifications preceding risk reduction testing.
- December 15, 2014–September 29, 2015, a combined Lockheed Martin and Sikorsky team conducted contractor-led risk reduction ground and flight testing using EDM-0 at Lockheed Martin, Owego, New York. The Government test team observed/monitored test activities and received test results. The activities included collection of data to validate radio frequency and co-site antenna modeling; aero performance data collection to validate aerodynamic drag modeling, and ballasted gross weight testing for active vibration control software updates; and

data collection to inform the PDR, such as two-engine and quick engine starts, and auxiliary power unit noise acoustic scorecard and safety.
- June 23, 2015, the DASD(DT&E) approved the VH-92A TEMP, which satisfied the MS B Acquisition Decision Memorandum requirement for an updated TEMP.

Summary of FY 2015 DT&E Engagement and Assessments
- The TEMP approval memorandum, signed by the DASD(DT&E) in June 2015, emphasized further refinement of the cybersecurity strategy, by defining the requirements and T&E planning to impact system design at the earliest possible time. The program is proactive in its cybersecurity approach. However, the margin to achieve maximum impact on system design and testing is closing fast—the CDR is scheduled for July 2016.
- The system-level PDR was held in August 2015, and the DASD(DT&E) assessed the system to be on target with its design and testing plans for a low-risk decision at MS C.
- The risk reduction ground and flight testing on EDM-0 was rigorous and sufficient in its execution to collect data and improve the system design and models. There were a few discoveries during testing that impacted antenna design and placement. The full icing recertification testing was canceled in favor of a certification by analysis of previous testing data on similar systems and the collection of new airflow data and analysis; this is a reasonable approach.
- The MCS subsystem development and testing are behind schedule and have impacted early planned system integration and testing efforts; however, the overall program effort has not been impacted. The program has adjusted testing and integration efforts to accommodate the delays; however, this remains a risk to the program. The planned MCS risk reduction testing using an HX-21 surrogate helicopter was canceled in lieu of earlier SIL build and testing. Additionally, cybersecurity efforts will involve the VH-92A system as assessed in the aforementioned MITRE cybersecurity risk assessment.
- The VH-92A program office did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The VH-92A was approved for acquisition as a low-risk approach to achieving mission capability. Overall, the risk remains low. Key risk areas for the program moving forward are in MCS development and integration and cybersecurity implementation and testing.

Trident II Life Extension (D5LE)

Executive Summary: The Trident II missile is a D5 ballistic missile launched from OHIO-class strategic submarines (SSBNs). The D5 missile is capable of delivering nuclear warheads in the event the Nation fails to deter nuclear war. Because D5 is a highly reliable and accurate missile, the U.S. Navy decided to use it on the OHIO Replacement submarines rather than to design a new missile. To accomplish this, the guidance systems, command sequencer, and electronics of the missile inventory must be modified to extend their life.

The Strategic Systems Programs (SSP) Office is procuring 108 new U.S. D5 missiles and D5LE Strategic Programs Alteration (SPALT) kits in FY 2011–FY 2015, and deliveries will be completed by FY 2019. In addition, SPALT kits for converting the existing D5 inventory to D5LE (269 U.S. missiles and 47 United Kingdom missiles), as well as spare SPALT kits, are being procured in FY 2016–FY 2023. Pending successful completion of the D5LE SPALT Development Program, the first D5LE missiles will be deployed in FY 2017. Conversion of the entire U.S. Fleet to D5LE missiles will complete in FY 2024.

Lead DT&E Organization: SSP

Summary of FY 2015 DT&E Activities

- SSP uses a comprehensive layered DT approach. Piece parts and components undergo performance and environmental testing, and manufacturing processes are validated. Subsystems undergo design and performance verification testing. Subsystems are assembled into packages and go through package qualification and package acceptance testing, while assembly processes are validated and margins and limits are measured and verified. System verification testing and integration testing are conducted in the simulation lab with hardware in the loop. Lastly, operationally realistic flight tests are conducted to validate that the upgraded missiles perform with the same level of reliability and accuracy as the D5 missiles.
- In 2015, the second two D5LE test missiles were successfully launched to verify that the alterations function as designed.

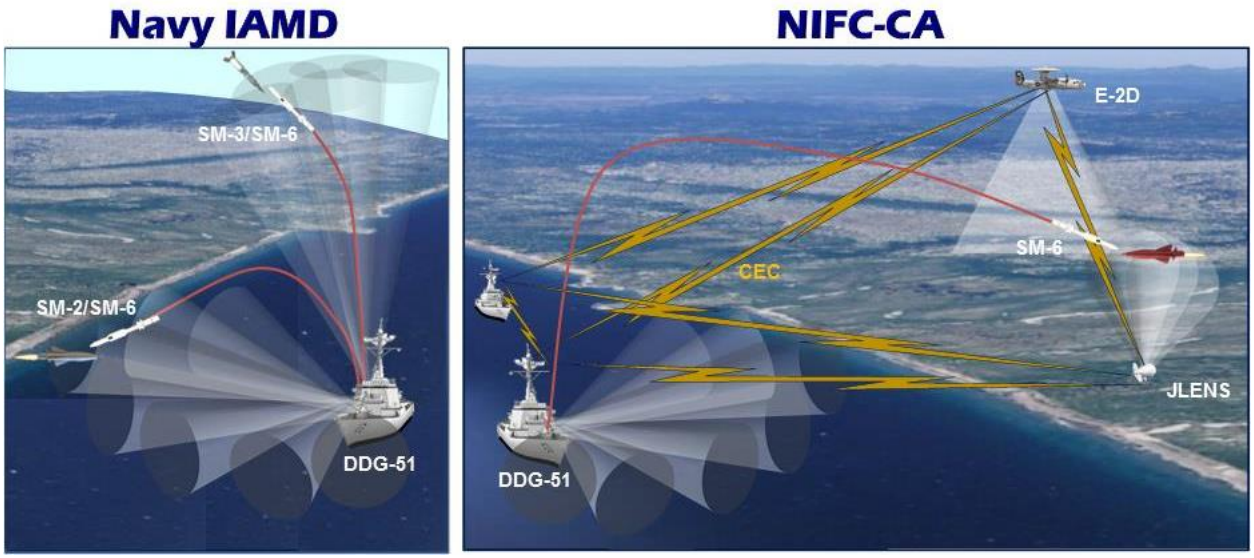
Summary of FY 2015 DT&E Engagement and Assessments

- Reliability testing is an integral part of piece part and package acceptance testing, lab testing, and flight testing. DASD(DT&E) reviewed FY 2015 test results and determined that reliability and performance met requirements.
- DASD(DT&E) will continue to work with SSP to review future test results, as they become available, to enable DASD(DT&E) to verify that missile performance and reliability are being maintained.
- The Trident II D5LE program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: To date, test results of D5LE reliability indicate that the D5LE missiles will meet the reliability requirement.

U.S. Navy Integrated Air and Missile Defense (IAMD) and Naval Integrated Fire Control–Counter Air (NIFC-CA) Capabilities

A mission context assessment of several Navy programs that, once integrated, provide two different synergistic sets of capabilities: IAMD and NIFC-CA. These system-of-systems (SoS) programs include Air and Missile Defense Radar (AMDR), DDG-51 Flight III Destroyer, Aegis Modernization, Cooperative Engagement Capability (CEC), and Standard Missile-6 (SM-6).



Executive Summary: The Navy's primary mission of delivering credible capability for deterrence, sea control, and power projection to prevent or contain conflict and fight and win wars is enabled by the surface Navy's IAMD and NIFC-CA capabilities. These two capabilities, made possible by a group of systems that are being developed or modernized, will be addressed both in the context of mission engineering and in the context of the individual programs. IAMD is the centerpiece of the Aegis Modernization combat system (CS) program upgrade, which is a significant improvement to Aegis. With this capability, Navy DDGs that are upgraded to the new Aegis Baseline (BL) 9 will be able to conduct ballistic missile defense (BMD) and antiair warfare (AAW) engagements simultaneously. The NIFC-CA from-the-sea (FTS) surface-to-air engage-on-remote (EOR) capability draws upon the combined capabilities from three surface Navy programs (DDG-51 with its Aegis Advanced Capability Build (ACB), CEC, and SM-6); a joint program, Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System; and one aircraft program, E-2D Advanced Hawkeye (AHE). The current plan for the full SoS testing is integrated under a NIFC-CA enterprise, which is controlled by the PEO for Integrated Warfare Systems (IWS) 7.0 and supported by the individual programs. NIFC-CA from-the-air (FTA) air-to-air EOR capability draws upon the capabilities of the F/A-18E/F, advanced medium-range air-to-air missile (AMRAAM), multifunctional information distribution system (MIDS), and the E-2D. PMA-298 manages the FTA program, but the SoS testing is primarily conducted as part of the individual test programs.

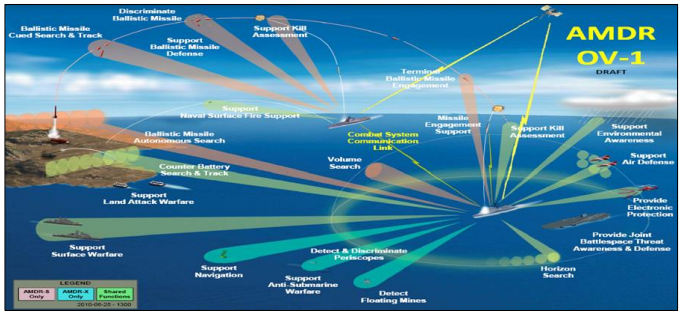
The Navy is upgrading the DDG-51 to the Flight III configuration with delivery in 2022. The new AMDR, which the Navy is developing specifically for BMD and advanced threats, will be employed on the Flight III. When integrated with other new and modernized systems, AMDR will provide the Flight III with an increase in IAMD capability.

Each of the individual programs and their test plans/results that are integrated into the IAMD and NIFC-CA capabilities are discussed below.

DDG-51 Flight III Destroyer

The ARLEIGH BURKE (DDG-51)-class ship is a multi-mission surface combatant capable of simultaneously engaging antiair, antisurface, and antisubmarine warfare threats while performing strike operations. DDG-51–class ships operate offensively and defensively as part of a carrier strike group, surface action group, amphibious task force, and underway replenishment group. The Navy is currently building the Flight IIA configuration (DDG-79 through DDG-123) with the SPY-1D(V) radar, and starting with the second ship of the FY 2016 procurement, a new configuration, Flight III, will include cooling and power upgrades to support the new AMDR. DASD(DT&E) is primarily focused on development and testing of the new Flight III variant.

Lead DT&E Organization: NSWC PHD



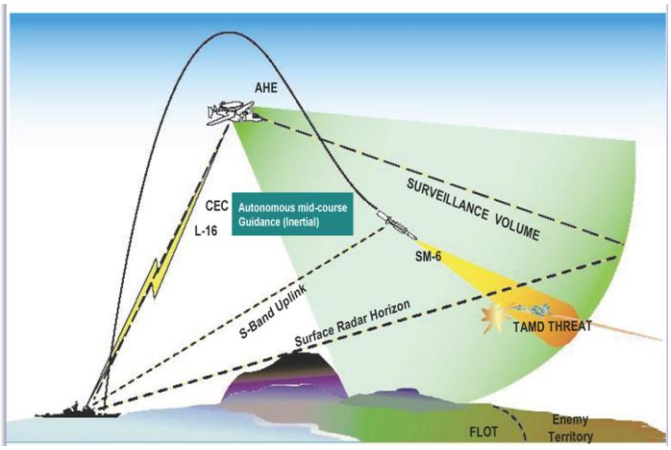
Air and Missile Defense Radar

AMDR is the Navy's next-generation radar system that will address current and future BMD and air defense (AD) challenges. The AMDR suite consists of an S-band radar (AMDR-S), an X-band radar, and a radar suite controller. AMDR-S is a new development IAMD radar providing added sensitivity for long-range detection and engagement of advanced threats. The initial X-band radar for the AMDR suite for ship sets 1–12 is a horizon-search radar based on existing technology, the AN/SPQ-9B X-band radar. AMDR will require no new development efforts for the AN/SPQ-9B and will accept the AN/SPQ-9B existing performance and logistics infrastructure. Starting with the 13th ship set, the Navy intends to develop and integrate a future X-band sensor into the AMDR suite.

Lead DT&E Organization: AMDR Cross-Product Team

NIFC-CA

The NIFC-CA project was placed on the DASD(DT&E) oversight list because it plays a unique role in integrating surface-to-air (Aegis Modernization ACB, CEC, E-2D, and SM-6) and air-to-air (F/A-18E/F, MIDS, E-2D, and AMRAAM) programs into a superior integrated SoS operational concept that allows integrated engagements. The focus of the NIFC-CA test program needs to ensure that the NIFC-CA SoS test programs



are adequately integrated, coordinated, and resourced.

Lead DT&E Organization for FTS Capability: PEO IWS 7
Lead DT&E Organization for FTA Capability: PMA-298

Aegis Modernization

The Aegis Modernization program consists of successive ACB upgrades to the Aegis Weapon System Mk 7, which is the automated segment of the Aegis Combat System (ACS). These upgrades are developed on an approximate 4-year cycle with ACB 12 conducting testing in 2012, ACB 16 in 2016, and ACB 20 in 2020. The ACB 12 upgrade, called Aegis BL 9 when integrated aboard an Aegis ship, provides Aegis DDGs with a comprehensive AAW and BMD mission modernization of their CS between 2013 and 2015. The Navy is also installing BL 9 on some USS TICONDEROGA (CG-47)-class cruisers and Flight I USS ARLEIGH BURKE (DDG-51) destroyers. New-construction DDGs, beginning with USS JOHN FINN (DDG-113), will also be delivered with BL 9.

Lead DT&E Organization: NSWC PHD

Cooperative Engagement Capability

CEC provides a sensor network that supports integrated tracking and improved situational awareness and results in a distributed and integrated AD weapon SoS among cooperating units such as Aegis CGs and DDGs, CVNs, LHAs, LHDs, and LPDs, and E-2C and E-2D aircraft. CEC provides the means to share sensor and weapons data among individual ships in a closely coordinated and cooperative manner to counter increasingly capable and less-detectable cruise missiles. CEC has multiple configurations including shipboard and airborne configurations. The shipboard version (AN/USG-2B) is being concurrently upgraded with the Aegis Modernization effort with testing on BL 9 currently ongoing. The airborne version (AN/USG-3B) is currently being upgraded and tested as part of the E-2D AHE upgrade effort. CEC is the data fusion tool for FTS, whereas MIDS performs that function for FTA.

Lead DT&E Organization: NSWC PHD

Standard Missile-6

SM-6 combines the tested legacy of the SM-2 propulsion and ordnance with a repackaged AMRAAM active seeker, allowing for enhanced performance at extended ranges. The SM-6 Block I missile increases the battlespace using its autonomous active seeker mode either with Aegis in a stand-alone configuration or beyond the horizon with a CEC configuration. When the firing ship is employed with NIFC-CA, SM-6 Block I will provide extended-range AAW defense to the full extent of the missile's kinematic limit both above and below the radar horizon. The program is conducting a series of FOT&E tests into 2016 and testing the SM-6 Block IA configuration.

Lead DT&E Organization: NSWC PHD

Summary of FY 2015 DT&E Activities

IAMD Mission Capability

- The Navy's IAMD capability is addressed in a mission context by employing DDG-51 ships, Aegis BL 9, CEC, MDA's BMDS, and SM-6 and SM-3 missiles to simultaneously engage BMD and AAW targets.
- An MDA-executed test using Aegis BL 9 and concurrent engagements with SM-2 and SM-3 missiles in an IAMD mode was planned for FY 2015. The Navy planned to use this test to satisfy Aegis Modernization IAMD requirements.
    - An additional IAMD test was planned using live BMD targets and simulated AAW targets during an MDA test in February 2015. The Navy planned to use this test to satisfy Aegis Modernization IAMD requirements.

NIFC-CA Mission Capability

- The Navy's NIFC-CA capability is addressed in a mission context by employing DDG-51 ships, Aegis BL 9, CEC, SM-6 missiles, and an E-2 aircraft to conduct an integrated engagement.
- The Navy continued FTS testing with planned live-fire missions on a 9-month interval to progressively present more challenging scenarios to assess the NIFC-CA battlespace.
- The Navy's plan for FTA emphasizes pillar T&E, which will focus on their specific capability contributions to NIFC-CA FTA as defined in the pillar program TEMPs and requirements. PMA-298 will leverage the results of individual pillar program tests to perform an end-to-end evaluation of NIFC-CA FTA as an SoS capability against the requirements in the Navy Integrating Capability Concept and operational utility for each mission thread contained in the concept of employment.

DDG-51 Flight III Destroyer

- DDG-51 Flight III first ship DT is scheduled to begin in 2021.
- Planning for DDG-51 integrated system testing using Aegis ACB 20 and AMDR has begun.
- The program plans to conduct early CS integration and testing (I&T) as part of the AMDR DT at the Pacific Missile Range Facility (PMRF), Hawaii, in FY 2017.
- The TEMP for Flight III will be integrated into the Aegis Modernization ACB 20 TEMP with an early version expected in 2016.

Air and Missile Defense Radar

- AMDR entered into the EMD phase in early 2014, and early DT was scheduled during FY 2015.
- The Navy had proposed conducting an early operational assessment (EOA) in early 2015 for the AMDR program to gain some early operator feedback on the radar design to inform the critical design review (CDR). The Navy now intends to execute this EOA-like event as a DT assist.

Aegis Modernization

- Aegis Modernization conducted a series of DT phases (DT-B2P through DT-B2R) at sea throughout 2015 aboard CG-59, DDG-65, DDG-52, and DDG-51 representing the various BL configurations to evaluate system performance against the requirements in the Naval Capabilities Document.
- The Aegis Modernization program is expected to submit two different TEMPs in 2016. The ACB 16 TEMP will cover the next upgrade to the Aegis BL and will cover testing through 2022 using Aegis Builds 24, 27, and 30 on CGs and DDGs. An ACB 20 TEMP is also being drafted that will further evolve infrastructure, development, and resourcing of the expected high-fidelity M&S needed for ACB 20/DDG-51 Flight III testing. An early version of this TEMP is intended for the DDG-51 Flight III In-Process Review (IPR) DAB in 2016. The final version will include DDG-51 Flight III hull, mechanical, and electrical (HM&E) testing and cover testing of Aegis ACB 20 Build 36.

Cooperative Engagement Capability

- CEC continued the DT-D1 phase of testing (formally DT-IIIE-1) into 2015 to assess the integration and interoperability between CEC and Aegis BL 9 as well as across all configurations of CEC.
- CEC continued the early phase of DT-D2 testing consisting of land-based test site (LBTS) testing with AN/USG-2B and CEC BL 2.1.10 and Ship Self-Defense System Mk2 MOD6C as part of CVN 78 testing.

Standard Missile-6

- SM-6 Block IA continued testing with one guided test vehicle (GTV) flight test at White Sands Missile Range (WSMR), New Mexico, in November 2014.
- SM-6 planned for four of its FOT&E live-fire events (DT-D1G/H/I) in 2015.
- SM-6 plans to conduct the final four of its 10 FOT&E live-fire events (DT-D1A/B/D/Ga) in 2016.

Summary of FY 2015 DT&E Engagement and Assessments

IAMD Mission Capability

- In conjunction with MDA test Flight Test Standard Missile (FTM)-25 in November 2014, the Navy successfully engaged two AAW threats with SM-2 while simultaneously engaging one BMD threat with SM-3 in IAMD mode. Data from these events were used to satisfy Aegis Modernization IAMD verification, validation, and accreditation (VV&A) requirements.
- In February 2015, the Navy successfully conducted IAMD testing with Aegis BL 9 at sea with simultaneous live BMD and simulated AAW targets during MDA test Flight Test Other (FTX)-19 on DDG-52 firing simulated SM-3, SM-2, and SM-6 missiles and Evolved Sea Sparrow Missiles (ESSMs). Test results were used to add to the Aegis Modernization IAMD VV&A effort.

NIFC-CA Mission Capability

- In February 2015, the Navy successfully conducted two NIFC-CA live-fire events at PMRF.
- During testing at WSMR in June 2015, NIFC-CA demonstrated a successful end-to-end FTS engagement in an overland environment against a threat with increased speed.
- As agreed to by DASD(DT&E) and Navy leadership, the NIFC-CA FTS testing strategy, which was approved by PEO IWS in September 2012, will cover NIFC-CA Increment 1 testing through 2018. An OSD-approved TEMP will document all Increment 2 testing.
- The NIFC-CA FTA component is preparing a Test and Evaluation Strategy to supplement the FTA testing currently addressed in each of the FTA pillar TEMPs.

DDG-51 Flight III Destroyer

- The DDG-51 Flight III program will conduct a DAB IPR in early 2016 to review the readiness of the program to proceed with construction of Flight III ships.
- The Navy is required to provide an addendum to the TEMP with test planning and updated resource requirements before the FY 2016 DAB review. The Navy intends to update the Aegis Modernization TEMP as a starting point for the Flight III TEMP. This approach will require the DDG-51 Flight III TEMP to include HM&E systems in addition to the ACB 20 test plan.
- DDG 51 Flight III T&E has a few potentially significant issues, which need to be addressed and resolved well before actual SoS testing begins in 2021.
    - The Deputy Secretary of Defense validated the requirement for an upgraded Self-Defense Test Ship (SDTS) to conduct live engagements in the near self-defense region to verify and validate the proposed end-to-end M&S. A study was conducted through 2015 to assess the costs of alternative approaches, and DOT&E and the Navy are to agree on a mutually agreeable alternative that will be included in the FY 2017 budget process.
    - The overall impact of the design compromises made to fit the AMDR into the DDG-51 seaframe cannot be fully assessed until the full SoS is tested in an end-to-end integrated test (IT) at sea. That testing, by the nature of the development timelines, is concurrent testing and will not take place until 73 percent of the AMDRs are already purchased, the ACB 20 CS development is complete, and at least 10 Flight III ships are on contract. This concurrency will be mitigated somewhat by the integrated testing of ACB 20 and the radar at Wallops Island, Virginia, before at-sea testing, but full end-to-end testing of the radar powered and cooled by ship systems integrated with the final CS will not take place until the first delivered platform is delivered in 2022.
- Early CS I&T scheduled to be conducted during AMDR DT in FY 2017, by the nature of the CS development timeline, will not include direct ACB 20 functionality and will be primarily based on the current Aegis BL 9 CS. This plan induces risk because the final CS build will not be available until the first delivered platform is delivered in 2022. Additionally, the first three ships will be configured with ACB 20 Phase 0 incorporating Technical Insertion (TI) 16 equipment and are part of the current multiyear DDG procurement. The follow-on ships will be part of the new multiyear procurement and will have ACB 20 Phase 1 TI 20 equipment.

Air and Missile Defense Radar (AN/SPY-6)

- AMDR conducted its CDR in April 2015 and began component testing at the contractor facilities in late FY 2015.
- AMDR was directed by the AMDR MS B ADM to undertake risk reduction efforts for the AMDR integration with a representative CS in support of the LRIP decision.
- A CS integration test (CIT) will be conducted in the 2nd and 3rd quarters FY 2017 at the Combat System Engineering Agent, Moorestown, New Jersey, LBTS facility. This configuration will be

an opportunity for Aegis to interact with the tactical AMDR back-end equipment and CEC equipment. An AMDR emulator consisting of the AMDR tactical back-end will be connected via the Aegis local area network interconnect system to the CS interface support equipment.

- A second CIT will be conducted during the 4th quarter FY 2017 at the advanced radar detection laboratory facility at PMRF with the AMDR engineering developmental model (EDM) array and CEC equipment. The primary objective of the CIT events is to demonstrate proof of concept that AMDR can functionally interface with a representative ACS and reduce risks to ACB 20 development.
- DT during the EMD phase is progressing because the DASD(DT&E) signed the TEMP for testing prior to MS C. DASD(DT&E) agrees with DOT&E that the current TEMP does not provide an adequate M&S and at-sea testing approach for testing AMDR as part of the DDG-51 Flight III SoS post-AMDR MS C. As directed in the March 2014 Resource Management Decision (RMD) for the FY 2015 Budget Request (RMD 700A1), the Navy, the Office of Cost Assessment and Program Evaluation, DOT&E, and DASD(DT&E) studied the costs of alternative proposals for providing an upgraded SDTS. This study is being considered as part of the FY 2017 budget process.
- Because a primary focus of this new radar is improved BMD capability, and with the emphasis of BMD patrols as a fleet requirement, the Navy and MDA should exploit any opportunity for additional realistic testing. The planned testing during deployment of the EDM at PMRF was predicated on significant targets of opportunity (TOOs) related to MDA testing. DASD(DT&E) noted during TEMP development that reliance on TOOs controlled by another program is risky, and the recent MDA test plan reflects a decrease in number and complexity of TOOs during the EDM deployment.
- The AMDR program planned to use the MDA mobile launch platform (MLP) as a launch platform for the Aegis Readiness Assessment Vehicle-M. MDA decided to decommission the MLP in 2014, and the Navy has begun developing a similar capability on a Military Sealift Command ship for the pre-MS C DT at PMRF.
- DASD(DT&E) encouraged the Navy and MDA to use the time during which the AMDR EDM is located at PMRF as an opportunity to explore I&T with the existing Aegis Ashore LBTS and other BMD system components. DASD(DT&E) continues to recommend keeping the EDM array at PMRF beyond MS C because significant opportunities exist to use MDA test events that provide challenging ballistic missile targets and presentations to collect data and further refine AMDR modeling.

Aegis Modernization

- During a continuation of DT-B2P (DDG-53 combat systems ship qualification testing (CSSQT)) in December 2014, the Navy conducted surface warfare (SUW) and undersea warfare (USW) tracking exercises. These events were mainly successful; however, console and helo-link issues were seen (without loss of mission), and the same issues that were seen in previous SUW testing continue to be present.
- During DT-B2Q (DDG-65 CSSQT/IT) in March 2015, the Navy conducted live-fire events LF-02, LF-04, LF-08, and LF-09. In LF-02, an SM-2 was successfully used to defeat a subsonic, low-altitude threat in AAW mode. In LF-04, an SM-2 was successfully used to defeat a subsonic low-altitude threat while also engaging a simulated ballistic missile threat in IAMD mode. In LF-08, two SM-2 missiles and an ESSM were planned to defeat a raid of high- and low-altitude threats. One SM-2 was successfully launched and defeated a low-altitude threat, but subsequent engagements were prevented by a casualty to one of the firing consoles. In LF-09, four SM-2 missiles were planned to defeat a raid of low-altitude threats in IAMD mode. However, because

of confusion about target presentation, no SM-2 missiles were fired and the test has been postponed until another test period.
- Also during DT-B2Q, three SM-6 scenarios were presented as part of the SM-6 FOT&E program discussed below.
- During DT-B2R (DDG-52 CSSQT/IT) in March 2015, the Navy successfully conducted AAW and SUW tracking exercises. Additionally, the Navy successfully conducted USW tracking exercises and live-fire events.
- Also during DT-B2R, the Navy conducted live-fire events LF-01, LF-02, and LF-03. In LF-01, an SM-2 was successfully used to defeat a subsonic, low-altitude crossing threat in AAW mode. In LF-02, an SM-2 was successfully used to defeat a subsonic, low-altitude threat in IAMD mode. In LF-03, an SM-2 was successfully used to defeat a subsonic, low-altitude threat while also engaging a simulated ballistic missile threat in IAMD mode.
- During CG-59 CSSQT in June 2015, in LF-02, an ESSM was successfully used to defeat a subsonic, low-altitude threat; in LF-03, an SM-2 was successfully used to defeat a subsonic, low-altitude threat; and in LF-06, an SM-2 was successfully used to defeat a subsonic, low-altitude threat.
- In March 2015, CG-60 successfully conducted a maintenance assessment.
- In conjunction with MDA test FTM-25 in November 2014, the Navy successfully engaged two AAW threats with SM-2 while simultaneously engaging one BMD threat with SM-3 in IAMD mode.
- In conjunction with MDA test FTX-19 in February 2015, the Navy successfully demonstrated simulated engagements against three live BMD targets while simultaneously conducting a simulated engagement against four simulated AAW targets in IAMD mode.

Cooperative Engagement Capability
- CEC participated in numerous testing events in concert with Aegis Modernization, E-2D, NIFC-CA, and CVN 78 testing.
- Of the seven test objectives, one is fully demonstrated (cooperative engagement processor performance), with the other six partially demonstrated.
- Interoperability issues with CEC and host systems still exist. These issues are planned to be addressed via the Far-Term Interoperability Improvement Project, pending funding via POM 17. Dual tracks, observed during CEC/E-2D testing in 2011–2014, are being addressed with changes to CEC and E-2D software. Implementation of the Accelerated Mid-Term Interoperability Improvement Project fixes in FY 2017 are planned to correct these dual-track issues.
- The CEC TEMP is currently in the signature cycle for an early 2016 approval.

Standard Missile-6
- The SM-6 Block IA program successfully conducted a follow-on flight test with a GTV test at WSMR in November 2014 with a successful engagement of a low-altitude target.
- During DT-B2Q (DDG-65 CSSQT/IT) in March 2015, the Navy conducted live-fire events D-1I, D-1H, and D-1G as part of the SM-6 FOT&E program. During D-1I and D1-H, SM-6 missiles were successfully used to defeat threats in the SM-6 FOT&E threat set. During D-1G, the SM-6 that was planned to engage its threat misfired and the mission was not completed.
- The full performance of SM-6 KPPs has yet to be demonstrated, but plans are in place to test, and no issues are expected. The interoperability performance requirement required fielding of the NIFC-CA Increment 1 capability in FY 2015. The launch availability requirement required the carrying of SM-6 missiles onboard for 8 months prior to firing. The 8-month storage onboard has been completed; one missile has been fired successfully and the remaining missiles are being

planned for future firings. The program expects the maximum range and launch availability KPPs to be demonstrated during SM-6 FOT&E and Aegis BL 9 testing in FY 2016. The assessment of the launch availability KPP is ongoing with the remaining missiles that underwent onboard storage scheduled for live fires in 2016.

The AMDR, DDG-51 Flight III Destroyer, Aegis Modernization, CEC, and SM-6 programs did not request a waiver or deviation from requirements in the TEMP.

Conclusion: Aegis Modernization, CEC, and SM-6 conducted DT&E in 2015 in accordance with their individual TEMPs that included SoS testing of some IAMD and NIFC-CA capabilities.

VIRGINIA-Class Submarine

Executive Summary: The VIRGINIA-class fast attack submarine is an ACAT ID program that previously delivered 11 submarines. In 2015, the program delivered SSN 784, the first of eight Block III submarines, on schedule and within budget. Block III submarines have the same capability as previously delivered submarines but at reduced cost and improved reliability. The major changes include replacing the large spherical-array sonar with a smaller, large-aperture bow (LAB) array sonar that uses a water-backed array of passive hydrophones and active transmitters; replacing the 12 vertical launch system tubes with two VIRGINIA payload tubes (VPTs) (six Tomahawk missiles per tube) and providing a new payload support electronics system and common weapon launcher; and incorporating a number of other design changes to reduce the cost per unit and improve reliability.

In May 2014, NAVSEA awarded the contract to build 10 Block IV submarines (two per year). Design changes are intended to further reduce the total ownership cost of VIRGINIA platforms again with the same capability. The Block V procurement is in the planning stages and is scheduled for award in FY 2019. The VIRGINIA payload module (VPM) is targeted for insertion in Block V hulls and will leverage the success of the VPT as it utilizes similar tubes developed for Block III. The CDD approved by the Joint Requirements Oversight Council in December 2013 adds KPPs for strike capacity, cost, and schedule, while it increases Tomahawk land-attack missile strike capacity from 12 to 40. This increased strike capacity is needed to replace the strike capacity that will be lost when the four SSGNs begin decommissioning in the mid-2020s. The design uses existing multiple all-up-round canisters (MACs) currently in use on SSGNs but does not preclude future capability to host other missile systems in other combinations within a different MAC interface configuration.

In May 2015, the initial fit-up of the dry-deck shelter (DDS) on USS NORTH DAKOTA (SSN 784) was completed in preparation for the first deployment of the DDS on a Block III VIRGINIA (SSN 774) class submarine.

Lead DT&E Organization: NUWC NPT

Summary of FY 2015 DT&E Activities

- The Commander, Operational Test and Evaluation Force (COTF) performed a DT assist on USS NORTH DAKOTA (SSN 784) in support of a preoperational testing deployment. COTF observed a Block III sonar early assessment follow-on test in December 2014, a dockside software build installation in March 2015, and an at-sea high-density contact management event in May 2015. The results of the DT assist support proceeding with the deployment.

Summary of FY 2015 DT&E Engagement and Assessments

- In March 2015, DASD(DT&E) supported a USD(AT&L) Defense Acquisition Executive Summary review of the Navy Acquisition Strategy and progress for Block V procurement, planned for June 2019. This procurement block provides a new VPM to add additional strike capability to offset the loss of this capability when SSGNs decommission in the mid-2020s. The review indicated that a sound Acquisition Strategy is in development, and the Navy is on schedule to award this contract.
- In August 2015, NAVSEA issued a Quality Alert Letter to the maintenance and new construction activities because of inferior parts delivered from a vendor. The Navy continues to investigate and correct every instance in which these critical parts were installed in VIRGINIA-class submarines.
- In September 2015, the USD(AT&L) delegated Milestone Decision Authority to the Secretary of the Navy and designated VIRGINIA-Class Submarine as an ACAT 1C program.
- Because of an earlier resolved issue with a sub-vendor that provides parts to the VIRGINIA-Class Submarine program, SSN 784 delivery was delayed. Because of this issue, near-term DT events were subsequently delayed. The Navy is committed to ensuring the safety of its crews and ships. High-quality standards for submarine components are an important part of the overall effort.
- The USS NORTH DAKOTA Weapon System Accuracy Test (WSAT) Report of December 2014 indicates that there are eight significant material deficiencies that need to be corrected and verified as corrected before the platform can be certified materially ready to conduct all of its warfare mission areas.
    1. Electronic Support Measures: Radar wideband displays limited to no contacts on the Contact Emitters List.
    2. Radar: BPS-16 did not gain contacts held by commercial radar and visually.
    3. 3-inch Launcher: Secondary muzzle ball valve leaks.
    4. Sonar: LAB array contacts anomalous trace.
    5. Sonar: LAB array striping.
    6. Sonar: Lightweight, wide-aperture array data loss issue.
    7. Sonar: LAB array self-noise data needs to be updated for Block III platforms.
    8. Sonar: Loss of sonar processor unit #7.
- Only two of these deficiencies (#4 and #5) are related to the Block III unique work. The other sonar deficiencies are data processing problems that the Sonar Participating Acquisition Resource Manager will fix.
- The platform is still within the industrial warranty period. An additional test period will be scheduled when the deficiencies have been corrected. Deficiency corrections are under way and should be tested in FY 2016 before or during DT.
- The VIRGINIA-Class Submarine program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The VIRGINIA-Class Submarine program is on track to continue DT of the Block III configuration in 2016 following correction of eight major WSAT deficiencies. The VIRGINIA-Class Submarine program has manageable technical and schedule risks, and senior Navy leadership is overseeing correction of the vendor material quality problem.

ZUMWALT-Class Destroyer (DDG 1000)

Executive Summary: The ZUMWALT-class destroyer (DDG 1000) is a large multi-mission surface combatant ship with an emphasis on land attack. It incorporates several new technologies such as electric drive, a reverse tumblehome (inward slanting) hull design for signature reduction, and a Total Ship Computing Environment (TSCE) integrating virtually all data systems aboard the ship. TSCE is the primary enabler for a reduction in crew size to less than half the complement of the DDG 51 destroyer class.

Due to construction delays the DDG 1000 is expected to hold its Hull, Mechanical, and Electrical (HM&E) delivery in mid FY 2016. The HM&E delivery will support a transit to San Diego, California, to capitalize on cost avoidance for completing mission systems equipment (MSE) activation. The Navy plans to award a contract for MSE activation on the West Coast, leading to an MSE delivery in late FY 2017. As a result, DT, integrated testing, and IOT&E will be performed concurrently in FY 2018 and FY 2019. This leaves no margin to address issues discovered during testing, resulting in high performance, cost, and schedule risks.

The DDG 1000 ZUMWALT-Class Destroyer program completed a Nunn-McCurdy certification in FY 2010, and the ADM directed the Navy to remove the Volume Search Radar hardware from the ship baseline and to revise T&E requirements for the program in the next update to the TEMP. The PEO for Integrated Warfare Systems (IWS) modified the DDG 1000 Multifunction Radar (MFR) to achieve a volume search (VS) capability. The first open-air test flights using the MFR VS were conducted at the end of FY 2014 and the results were presented by PEO IWS 2.0 in FY 2015.

Lead DT&E Organization: NSWC PHD

Summary of FY 2015 DT&E Activities

- The delivery schedule was delayed in FY 2015 with the latest estimate for HM&E delivery in March 2016. Reasons for the delays were technical risk, shipyard performance, and shipyard workforce constraints. The complexity of the first-of-class activation of the ship's unique Engineering Control System and Integrated Power System has extended the time required for test and activation.
- HM&E systems activation is in progress at Bath Iron Works, Maine, in preparation for builder's trials. Several industrial tests have been identified in the TEMP as DTs. The dark ship recovery demonstration – emergency diesel generator test is in progress, and the propulsion plant system testing is scheduled for early CY 2016.
- The Navy planned to perform a full-ship shock trial (FSST) on the third and final hull of the program. DOT&E called for an FSST on the first hull before its initial deployment. The Navy and DOT&E presented the rationale to the Deputy Secretary of Defense who directed the Navy, in a Resource Management Decision, to fund the DDG 1000-class component shock qualification program and to execute the FSST before the ship's first deployment.

- The DDG 1000 program did not request a waiver or deviation from requirements in the TEMP.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) approved the PMS 500 request to conduct land-based DT&E for the MFR VS modification in late FY 2014. The event was not described in the currently approved TEMP but is adequately described in the draft TEMP update that is in the Navy approval process. Results were briefed to DASD(DT&E) in FY 2015. Although basic VS functionality was demonstrated, issues were found in short-range clutter rejection, track continuity, and firm-track range. Corrective actions for issues discovered are in progress at the land-based test site.
- DASD(DT&E) is closely monitoring planning for the DDG 1000 program at Wallops Island, Virginia, and the Self-Defense Test Ship (SDTS) in Port Hueneme, California. Current plans call for removal of the MFR array at Wallops Island in FY 2016 in order to install it in the SDTS for DDG 1000 anti-ship cruise missile (ASCM) self-defense testing. The MFR has demonstrated improved performance during FY 2015 land-based flight tests, but further maturation of the radar will be required to support successful ASCM testing aboard the SDTS and DDG 1000.
- DASD(DT&E) participated in test plan working groups for surface warfare, land-attack warfare, integrated undersea warfare, mission system testing of the TSCE Software Release 8, in-stride mine avoidance, aviation operations, and radar cross-section measurement.
- DASD(DT&E) views some of the limitations of the MFR VS as increased risk in air warfare ship self-defense. DASD(DT&E) will closely monitor development of the capability to assess the likelihood of achieving self-defense requirements.

Conclusion: The planned period of MSE activation with a subsequent MSE delivery in late FY 2017 has compressed the T&E schedule so that DT, integrated testing, and IOT&E will occur concurrently. This leaves no margin to address issues discovered during testing, resulting in high performance, schedule, and cost risks.

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6.4 Air Force Programs

This section includes summaries of the following 10 programs:

- Air and Space Operations Center–Weapon System (AOC-WS) Increment 10.2
- B61-12 Life Extension Program (LEP) Tail Kit Assembly (TKA)
- Defense Enterprise Accounting and Management System (DEAMS)
- Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)
- Global Positioning System (GPS) Enterprise
- KC-46A Tanker Modernization
- MQ-9 Reaper
- RQ-4B Global Hawk
- Small Diameter Bomb Increment II (SDB II)
- Space-Based Infrared System High Component (SBIRS High)

Air and Space Operations Center–Weapon System (AOC-WS) Increment 10.2

Executive Summary: The AOC-WS (AN/USQ-163 Falconer) is the operations command center of the joint or combined force air component commander and provides the capability to plan, task, execute, monitor, and assess the activities of assigned or attached forces. The AOC-WS Increment 10.1 configuration established the standard AOC baseline capabilities but did not bring the AOC-WS into a net-centric environment or fully realize the intent of the Air Force Command and Control (C2) Enabling Concept and Joint Concept for Net-Enabled Command Capability, also known as Joint Command and Control. AOC-WS Increment 10.2 is the first increment for modernization and will lead Air Force operational C2 transition to a net-centric capability.

Lead DT&E Organization: 96th Test Wing

Summary of FY 2015 DT&E Activities

- August 24–September 11, 2015, AOC-WS Increment 10.2 completed DT1 at the Combined Air Operations Center–Experimental in the Ryan Center, Joint Base Langley-Eustis, Virginia.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) participated in weekly status updates from April through August 2015 as the combined test force assessed the system's readiness for test and ensured that all necessary preparations were proceeding as planned.
- DASD(DT&E) participated in the test readiness review for the contractor-led system acceptance test in June 2015, providing insight and recommendations to the PEO.
  - The contractor carried open discrepancies into the test with the promise and expectation of closing them and verifying the closure during the test.
- DASD(DT&E) participated in the test readiness review for the Government-led DT1 event in August 2015.
  - The PEO decided to proceed with DT1, understanding that some of the entrance criteria specified in the TEMP had not been met.
  - DASD(DT&E) concurred in that decision in order to gain a greater insight into the program's performance and inform DT2 readiness decisions as well as program risks and issues.
- Although DT1 scope was limited by schedule, the test team identified 62 Category I defects across the system and was unable to verify correction of seven Category I defects identified in Builds 1–4. In addition, the test team identified 358 Category II Urgent defects over the course of DT1. System maturity was not demonstrated and critical issues were noted across all objectives for testing the core software.
- The AOC-WS program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The test team noted a high probability of undiscovered significant problems because of the limited scope of DT1. The program office and PEO have delayed entry into DT2 and established a more iterative risk reduction testing process involving program office and test community personnel to work through the backlog of discrepancies. DASD(DT&E) supports the corrective actions and delay of DT2 and MS C as prescribed by the PM/PEO and will continue to support the restructuring of the test schedule.

B61-12 Life Extension Program (LEP) Tail Kit Assembly (TKA)

Executive Summary: The B61 thermonuclear bomb family is a key component of current U.S. nuclear deterrence. As an air-delivered nuclear weapon, the B61 plays a critical role in supporting the airborne leg of the nuclear triad for the United States and allies abroad. A U.S. Air Force-procured B61-12 TKA, in concert with the Nuclear Weapons Council-directed B61-12 LEP, promotes compliance with U.S. guidance and policy, works within existing program constraints, and provides a long-term solution for the identified U.S. Strategic Command and U.S. European Command capability gaps in the Airborne Strategic Deterrence Initial Capabilities Document. The overall B61-12 LEP program is composed of the DoD-managed TKA and the Department of Energy-managed bomb assembly (BA) and is closely coordinated between the two departments at all levels.

The TKA is designed to be mechanically mated and electrically connected to the nuclear BA and provides the B61-12 with a guide-to-target capability, while retaining the legacy ballistic flight capability. Controlled guidance is achieved via preprogrammed target location data being provided as inputs to the TKA's guidance, navigation, and control system. The B61-12 weapon is capable of two delivery profiles: ballistic free fall (objective F-16 midlife update, F-16C/D, and PA-200) and inertial guidance (threshold B-2A and F-15E; objective F-35A and Long-Range Strike Bomber).

The B61-12 TKA program entered EMD in November 2012, without a prior Technology Maturation and Risk Reduction phase, and awarded a contract to the Boeing Company shortly thereafter. The program is in the first EMD phase and has completed the subsystem competitive prototyping and preliminary design; the critical design was completed in January 2016. The second EMD phase was awarded in December 2015 and will emphasize developmental and operational testing and manufacturing processes. The program has conducted various captive carry and flight testing during FY 2015, collecting data to augment system performance models and to characterize the environment.

Lead DT&E Organization: 96th Test Wing

Summary of FY 2015 DT&E Activities

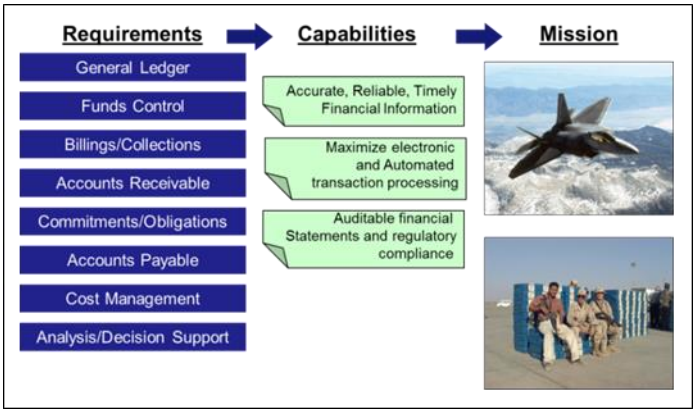
- Numerous instrumented flights occurred throughout FY 2015 on the B-2A, F-35A, and PA-200 to collect vibration and other environmental data for input to system models.
- Separation tests were conducted in FY 2015 on the F-15E and B-2A with a mass- and aerodynamically representative B61-12. The data were collected to update system models.
- Aerodynamic preprogrammed guided flights were flown on the F-15E in early FY 2015 to update system models.
- In July and August 2015, war-representative, instrumented guided flights were flown from the F-15E to characterize inertial-guidance performance.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) assesses the program T&E schedule to be medium risk. Multiple test events have been delayed since entering EMD and there is about a 9-month delay to the baselined T&E program. Because these events are critical for informing a MS C decision, and the MS C decision date has not moved, there is compression of the test event schedule in FY 2017 and FY 2018 just prior to MS C. This compression is likely to result in either less information at MS C or a delay of MS C. The FRP decision has already been delayed by 6 months.
- The test data acquired in FY 2015 have been successfully applied toward the goal of model improvement and validation, and ultimately verifying system design. The only major discovery to note is a problem with the aerodynamic model in the low Mach range, which was discovered during instrumented guided flights. This discovery has driven the program to conduct additional aerodynamic preprogrammed guided tests.
- The program has met all the exit criteria for the EMD-1 contract except for the Inertial Measurement Unit 3.5, which will be completed by July 2017. The EMD-2 contract phase started in December 2015.
- The B61-12 LEP TKA program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The B61-12 TKA program is active in DT to impact system design and has collected appropriate data to inform decision making. The planned future testing, however, is at medium risk for informing a MS C decision, as scheduled.

Defense Enterprise Accounting and Management System (DEAMS)



Executive Summary: DEAMS is a single financial system developed and implemented by the Air Force, the U.S. Transportation Command, and the Defense Finance and Accounting Service. DEAMS provides an enterprise-level view of critical financial data supporting decision making at all levels. It will replace legacy financial and accounting systems with a commercial off-the-shelf (COTS)-based funds management solution qualified by the Joint Financial Management Improvement Program. DEAMS is subject to the FY 2010 NDAA requirement to be auditable by 2017.

DEAMS Increment 1 is composed of seven releases of increasing capability followed by a COTS Oracle Enterprise Business Suite technical upgrade from R11i to R12 and an eighth release to incorporate features and interfaces to support deployment to the Surface Deployment and Distribution Command. Release 3 components 1.R3.0, portions of 1.R3.1, and 1.R3.2 were deployed in the 1st quarter FY 2015. The Air Force Operational Test and Evaluation Center conducted IOT&E of Release 3 from October 1, 2014, through May 2015. Site deployments during FY 2015 brought the number of users from approximately 4,400 to 9,100 with an increase to 11,000 in the 1st quarter FY 2016. In FY 2015, the PMO focused development and testing efforts on improving DEAMS program processes and system performance and accelerating deployments toward full fielding. Development and test of functional enhancements in Increment 1, Release 4 were conducted. In parallel, the program produced a series of corrective action post-production support (PPS) releases to address problems found during standard field use and to mitigate adverse findings from prior operational assessments.

Lead DT&E Organization: AFLCMC/HNIZ

Summary of FY 2015 DT&E Activities

- The PMO conducted contractor component validation and integration (CV&I) and Government qualification test and evaluation (QT&E).

Summary of FY 2015 DT&E Engagement and Assessments

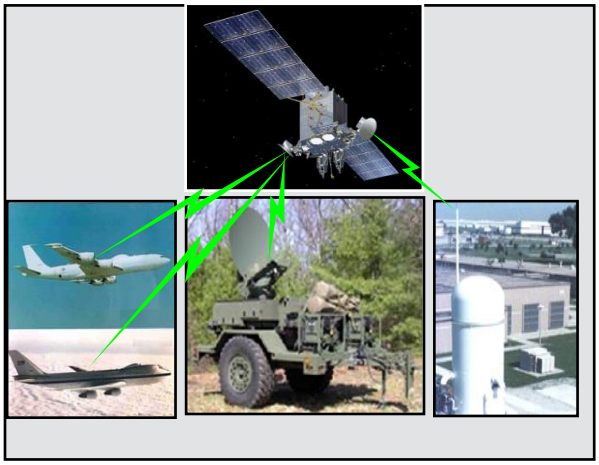
- The DEAMS program updated the TEMP for the full deployment decision, which was proceeding through the approval process.
- The PMO resolved deficiencies found during FY 2015 DT events, leaving no unresolved Severity 1 or 2 deficiencies before promoting the software to production.
- The DEAMS program completed planned DT&E of four Release 4 enhancement packages and seven significant PPS activities. Four of the PPS releases were deployed before fielding Release 4 components and three PPS releases followed. Two of the PPS releases were cyber releases composed specifically of mitigations to cybersecurity vulnerabilities.
- Release 3 IOT&E results were that the system was not effective, suitable, or survivable. The USD(AT&L) ADM dated September 30, 2015, directed a verification of fixes (VoF) test to

assess improvements in the deficient areas and provide information against criteria for a full deployment decision. No singular DT event supported the VoF. The normal PPS cycle of activity was performed for three releases between July 2015 and October 2015 before the January 2016 VoF and was documented in test reports by the Lead DT&E Organization.

- Neither the Oracle Business Intelligence Enterprise Edition (OBIEE) enhanced reporting tool nor the Defense Departmental Reporting System interface was completely provided and available for full operational use with Release 3, as initially planned, before fielding Release 4 components. Limitations of the QT&E test environment in capacity and data environment led the Lead DT&E Organization to assess the formal deployment of the initial set of financial reports—status of funds, Government open orders, and open document list—as a high risk in June 2015. After a period of subject matter expert evaluation and adjustment in production, access to the new reports was granted to a select group of users at the Air Mobility Command and five additional bases for trial use in August 2015. Corrective actions to improve the performance and usability of these reports as well as adding to the set of available OBIEE reports are under way.
- The program continued to employ more integrated DT&E than in previous major releases by combining functional validation activities of CV&I and QT&E for Release 4. The DEAMS Functional Management Office (FMO) observed test script execution performed by the system integrator (SI) in an SI's development test environment. This activity was followed by installation and FMO-run and PMO-run regression testing with limited sample point verification in the Capabilities Integration Environment integration zone, followed by installation and checkout in the DISA Defense Enterprise Computing Center Global Combat Support System–Air Force pre-production and production areas. Full functional validation and regression testing by the FMO in QT&E environments had been the norm. The combined approach reduced total test time but was not as robust in emulating prospective user experience in that functional representatives had a considerably shorter opportunity to exercise new or modified features on their own.
- The DEAMS program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The PMO completed FY 2015 planned DT and deployment of corrective patch releases toward improving system operational performance parameters.

Family of Advanced Beyond Line-of-Sight Terminals (FAB-T)



Executive Summary: FAB-T enables strategic nuclear and nonnuclear command and control (C2) with extremely high frequency (EHF), protected, and survivable communications terminals for beyond line-of-sight communications.

FAB-T provides nuclear-survivable terminals capable of communicating with Milstar (low data rate (LDR)) and advanced extremely high frequency (AEHF) (LDR/extended data rate) satellite constellations for airborne, ground-fixed, and transportable applications for nuclear C2.

The FAB-T program followed a two-contractor development approach to reduce program risk and ensure the best value to produce FAB-T for DoD. On June 2, 2014, the Raytheon Company, Marlborough, Massachusetts, was selected to complete development of, produce, and field the FAB-T command post terminal (CPT). The FAB-T program achieved MS C on September 1, 2015, and was approved to enter into the first LRIP of the airborne and ground-fixed CPT configurations.

Lead DT&E Organization: 96th Test Wing

Summary of FY 2015 DT&E Activities

- July 22, 2014–August 27, 2015, Raytheon completed terminal physical qualification testing on the airborne and ground-fixed CPT. Physical qualification included environmental qualification testing, TEMPEST, gamma dose rate, high-altitude electromagnetic pulse, electromagnetic interference/electromagnetic compatibility, lightning, and a humidity regression test.
- November 20–December 18, 2014, Raytheon and the 46th Test Squadron (46 TS) of the 96th Test Wing completed developmental flight tests on the airborne CPT engineering development model (EDM) with a cooperating ground-fixed CPT EDM at the program's strategic communications laboratory. Raytheon conducted two flights and the 46 TS executed three flights of the Raytheon terminal on an airborne test bed.
- December 18, 2014–April 8, 2015, Raytheon completed functional qualification testing (FQT) phase 1 on the Technical Requirements Document (TRD) Block 1 requirements for the airborne and ground-fixed CPT.
- December 19, 2014–July 30, 2015, Raytheon completed reliability growth testing (RGT) on the airborne CPT.
- February 13–20, 2015, Raytheon completed maintenance demonstration testing on the airborne and ground-fixed CPT.
- February 23–April 17, 2015, Raytheon completed security verification testing (SVT) of the TRD Block 1 software.
- February 23–June 2, 2015, Raytheon completed RGT on the ground-fixed CPT.
- April 9–August 17, 2015, Raytheon completed FQT phase 2 on the TRD Block 1 requirements.

- May 12–June 24, 2015, Raytheon and the 46 TS completed regression ground and flight tests with post–FQT software. Raytheon implemented multiple software changes to correct deficiencies to complete FQT and flight testing.
- August 5–26, 2015, Raytheon completed software qualification testing (SQT)-2, part 1 for the TRD Block 2 software.
- August 27–September 11, 2015, Raytheon completed the AEHF and Milstar factory payload portion of FQT for the TRD Block 2 requirements.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) engaged in test readiness reviews for Raytheon qualification tests to assess progress against the high-risk contractor test schedule.
- DASD(DT&E) engaged in Raytheon program management reviews on design, development, integration, and test to track progress on hardware and software deficiency resolutions, as well as corrective actions during reliability growth testing. DASD(DT&E) identified insufficient hours to verify reliability requirements through contractor testing.
- DASD(DT&E) assisted the program in drafting an interim DEF and granted an interim approval to start Government DT&E before approval of a TEMP.
- DASD(DT&E) engaged with the program office to develop an updated DEF for inclusion in the TEMP to support the program's key acquisition decisions and guide DT planning.
- DASD(DT&E) is engaged through the FAB-T Integrated Test Team (ITT) to review contractor and 46 TS test planning to evaluate satisfaction of the DEF developmental objectives to support key program decisions.
- DASD(DT&E) engaged with the program office and ITT to draft the TEMP to support the MS C/ LRIP decision. The TEMP was approved by the DASD(DT&E) on July 20, 2015.
- DASD(DT&E) provided an assessment of DT for the Integrating Integrated Product Team, OIPT, and MS C/LRIP DAB decision.
- DASD(DT&E) continues to monitor program office efforts to have a CDT assigned to the program.
- The FAB-T program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

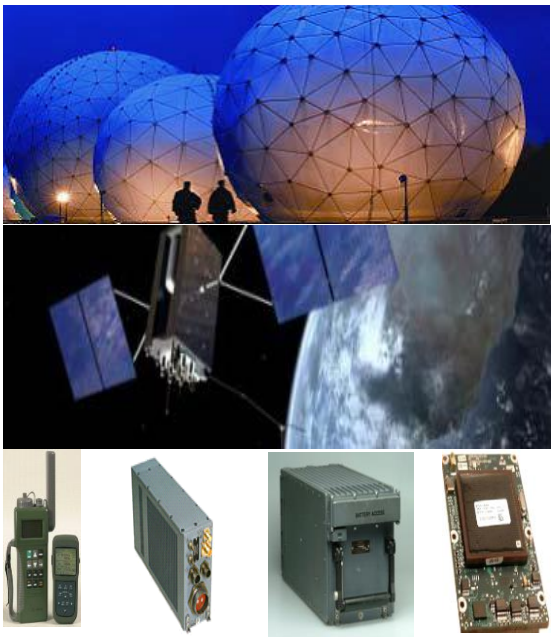
- DASD(DT&E) provided a DASD(DT&E) program assessment of FAB-T for the MS C/LRIP milestone decision on September 1, 2015.
    - FAB-T is on track to demonstrate system performance objectives. Satellite acquisition and tracking were demonstrated during FQTs and during contractor and Government flight tests.
    - Full demonstration of KPPs is at risk with late delivery of baseband equipment to support the FAB-T interface with Presidential and National Voice Conferencing. The interface compatibility was demonstrated during FQT with a Baseband Interface Group emulator.
    - Satellite control and nuclear command, control, and communications risk reduction activities and DT&E are planned after the MS C decision.
    - The current reliability projections for the airborne and ground-fixed terminals assumed 100 percent fix effectiveness. Continued testing is needed to verify the effectiveness of corrective actions before concluding that reliability requirements have been met. The current test schedule approved in the MS C TEMP offers sufficient testing to support this statistical inference.
    - Over-the-air communications with on-orbit AEHF and Milstar satellites were demonstrated, as well as interoperability with other EHF terminals. The FAB-T control interface to support

use of the AEHF Satellite Mission Control Subsystem and Mission Planning Subsystem has not yet been demonstrated for satellite control.
    - The terminal has already gone through a cooperative vulnerability and penetration assessment and will go through an adversarial assessment during integrated T&E. Additionally, the National Security Agency signed off on the SVT.
- DASD(DT&E) recommended approving MS C and authorizing LRIP of Lot #1 of the CPTs.

Conclusion: The FAB-T program revised its DT&E strategy with its new development contractor. The DASD(DT&E) approved the updated TEMP to support the MS C decision in FY 2015. Although delays in completing some DT&E activities occurred, FAB-T development has steadily progressed since its production down-select decision in June 2014. FAB-T needs to continue to grow reliability of the terminals to achieve and verify stated reliability requirements. LRIP Lot #1 terminals include modification kits to continue use of the existing ground-fixed and airborne CPT legacy antennas. DT&E of the new antennas, as well as the ground-transportable CPT configuration, will factor into the LRIP Lot #2 decision and FRP decision.

Global Positioning System (GPS) Enterprise

Executive Summary: GPS is a dual-use, military/civil system providing real-time, accurate, worldwide positioning and timing services, enabling navigation to an unlimited number of users. The satellites transmit a radio frequency signal containing time and ephemeris data from which user equipment (UE) determines position, velocity, and time. The system operates in all weather and specified electromagnetic environments, supporting peace and wartime operations in air, space, land, and sea domains.



GPS consists of control, orbiting, and UE segments. All three segments are being upgraded through modernization programs. The principal purpose of the modernization is to enable use of modernized (M-code) military GPS navigation signals, which are more resistant to hostile interference attempts.

The current operational on-orbit constellation consists of GPS IIR, IIR-M, and IIF satellites and will be modernized with GPS III satellites. The GPS IIF satellites continued deployment with three satellites launched, tested, and declared operational in 2015. GPS III satellites are in development and will be available for launch in 2017.

The current control segment is the Operational Control Segment (OCS), modified by the Architecture Evolution Plan (AEP). OCS-AEP is in sustainment and will be replaced by the Next-Generation Operational Control System (OCX), fielded in three "blocks." OCX Block 0, expected in 2018, will operate concurrently with OCS-AEP and allow the launch and checkout of GPS III satellites. OCX Block 1, expected in 2021 or later, will replace OCS-AEP and will enable the operational control and employment of all residual GPS IIR, IIR-M, and IIF satellites, as well as GPS III satellites. OCX Block 2, expected sometime after 2023, will enable full control of navigation warfare capabilities being developed for the modernized GPS architecture.

Because of delays in OCX delivery and the need to employ GPS III satellites to sustain the operational GPS constellation minimum satellite quantity in late 2019, the Air Force is planning a "bridge" control segment capability called Contingency Operations (COps). The Air Force will operate COps to employ GPS III satellites while concurrently operating OCS-AEP to employ residual GPS satellites. COps is not yet under contract but must be delivered and tested before the projected September 2019 GPS III constellation sustainment need date.

Current military GPS receivers are a mixture of precise positioning service (PPS)-capable and selective availability anti-spoofing module (SAASM)-capable receivers. The Air Force is developing modernized military GPS user equipment (MGUE) in two increments for new applications and to replace these PPS and SAASM receivers. The first increment is in development,

with MS B currently planned for 2016, and will be integrated and tested on four lead platforms between 2016 and 2020. These lead platforms are the Joint Light Tactical Vehicle (JLTV); Defense Advanced GPS Receiver Distributed Device-equipped Stryker family of wheeled tactical vehicles; DDG-51, ARLEIGH BURKE-class destroyer; and B-2 Spirit bomber. The lead platforms are intended to function as pathfinders, representing a subset of the integration and operating environment challenges of DoD weapon systems operating in air, land, and maritime domains that must eventually incorporate MGUE. The second MGUE increment requirements are still in development and are intended to deliver the joint common handheld GPS receiver, MGUE receivers for precision-guided munitions, and receivers for space vehicles.

Lead DT&E Organization: SMC/GPEV

Summary of FY 2015 DT&E Activities

- August 2014–May 2015, MGUE conducted integrated system testing (IST) consisting of Gypsy Juliet (August 2014), Red Flag testing (February 2015), and SPAWAR Systems Center lab testing (March–May 2015).
- November 2014–April 2015, the GPS III test team conducted space vehicle mission data unit (MDU) hardware testing.
- During early FY 2015, Systems Engineering and Integration (SE&I) completed SI L-band Demo 3.0.
- During FY 2015, DASD(DT&E) reviewed the Golden Dry Run testing, which is on the critical path to the Launch and Checkout System acceptance decision.
- March–August 2015, the OCX team conducted two of three Golden Dry Runs on Block 0 in preparation for configuration item qualification testing. Each test identified deficiency reports that were to be fixed before the next test; the third dry run is scheduled for January 2016.
- April 2015, the GPS III programs executed payload and space vehicle mating and DT&E.
- June 2015, the GPS III Program Office and development contractor conducted acoustic testing on Space Vehicle 1.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) led incorporation of the DEF into the GPS Enterprise TEMP (E-TEMP). DASD(DT&E) led core team meetings for the cyber evaluation portion of the DEF, participated in four Integrated Test Team meetings and in E-TEMP Working Groups, and was involved at all levels in coordinating DEF inclusion into the E-TEMP.
- DASD DASD(DT&E) engagement regarding design of experiments (DOE) and the E-TEMP included the following:
    - Led development of MGUE test designs using rigorous DOE methodologies. DOE has been shown to require fewer MGUE test cases than a non-DOE T&E strategy.
    - Led development of STAT in the test strategy of the GPS III space vehicles. The program office agreed with DASD(DT&E) recommendations to reconsider combinatorial design in favor of a design-oriented approach upholding statistical rigor in the Revision C version of the E-TEMP.
    - Attended the Consolidated Test Transition Working Group (CTTWG). The CTTWG is chartered to identify overlaps in enterprise testing and to mitigate those redundancies using STAT/DOE. DASD(DT&E) provided subject matter experts in STAT/DOE for the CTTWG to leverage.
    - Recommended that the Revision C version of the E-TEMP use quantifiable metrics in entrance criteria for test events.

  - Reengaged with the GPS Program Office to develop a new DOE and test strategy for MGUE as card maturity continues to stall the current test strategy.
  - Conducted three rigorous reviews of the GPS E-TEMP in FY 2015. DASD(DT&E) approved the DT&E approach and recommended that the program office present the E-TEMP for approval.
- DASD(DT&E) reviewed the Red Flag IST 3-3 Phase 0 test report. The objective of the test was to demonstrate M-code tracking on modified Modernized User Equipment cards. DASD(DT&E) assesses that there are not enough sample sizes or data points to determine Technical Requirements Document compliance or verification of requirements.
- DASD(DT&E) has continuously worked with the GPS Directorate cybersecurity team and the NCR. These relationships have identified key players toward resolving proprietary information issues between development contractors and the contractors at the NCR. This cybersecurity approach has garnered the attention of OSD and the NCR for its thorough approach.
- DASD(DT&E) worked with GPS SE&I to further refine the event-based planning tool, which allows DASD(DT&E) to determine test events with maximum impact on requirement verification and decision support.. This tool has allowed SE&I to identify shortfalls or ambiguities in resources and to map system requirement specifications to decisions by linking together tables in the E-TEMP.
- DASD(DT&E) reviewed results of the GPS III MDU flight software item qualification test, which was completed by Harris Corp. A software acceptance review was completed on August 6, 2015.
- The GPS program did not request a waiver or deviation from requirements in the E-TEMP.

Conclusion: The GPS Program Office is conducting DT&E to quantify contract technical performance and manufacturing quality, minimize design risks, predict integrated performance in the intended environment, and identify problems to allow for early and timely resolution. The E-TEMP is being updated to reflect the current evaluation strategy. During combined GPS Program Office and DASD(DT&E) DEF updates for MGUE, OCX, COps, and other segments, several gaps were identified in the test approach. These updated DEFs will alleviate these gaps and form the DT&E foundation of the new E-TEMP. The MGUE program will address the maturity issues identified in the initial test articles with the delivery of final test articles. The OCX program completed the third Configuration Item Qualification Test (CIQT) Golden Dry Run of Block 0 on February 29, 2016. The Government approved the results to be adequate for CIQT Run for Record and has taken actions to execute the COps program that is needed to maintain the GPS constellation.

KC-46A Tanker Modernization

Executive Summary: As the initial phase of a comprehensive aerial refueling recapitalization strategy, the KC-46 program will replace approximately one-third of the capability provided by the aging KC-135 fleet with 179 aircraft. The KC-46 will provide additional fuel and cargo capacity, as well as greater fuel efficiency. The KC-46 will provide aerial refueling support to Air Force, Navy, Marine Corps, and allied nation coalition force aircraft, while supporting additional mission areas including airlift and aeromedical evacuation, as well as treaty compliance.

The program is currently in the early phases of flight testing. The Boeing 767-2C provisioned freighter conducted flight and ground tests leading to the required Federal Aviation Administration (FAA) certifications. The first KC-46A started flight testing at the end of September 2015. As of the end of FY 2015, the program is running about 8 months behind schedule for MS C.

Lead DT&E Organization: 412th Test Wing

Summary of FY 2015 DT&E Activities

- In December 2014, because of the pressure of schedule slips, the program and OSD agreed to a minimum system knowledge set required for entry to MS C.
- By August 2015, additional manufacturing and ground test schedule test slips required Boeing to rebaseline the schedule again.
- September 15, 2015, the program completed cargo loading demonstrations, a prerequisite for MS C entry, though the testing highlighted issues that must be resolved before final production.
- On September 18, 2015, the test team completed Dry Run #4 with a complex test scenario that incorporated Boeing; the Air Force, Navy, and FAA; and Cobham, the company that makes the wing air refueling pods (WARPs) and centerline drogue system (CDS). Dry runs stress test team and leadership coordination during simulated test missions. Effective implementation of the critical lessons learned during dry runs will prove key to keeping the test program on track.
- As of September 30, 2015, EMD-1 (the Boeing 767-2C provisioned freighter) flew 61 sorties for 181.3 hours, about 8 percent of the total projected flight test program. Tests emphasized aerodynamics, handling qualities, flutter testing, and aircraft envelope expansion necessary for the FAA to award the amended type certificate. Flight testing uncovered no buffet anomalies with the WARPs throughout the envelope.
- EMD-1 maintained or exceeded the planned monthly flight-test-hour rate documented in the TEMP during its initial 2 months of flight testing, as expected.
- As of September 30, 2015, the KC-46A flew two sorties for 5.9 hours, completing initial safety checks.

- In October 2015, the program deployed the WARP and CDS drogues, and then completed the first phase of the drogues' free air testing in November 2015.
- October and November 2015, the program lowered and flew the air refueling boom at various altitudes and airspeeds, completing the first phase of the boom's free air testing.
- At the end of January 2016, a boom control system issue was discovered during air refueling DT&E with the F-16 and C-17. As of the date of this report, the program office and Boeing were aggressively analyzing test data to determine root cause, and modeling the boom system to discern the best solution. DASD(DT&E) continues to closely monitor the issue and its potential effect on the program schedule.

Summary of FY 2015 DT&E Engagement and Assessments

- Manufacturing issues primarily due to required electrical wiring redesign, removal, and reinstallation; required redesign of parts of the fuel system; as well as inadvertent introduction of a caustic fluid to the air refueling system during ground testing have likely delayed completion of the DT&E required to start IOT&E by about a year.
- The cumulative delays have rendered the previous test schedule obsolete. Boeing and the program office are currently building a new schedule to reflect the current realities.
- As DASD(DT&E) recommended at the beginning of the program, the Integrated Test Team (ITT) shifted the bulk of air refueling receiver work to the Air Force at the Air Force Test Center with Boeing support. The program plans to certify the first eight receivers for IOT&E in the Seattle, Washington, operating area before shifting certification of the remaining 11 receivers to Edwards Air Force Base, California, in parallel with the first half of IOT&E. Even with this parallel DT&E and IOT&E approach, the FRP decision date has shifted to FY 2018, after the contracted required assets availability date in August 2017.
- DASD(DT&E) assesses that the program office and Boeing remain committed to completing the agreed minimum flight tests before the MS C LRIP decision, which is event driven. If flight testing goes almost perfectly, that pushes the MS C DAB to the April 2016 time frame.
- DASD(DT&E) remains concerned about the insufficient calendar time planned for correction of significant discrepancies and/or deficiencies discovered during DT before the planned start of OT based on previous experience with like programs. DASD(DT&E) is working with the ITT to find efficiencies within the schedule. Because the current delays have been mostly production related, some of the DASD(DT&E)-identified risk areas to the flight test program have yet to be encountered. The start of IOT&E remains event driven, requiring the closing of significant open deficiencies before commencement.
- DASD(DT&E) remains concerned about the concurrence of activities such as aircrew and maintenance training during DT&E, which would increase the competition for limited aircraft resources. The proposed schedule rebaseline, however, uses LRIP aircraft for training and for OT, which would mitigate this concern.
- DASD(DT&E) continues to work through the Integrated Product Team process with the Lead DT&E Organization and the program office to obtain the necessary military-specific cybersecurity and interoperability data and analysis to support military certifications.
- The KC-46A program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: The first two EMD aircraft flew regularly and productively toward the end of FY 2015. The program overall is running about a year behind the initial baseline recorded in the August 2012 Integrated Master Schedule.

MQ-9 Reaper

Executive Summary: The MQ-9 Reaper is a multi-mission hunter-killer and intelligence, surveillance, and reconnaissance weapon system with a timely and persistent capability to find, fix, track, target, engage, and assess time-sensitive targets.

The program is in production for Increment I, Block 1 and Block 5 aircraft. The MQ-9 Block 5 completed baseline Increment I DT&E in FY 2015. The program plans to continue development, integration, and flight test of new capabilities originally required to support overseas contingency operations.

Lead DT&E Organization: AFLCMC/WI

Summary of FY 2015 DT&E Activities

- MQ-9 Block 5 completed hardware and software development and testing at the system integration laboratory in Poway, California, and the flight test facilities in Gray Butte, California, and the Naval Air Warfare Center, Weapons Division, China Lake, California. The Block 5 system completed 24 test missions for 90 hours of flight testing in FY 2015.
- The MQ-9 Block 5 completed baseline Increment I flight tests, including evaluations of hardware, software, and procedural changes to improve the capability to generate a sortie under high outside air temperature conditions.

Summary of FY 2015 DT&E Engagement and Assessment

- DASD(DT&E) was engaged in evaluating T&E options to support a revised acquisition strategy to accelerate fielding of new capability; monitoring DT&E progress; and developing performance assessment plans and criteria for Increment I capabilities and limitations.
- The Block 1 system has demonstrated operational capability in the killer role and is currently in sustainment.
- The MQ-9 Block 5 demonstrated baseline Increment I capability with the Block 30 ground control station, providing increased alternating current power for current and future payloads; stronger landing gear to increase reliability and gross weight capability to 11,700 pounds; an encrypted data link capability; and an improved electro-optical-infrared capability.
- Prior DT&E revealed that the integrated Block 5 configuration generates additional heat load, which limits ground operating times in hot weather environments. In FY 2015, hardware, software, and procedural changes were implemented and tested to address this issue. The developmental evaluations concluded that the modifications were adequate to generate sorties at ground temperatures up to 110 degrees. The user requirement is 120 degrees, and no additional design changes are planned to increase the hot weather capability.
- Development is complete for baseline Increment I, Block 5 capabilities, with some deficiency correction regression T&E efforts remaining. The Increment I, Block 5 configuration had 19 Category 1 deficiency reports pending or remaining open at the end of FY 2015.

- Additional DT&E is now planned for integration of new capabilities originally developed to support overseas contingency operations. This DT&E and corrections of deficiencies are expected to extend the Increment I DT&E effort into FY 2019.
- The MQ-9 system meets the "killer" requirement and partially meets the hunter and net-ready key parameters because of sensor limitations with specific target sizes and motion as well as imagery transmission issues.
- The demonstrated reliability is approximately 2.5 hours, against a revised threshold of 19 hours mean time between critical failure for the Block 5 aircraft. The Block 5 aircraft currently has approximately 330 flight hours in a DT environment. The failures experienced on the Block 5 aircraft have been similar to the Block 1 aircraft failure items.
- The Air Force deferred 21 CPD requirements that the system will not meet or will only partially meet.
- The MQ-9 Reaper program did not request a waiver or deviation from requirements in the TEMP.

Conclusion: MQ-9 aircraft development is essentially complete, with deficiency correction and integration of additional capabilities remaining to complete Increment I development.

RQ-4B Global Hawk

Executive Summary: The Global Hawk is a high-altitude, long-endurance unmanned aircraft system providing intelligence, surveillance, and reconnaissance to Warfighters in low to medium threat environments. Global Hawks have been developed in discrete blocks of capability; Block 30 is in sustainment, and Block 40 has completed initial capability development. Block 40 shares an airframe similar to the earlier blocks and integrates the Multi-Platform Radar Technology Insertion Program sensor, an active electronically scanned array synthetic aperture radar (SAR) that provides ground moving target indicator capability and spot and wide-area search imagery.

Block 40 first flight was in November 2009 and the initial capability development effort completed in June 2015. The last production Block 40 was delivered in October 2014. The program rebaselined at MS C in February 2015, following a Nunn-McCurdy breach in 2011.

Lead DT&E Organization: 412th Test Wing

Summary of FY 2015 DT&E Activities

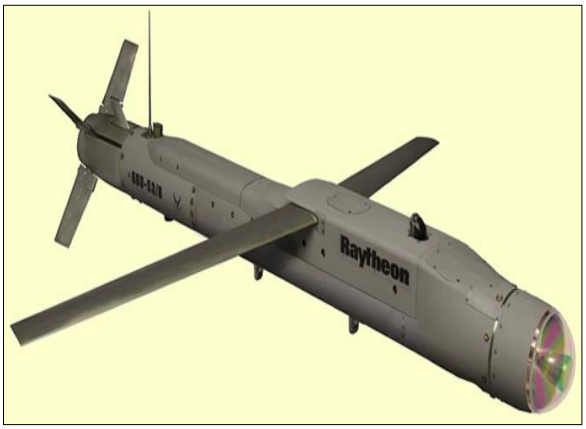
- The program conducted 24 Block 40 developmental test flights for 305 hours.
- The program completed Block 40 interoperability and deficiency correction testing.
- The program completed DT&E of Block 40 radar maritime modes.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) was engaged in supporting development of a T&E strategy to rebaseline the acquisition program and in assessing DT&E and program progress.
- Delays in software updates for the external Air Force Distributed Common Ground Station system to permit exploitation of Block 40 radar imagery delayed completion of interoperability and integrated system-level tests until June 2015.
- Block 40 completed DT&E of maritime moving target indicator and maritime inverse SAR modes to support the NATO Alliance Ground Surveillance system.
- The Lead DT&E Organization conducted tests to evaluate updated aircraft components to replace obsolete technology and qualify new manufacturing sources.
- The RQ-4B Global Hawk program did not request a waiver or deviation from requirements in the 2009 approved TEMP. A TEMP update is in progress to support completion of the baseline program and transition to sustainment and modernization subprograms. DASD(DT&E) assesses that the TEMP update currently lacks adequate resources to execute the updated strategy.

Conclusion: Initial DT&E of Global Hawk system capability is complete. DASD(DT&E) assesses that the TEMP update currently lacks adequate resources to execute the updated strategy.

Small Diameter Bomb Increment II (SDB II)



Executive Summary: The SDB II (Guided Bomb Unit-53/B) is an Air Force-led ACAT ID program, with Navy participation, providing the Warfighter with the adverse-weather capability to attack mobile targets from standoff ranges (greater than 40 nautical miles) through weather. It uses a multimode seeker (semi-active laser/imaging infrared/millimeter wave) and dual-frequency weapons data link (Link 16/ultrahigh frequency (UHF)).

The SDB II program received MS C approval (3rd quarter FY 2015) to proceed to LRIP in support of OT and fielding. SDB II is the second increment of the miniature munitions weapons system capability program and is a 250-pound class precision-guided air-to-ground munition.

Testing will be accomplished over two phases. The first phase will support verification of the full SDB II capability and integration on the F-15E (Threshold) aircraft supporting the full functionality of the SDB II in normal attack (NA), laser-illuminated attack (LIA), and coordinate attack (CA) engagement modes for required assets available in FY 2017. The second phase of testing will support verification of SDB II integration on the F-35B (Marine Corps) and F-35C (Navy) for IOC in FY 2022.

DT consists of a contractor-developed system verification program as well as a Government-led 28-shot program to follow the contractor's EMD effort. Raytheon Missile Systems (RMS) is executing 16 NA guided test vehicle (GTV) releases, four each LIA and CA GTV releases, and 10 all-up round releases with warheads (six NA, three CA, one LIA) to meet statutory LFT&E requirements to assess end-to-end lethality. GTVs have live fuzes with telemetry units installed in lieu of warheads. Twenty-eight additional NA GTV releases were approved at MS B with the intent to increase confidence in the system's capabilities as well as to gather additional captive-carry and free flight reliability data before entering dedicated OT. All GTV release missions will gather live fuze functionality data to further assess system lethality. RMS is executing 12 multiple-week captive flight test (CFT) efforts utilizing the front of an SDB II seeker mounted on a UH-1 helicopter to characterize sensor performance in a dynamic environment. RMS completed a control test vehicle release effort to characterize weapon release and navigation performance. The data were also key to completing the air worthiness effort required for OT.

Lead DT&E Organization: 96th Test Wing

Summary of FY 2015 DT&E Activities

- February 27, 2015, the SDB II program successfully conducted GTV-8 demonstrating operation with a degraded GPS condition.
- March 30–April 18, 2015, CFT-11 was executed in a desert environment at White Sands Missile Range (WSMR), New Mexico. Data on 19 test points were collected with 30 hours of pod time.

- August 7, 2015, the SDB II program successfully conducted GTV-13 demonstrating for the first time a UHF handoff.
- August 13, 2015, the SDB II program successfully conducted GTV-12 demonstrating post-launch in-flight target updates over a UHF data link.
- August 17, 2015, the captive-carry reliability test program began with an objective of collecting 1,500 captive-carry reliability hours on 10 production-representative inert weapons (approximately 150 hours/asset). A total of 76 hours of captive-carry reliability testing was completed; however, there are not yet enough data to make a credible statement about captive-carry mean time between failures (MTBF).
- September 15, 2015, LF-3 and LF-5 were launched on the same sortie at WSMR. LF-3 successfully impacted the intended target with a good warhead detonation and met all of the test objectives. LF-5 successfully impacted the intended target; however, the warhead failed to detonate. The remaining LF-4 and LF-6 tests were delayed because of the anomaly observed during LF-5. The investigation is still in progress and LF-5 will likely be reattempted.
- September 16–October 6, 2015, the CFT hybrid events were executed over land and sea at Eglin Air Force Base, Florida. Data on 16 test points were collected with 20 hours of pod time.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) provided a program assessment of the SDB II program in support of the MS C decision based on the program meeting the exit criteria and completing nine GTV and two LF flight tests.
- DASD(DT&E) supports the option to advance integration on the F/A-18E/F (objective platform) to reduce risk associated with the Navy F-35 integration schedule.
- A cybersecurity assessment in the developmental/integrated test phase has been added to identify vulnerabilities and enable potential resolution via software.
- DASD(DT&E) will remain engaged in the sulfur dioxide environmental test and demonstration of the LIA and CA modes of the weapon in flight test, which must be demonstrated before award of LRIP Lot 2 (FY 2016).
- The SDB II program did not request a waiver or deviation from requirements in the TEMP.

DASD(DT&E) Program Assessment

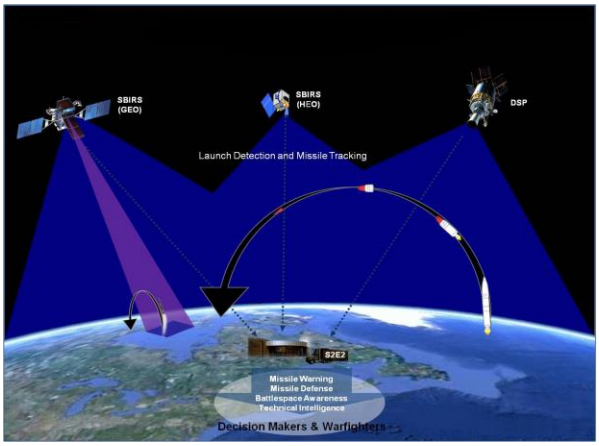
- DASD(DT&E) conducted a DASD(DT&E) program assessment of the SDB II on May 6, 2015, to support a MS C decision. The SDB program sought authority to proceed to LRIP in support of OT and fielding and the F-15 required asset availability. Based on DT conducted at the time of the assessment, the DASD(DT&E) assessed that there was a low risk of major redesign after MS C and recommended that the USD(AT&L) approve the MS C decision supporting LRIP. The summary of the DASD(DT&E) evaluation follows.
  - Performance. Assessed as low risk. Entry criteria for MS C included successful demonstration of nine GTV and two LF missions in the NA mode. As of MS C, there have been 10 successful GTV flights out of 12 attempts and two successful LF missions out of four attempts (one LF attempt is considered a no test). Test results have demonstrated successful targeting and in-flight target updates via Link 16 for moving and fixed targets.
  - Reliability. Assessed as medium risk. Test, analyze, and fix laboratory testing resulted in 253 hours MTBF (Threshold: 250 hours) and supported the reliability growth plan. Flight test results support a probability of free flight reliability growth of 0.81. The captive-carry reliability test has not begun because of a delay in delivery of captive-carry test assets. Approximately 30 hours of flight test have been completed with five anomalies, elevating our assessment of risk.

- Interoperability. Assessed as low risk. Flight test results demonstrate that the SDB II can communicate with the F-15E launch platform using the TacNet 1.1 (Link 16). Testing utilizing UHF was completed in captive testing and is first planned for free flight test with GTV-13.
- Cybersecurity Testing. Not assessed. No cybersecurity KPPs or KSAs were incorporated into the design. The PM has directed that a cybersecurity risk assessment be conducted in accordance with Air Force Instruction 33-210 for platform information technology certification and accreditation.

Conclusion: The program continues testing in accordance with the approved TEMP. Although 47 DT&E free flight test missions remain after MS C, the 15 successful free flight missions completed to date have demonstrated sufficient system performance and design maturity that the risk of a major redesign after MS C is assessed as low. DASD(DT&E) assesses current performance risk as demonstrated in DT&E to be medium given multiple unrelated failures.

Space-Based Infrared System High Component (SBIRS High)

Executive Summary: SBIRS is an integrated "system of systems" consisting of nonsurvivable and survivable space and ground elements. It provides unambiguous, timely, and accurate missile warning and missile defense information to the President of the United States, the Secretary of Defense, Unified Commanders, and other users. Additionally, SBIRS supports technical intelligence and battlespace awareness users with data to make assessments, derive intelligence products, and provide recommendations to assist Warfighters in their combatant roles and missions.



Lead DT&E Organization: SMC/RSE

Summary of FY 2015 DT&E Activities

- Throughout FY 2015, the system readiness (SR) campaign demonstrated the maturity of the Block 10 SR to enter integrated test and evaluation (IT&E). The System Readiness Team (SRT) conducted command and control (C2) system spot checks to clearly define capabilities needed to progress from each system subtest to the overall C2 cutover SR campaign.
- October 2014–March 2015, the SRT conducted pre-live commanding SR block testing during capability integration that demonstrated the system's readiness to proceed with commanding live assets. Pre-live spot check events demonstrated readiness for performing C2 and mission management (MM) using live assets in support of C2 cutover readiness as well as readiness for IT&E.
- January 2015–August 2015, live, single type SR block testing demonstrated that the block entrance criteria are met and that C2 and MM can use live assets of a single space vehicle type. Each live, single type SR block contained events to exercise different space vehicle configurations or functionality. During this phase, each space vehicle type has three corresponding SR blocks that increase in complexity, robustness, and operational realism, ultimately leading to execution of C2 and MM for the full satellite constellation.
- September 2015–October 2015, live constellation SR blocks are executed when the block entrance criteria are met and demonstrate that the Delivery 3 system is capable of managing combinations of space vehicle types and the full complement of assets. The live constellation SR blocks culminate in the constellation soak, a planned 2-week demonstration of the full Delivery 3 system utilizing C2 and MM capabilities. The constellation soak is a component of the overarching Block 10 IT&E readiness soak.

Summary of FY 2015 DT&E Engagement and Assessments

- DASD(DT&E) initiated and provided technical leadership for the revised Enterprise Test and Evaluation Master Plan (E-TEMP) by leading a follow-up DEF core team meeting. This DEF focused on strengthening the cybersecurity and SBIRS Survivable/Endurable Evolution (S2E2) data collection sections of the E-TEMP.
- DASD(DT&E) provided comments and recommendations on the revised E-TEMP, focusing on cybersecurity assessment and S2E2 evaluation. Recommendations included performing a cyber

threat environmental evaluation as well as better integrating S2E2 into the overall testing strategic plan.

- DASD(DT&E) recommended program risk assessment planning by each participating member of the Integrated Test Team (ITT); each ITT member adopted this recommendation in later status briefings showing the high-risk factors for DT&E.
- SMC/RSE requested an interoperability requirements testing waiver from JITC for Block 10. Instead of evaluating interoperability at the end of Block 10, SMC/RSE would rather assess interoperability at the end of Block 20 when the final ground test segment completes testing. DASD(DT&E) concurs in the waiver request given the comprehensiveness of the planned Block 20 testing.
- The SBIRS High program did not request a waiver or deviation from requirements in the E-TEMP.

Conclusion: The program is executing DT&E activities in accordance with the E-TEMP.

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Abbreviations and Acronyms

3G	third-generation
AAG	advanced arresting gear
AAW	antiair warfare
ACAS	Assured Compliance Assessment Solution
ACAT	acquisition category
ACB	advanced capability build
ACS	Aegis Combat System
ACWA	Assembled Chemical Weapons Alternatives
AD	air defense
ADM	Acquisition Decision Memorandum
ADTRA	Advanced Dynamic Transmit Array
AEC	Army Evaluation Center
AEHF	advanced extremely high frequency
AEP	Architecture Evolution Plan
AF-IPPS	Air Force Integrated Personnel and Pay System
AF/TE	Air Force Directorate of Test and Evaluation
AFB	Air Force Base
AFED	Aviation-Fires Evaluation Directorate
AFIT	Air Force Institute of Technology
AFLCMC	Air Force Life Cycle Management Center
AHE	E-2D Advanced Hawkeye
AI	artificial intelligence
ALIS	Autonomic Logistics Information System
AMD	air and missile defense
AMDR	Air and Missile Defense Radar
AMNS	airborne mine neutralization system
AMPV	Armored Multi-Purpose Vehicle

AMRAAM	advanced medium-range air-to-air missile
AMSAA	Army Materiel Systems Analysis Activity
AN/TPY-2	Army Navy/Transportable Radar Surveillance
Ao	operational availability
AOC-WS	Air and Space Operations Center–Weapon System
APT	Advanced Pilot Training
ARD	Acoustic Research Detachment
ARL	Army Research Laboratory
ASCM	anti-ship cruise missile
ASD(R&E)	Assistant Secretary of Defense for Research and Engineering
ASW	antisubmarine warfare
ATC	air traffic control
ATEC	Army Test and Evaluation Command
ATP	authority to proceed
AUV	autonomous underwater vehicle
AW	air warfare
AWE	advanced weapons elevator
AWQI	Acquisition Workforce Qualification Initiative
BA	bomb assembly
BBP	Better Buying Power
BCR	Budget Certification Report
BFV	Bradley fighting vehicle
BGCAPP	Blue Grass Chemical Agent-Destruction Pilot Plant
BL	baseline
BMD	Ballistic Missile Defense
BMDS	Ballistic Missile Defense System
BoS	best-of-suite
C2	command and control
C4I	command, control, communications, computers, and intelligence

C4ISR	command, control, communications, computers, intelligence, surveillance, and reconnaissance
C4ISRED	C4ISR Evaluation Directorate
CA	coordinate attack
CAC2S	Common Aviation Command and Control System
CAP	Critical Acquisition Position
CAT	Carrier, Ammunition, Tracked
CBA	cost-benefit analysis
CBTE	capabilities-based test and evaluation
CC	combat communications
CCMD	combatant command
CDD	Capability Development Document
CDM	Competency Domain Manager
CDR	critical design review
CDS	centerline drogue system
CDT	Chief Developmental Tester
CEC	Cooperative Engagement Capability
CEESIM	Combat Electromagnetic Environment Simulator
CEMA	cybersecurity electromagnetic activities
CERDEC	Communications-Electronics Research, Development, and Engineering Center
CFT	captive flight test
CIO	chief information officer
CIQT	Configuration Item Qualification Test
CIRCM	Common Infrared Countermeasures
CIT	combat system (CS) integration test
CLM	continuous learning module
CMC	common missile compartment
COE	center of excellence
COOPEX	Concept of Operations Exercise

COps	Contingency Operations
COTF	Commander, Operational Test and Evaluation Force
COTM	communications on the move
COTS	commercial off-the-shelf
CPD	Capability Production Document
CPO	corrective action, producibility improvement, and obsolescence
CPOF	Command Post of the Future
CPT	command post terminal
CREW	counter radio-controlled improvised explosive device (RCIED) electronic warfare
CRG	Center for Reliability Growth
CRH	Combat Rescue Helicopter
CRIS	Cyber Range Interoperability Standards
CS	capability set; communication system; combat system
CSSQT	combat systems ship qualification testing
CSV	Combat Support Vehicle
CT	customer test
CTEIP	Central Test and Evaluation Investment Program
CTOL	conventional takeoff and landing
CTT	Cyber Table Top
CTTWG	Consolidated Test Transition Working Group
CTV	Combat Tactical Vehicle
CU	Capability Upgrade
CV	carrier variant
CV&I	component validation and integration
CVN 78	GERALD R. FORD Class Nuclear Aircraft Carrier
CVPA	cooperative vulnerability and penetration assessment
CY	calendar year
D5LE	Trident II Life Extension

DA SIT	design agent systems integration testing
DAB	Defense Acquisition Board
DACM	Director for Acquisition Career Management
DAG	Defense Acquisition Guidebook
DAI	Defense Agencies Initiative
DASC	direct air support center
DASD(DT&E)	Deputy Assistant Secretary of Defense for Developmental Test and Evaluation
DASN(RDT&E)	Deputy Assistant Secretary of the Navy for Research, Development, Test, and Evaluation
DAU	Defense Acquisition University
DAWDF	Defense Acquisition Workforce Development Fund
DAWIA	Defense Acquisition Workforce Improvement Act
DBR	dual-band radar
DCGS-N	Distributed Common Ground System–Navy
DEAMS	Defense Enterprise Accounting and Management System
DEF	Developmental Evaluation Framework
DHMSM	Department of Defense Healthcare Management System Modernization
DIADS	Digital Integrated Air Defense System
DISA	Defense Information Systems Agency
DIT	development integration test
DITL	day-in-the-life
DLA	Defense Logistics Agency
DoD	Department of Defense
DoDI	DoD Instruction
DOE	design of experiments
DOH	defense of homeland
DON	Department of the Navy
DOT&E	Director of Operational Test and Evaluation
DREN	Defense Research and Engineering Network

DT	developmental test/testing
DT&E	developmental test and evaluation
E2E	end-to-end
ECP	Engineering Change Proposal
EDM	engineering development model
EDS	explosive destruction system
EHF	extremely high frequency
EHR	electronic health record
EMALS	Electromagnetic Aircraft Launch System
EMD	Engineering and Manufacturing Development
EMP	electromagnetic pulse
EMS	electromagnetic spectrum
EO/IR	electro-optical and infrared
EOA	early operational assessment
EOC	engagement operations center
EOR	engage-on-remote
EPG	Electronic Proving Ground
EPS	Electronic Procurement System; Enhanced Polar System
ESS	electronic security system
ESSM	Evolved Sea Sparrow Missile
ET&E	Engineering and Test and Evaluation
E-TEMP	Enterprise TEMP
EW	electronic warfare
EWIIP	Electronic Warfare Infrastructure Improvement Project
FAA	Federal Aviation Administration
FAB-T	Family of Advanced Beyond Line-of-Sight Terminals
FAT	first article testing
FF	fixed-facility
FFRDC	Federally Funded Research and Development Center

FIPT	Functional Integrated Product Team
FMO	Functional Management Office
FOC	full and open competition
FOT&E	follow-on operational test and evaluation
FoV	family of vehicles
FQT	formal qualification test; functional qualification testing
FRP	full-rate production
FSST	full-ship shock trial
FTA	from-the-air
FTM	Flight Test Standard Missile
FTS	from-the-sea
FTX	Flight Test Other
FY	fiscal year
G/ATOR	Ground/Air Task-Oriented Radar
GBSD	Ground-Based Strategic Deterrent
GIT	Government integration test
GMD	ground-based midcourse defense
GP	General Purpose
GPK	Gunner's Protection Kit
GPS	Global Positioning System
GRT	Government regression testing
GSIL	Government software-in-the-loop
GTV	ground test vehicle; guided test vehicle
HALO	High-Altitude Observatory
HASC	House Armed Services Committee
HEL	high-energy laser
HFE	human factors engineering
HM&E	hull, mechanical, and electrical
HMS	Handheld, Manpack, and Small Form Fit

HNW	highband networking waveform
HPM	high-power microwave
HQ	headquarters
HWIL	hardware-in-the-loop
HX-21	Naval Rotary-Wing Aircraft Test and Evaluation Squadron Two One
I&I	interoperability and integration
I&M	Improvement and Modernization
I&T	integration and testing
IAMD	Integrated Air and Missile Defense
IBCS	IAMD battle command system
ICA	initial capability assessment
ICBM	intercontinental ballistic missile
IFCN	integrated fire control network
IFPC	Indirect Fire Protection Capability
IOC	initial operational capability
IOT&E	initial operational test and evaluation
IPG	Interoperability Process Guide
IPPS-A	Integrated Personnel and Pay System–Army
IPR	In-Process Review
IPT	Integrated Product Team
IRBM	intermediate-range ballistic missile
IRCM	infrared countermeasures
IRT	Independent Review Team
ISR	intelligence, surveillance, and reconnaissance
IST	integrated system test/testing
ISTF	installed system test facility
IT	information technology; integrated test
IT&E	integrated test and evaluation
ITF	integrated test force

ITT	Integrated Test Team
ITTS	Instrumentation, Targets, and Threat Simulators
IWS	Integrated Warfare Systems
JAGM	Joint Air-to-Ground Missile
JDIGS	Joint Distributed IRCM Ground-Test System
LIA	laser illuminated attack
JIM	Joint Improvement and Modernization
JIOR	Joint Information Operations Range
JITC	Joint Interoperability Test Command
JLENS	Joint Land Attack Cruise Missile Defense Elevated Netted Sensor System
JLTV	Joint Light Tactical Vehicle
JMETC	Joint Mission Environment Test Capability
JMN	JMETC Multiple Independent Levels of Security (MILS) Network
JMS	Joint Space Operations Center (JSpOC) Mission System
JROC	Joint Requirements Oversight Council
JSpOC	Joint Space Operations Center
JTRS	Joint Tactical Radio System
KLP	Key Leadership Position
KM	knowledge management
KPP	key performance parameter
KSA	key system attribute
LAB	large-aperture bow
LBET	land-based engineering test
LBTS	land-based test site
LCS	Littoral Combat Ship
LDP	Lab Demo Program
LDR	low data rate
LDU	limited deployment unit

LF	live-fire
LFD	limited fielding decision
LFT&E	live-fire test and evaluation
LHA(R)	Amphibious Assault Ship
LIA	laser-illuminated attack
LMP	Logistics Modernization Program
LOS	line-of-sight
LRIP	low-rate initial production
LRU	line-replaceable unit
LSC	linear-shaped charge
LSP	laser shock peening
LUT	limited user test
LVC	live, virtual, and constructive
M&S	modeling and simulation
MAC	multi-static active coherent; multiple all-up-round canister
MAIS	Major Automated Information System
MBT	main battle tank
MCM	mine countermeasures
MCNSD	Mission Command and Network Systems Division
MCR	message completion rate
MCS	mission communications system
MCSC	Marine Corps Systems Command
MCTSSA	Marine Corps Tactical Systems Support Activity
MDA	Missile Defense Agency
MDAP	Major Defense Acquisition Program
MFAS	multifunction active sensor
MFR	Multifunction Radar
MGUE	Military GPS User Equipment

MiDAESS	MDA Engineering and Support Services
MIDS	multifunctional information distribution system
MILS	Multiple Independent Levels of Security
MLP	mobile launch platform
MM	Mission Module; mission management
MNVR	Mid-Tier Networking Vehicular Radio
MOA	memorandum of agreement
MOT&E	multi-Service operational test and evaluation
MP	Mission Package
MRBM	medium-range ballistic missile
MRTFB	Major Range and Test Facility Base
MS	milestone
MSALTS	Multi-Spectral Sea and Land Target Simulator
MSED	Mounted Systems Evaluation Directorate
MTBEFF	mean time between effective function failures
MTBF	mean time between failures
MTBOMF	mean time between operational mission failures
MTBSA	mean time between system abort
MTC2	Maritime Tactical Command and Control
MTTR	mean time to repair
MUOS	Mobile User Objective System
NA	normal attack
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organization
NAVAIR	Naval Air Systems Command
NAVSEA	Naval Sea Systems Command
NAWCAD	Naval Air Warfare Center, Aircraft Division
NCR	National Cyber Range
NCW	network-centric waveform

NDAA	National Defense Authorization Act
NEWEG	Next-Generation Electronic Warfare Environment Generator
NGDS	Next Generation Diagnostic System
NGEN	Next Generation Enterprise Network
NGJ	Next Generation Jammer
NICE	National Initiative for Cybersecurity Education
NIFC-CA	Naval Integrated Fire Control–Counter Air
NPT	Newport
NR KPP	net-ready key performance parameter
NSA	National Security Agency
NSS	national security systems
NSWC	Naval Surface Warfare Center
NSWCCD	Naval Surface Warfare Center, Carderock Division
NUWC	Naval Undersea Warfare Center
OA	operational assessment
OAR	open-air range
OCS	Operational Control Segment
OCX	Operational Control System
OFDM	orthogonal frequency-division multiplexing
OIPT	Overarching Integrated Product Team
ONR	Office of Naval Research
OPNAV	Office of the Chief of Naval Operations
OR	OHIO Replacement
OSD	Office of the Secretary of Defense
OSTP	Office of Science and Technology Policy
OT	operational test/testing
OT&E	operational test and evaluation
OTA	over-the-air
P2N	point-to-net

P2P	point-to-point
P&D	Production and Deployment
PCAPP	Pueblo Chemical Agent-Destruction Pilot Plant
PCD	position category description
Pdm	product manager/management
PDP	production decision point
PDR	preliminary design review
PEO	program executive office
PHD	Port Hueneme Division
PIM	Paladin Integrated Management
PM	program manager
PMO	program management office
PMRF	Pacific Missile Range Facility
PMW	Program Manager Warfare Systems
POM	Program Objective Memorandum
PoP	Point of Presence
PPS	post-production support; precise positioning service
PPT	production proveout test
PQT	production qualification testing
PRD	Performance Requirement Document
PRR	production readiness review
QDD	quick-disconnect duct
QT	qualification testing
QT&E	qualification test and evaluation
R&D	research and development
R&M	reliability and maintainability
RALS	Runway Arrested Landing Site
RAM	reliability, availability, and maintainability
RAMPP	RAM Program Plan

RCIED	radio-controlled improvised explosive device
RDT&E	research, development, test, and evaluation
REP	Resource Enhancement Program
RF	radio frequency
RFP	request for proposal
RGP	reliability growth program
RGT	reliability growth testing
RIU	radar interface unit
RKV	redesigned kill vehicle
RM&AP	Roadmap and Action Plan
RMD	Resource Management Decision
RMDS	radio mission data set
RMF	Risk Management Framework
RMMV	remote multi-mission vehicle
RMS	remote minehunting system; Raytheon Missile System
RR	Rifleman Radio
RSDP	Regional Service Delivery Point
S2E2	SBIRS Survivable/Endurable Evolution
S3	safety and suitability for service
S&T	science and technology
SAASM	selective availability anti-spoofing module
SAR	synthetic aperture radar
SAR&DP	Spectrum Access Research and Development Program
SATCOM	satellite communications
SBIRS	Space-Based Infrared System
SCI	Sensitive Compartmented Information
SCS	Ship Control System
SDB	Small Diameter Bomb
SDC	static detonation chamber

SDTA	system demonstration test article
SDTS	Self-Defense Test Ship
SE	systems engineering
SEP	System Enhancement Package
SERPPAS	Southeast Regional Partnership for Planning and Sustainability
SES	senior executive service
SGR	sortie generation rate
SI	system integrator
SIL	system integration lab
SINCGARS	single-channel ground and airborne radio system
SIT	system integration test
SLAD	Survivability/Lethality Analysis Directorate
SM-3	Standard Missile-3
SM-6	Standard Missile-6
SMC	Space and Missile Systems Center
SME	subject matter expert
SNE	Soldier Network Extension
SoS	system of systems
SPALT	Strategic Programs Alteration
SPAWAR	Space and Naval Warfare Systems Command
SPH	self-propelled howitzer
SPHS	Self-Propelled Howitzer Systems
SQT	software qualification testing
SR	system readiness
SRBM	short-range ballistic missile
SRF	Spectrum Relocation Fund
SRR	systems requirements review
SRT	System Readiness Team
SRW	Soldier Radio Waveform

SSBN	ballistic missile submarine
SSC	Ship-to-Shore Connector
SSC PAC	SPAWAR Systems Center Pacific
SSDS	Ship Self-Defense System
SSEE	Ship's Signal Exploitation Equipment
SSP	Strategic Systems Programs
STAT	scientific test and analysis techniques
STEM	science, technology, engineering, and mathematics
STOVL	short takeoff and vertical landing
STRI	Simulation, Training, and Instrumentation
STRL	Science and Technology Reinvention Laboratory
SUW	surface warfare
SV	software version
SVT	security verification testing
SWS	Strategic Weapons System
SYSCOM	systems command
T&E	test and evaluation
TACC	tactical air command center
TAOC	tactical air operations center
TD	Technology Development
TDP	Technology Development Plan
TECHEVAL	technical evaluation
TEIP	T&E Enterprise Improvement Process
TEMP	Test and Evaluation Master Plan
TEVV	test, evaluation, verification, and validation
TEWG	T&E Working Group
TFA	Test Functional Area
TFM	Test Functional Manager
TKA	Tail Kit Assembly

TI	technical insertion
TMRR	Technology Maturation and Risk Reduction
TOO	target of opportunity
TOW	tube-launched, optically tracked, wire-guided
TR	Tactical Radios; Trouble Report
TRA	technology readiness assessment
TRD	Technical Requirements Document
TRL	Technology Readiness Level
TRMC	Test Resource Management Center
TS	Top Secret; Test Squadron
TSCE	Total Ship Computing Environment
TSCRS	Tri-Service C-band Roadmap Study
TSMO	Threat Systems Management Office
TSP	Threat Systems Program
TSPI	time-space-position information
TSRM	third-stage rocket motor
TST	Test Specification Tool
UARC	University Affiliated Research Center
UAS	unmanned aircraft system; Unmanned Autonomous System
UAT	user acceptance test
UE	user equipment
UHF	ultrahigh frequency
UK	United Kingdom
ULTRA	Unified Lab for Tactical Radios–Army
U.S.C.	United States Code
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USMC	U.S. Marine Corps
USN	U.S. Navy
USW	undersea warfare

VPM	VIRGINIA payload module
VPT	VIRGINIA payload tube
VS	volume search
VV&A	verification, validation, and accreditation
VX-20	Air Test and Evaluation Squadron Twenty
VX-23	Air Test and Evaluation Squadron Twenty-Three
WARP	wing air refueling pod
WC	Warfare Center
WCDMA	wideband code division multiple access
WDA	weapons delivery accuracy
WIN-T	Warfighter Information Network–Tactical
WIPT	Working Integrated Product Team
WNW	Wideband Networking Waveform
WRC	World Radiocommunication Conference
WRP	Western Regional Partnership
WSAT	weapon system accuracy test
W/SC	Warfare and System Center
WSMR	White Sands Missile Range
WTI	Weapons and Tactics Instructor
YPG	Yuma Proving Ground

Department of Defense Developmental Test and Evaluation FY 2015 Annual Report

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