Tactical Tomahawk Missile and Weapon System

Executive Summary

- In FY17, the Navy successfully concluded Tactical Tomahawk Weapon Control System (TTWCS) operational test event OT-D-8. Testing included cybersecurity events, a reliability/maintainability maintenance demonstration, a non-firing strike group scenario, modeling and simulation, and a live fire flight test event.
- Upon completion of the Operational Test Launch program in 2013, DOT&E removed the Tomahawk Weapon System (TWS) from operational testing oversight. This decision was based upon TWS's history of consistent satisfactory performance over the past 9 years in test planning, test execution, and meeting reliability and performance requirements.
- In FY17, the Navy issued an acquisition strategy for a series of incremental upgrades to develop an anti-ship capability. These upgrades modify the Block IV Tactical Tomahawk (TACTOM) into a Maritime Strike Tomahawk (MST). Consistent with mission changes brought about by plans to develop an anti-ship capability, the TWS was placed back on DOT&E oversight. The Navy intends to field MST as a Rapid Deployment Capability (RDC) with a Quick Reaction Assessment (QRA) test strategy with an Initial Operational Capability fielding in FY22. However, a QRA alone will not support fielding beyond an initial capability.
- To collect sufficient data for an adequate assessment of the MST capability, DOT&E identified the need for 16 test flights which could be accommodated by a combination of developmental and operational tests. Accomplishing this scope of live testing is reliant upon the Navy developing a tactical software in the-loop modeling and simulation test bed similar to the current Tomahawk modeling and simulation test bed for the land attack mission area.
- The Navy has yet to provide any plans to assess the functionality and lethality of the warhead against the MST target set.

System

- The Tomahawk Land Attack Missile is a long-range land attack cruise missile designed for launch from submarines and surface ships. Beginning in 2017, the Navy began planning the development of the anti-ship capability as part of the Block IV modernization program. To provide the anti-ship capability of the MST, a new seeker will be developed; however, the warhead for the MST mission will be the same as on the Block IV system.
- Currently, there are three fielded variants: Block III with a conventional unitary warhead, Block III with a conventional submunitions warhead, and Block IV with a conventional unitary warhead. Production of Tomahawk Block II and III missiles is complete. The Block IV Tomahawk is in production as the follow-on to the Block III conventional unitary warhead variant. These missiles are produced at lower cost and provide added capability, including the ability to communicate and be redirected to an alternate target during flight.
- The TWS also includes the Tomahawk Theater Mission Planning Center (TMPC) and the shipboard TTWCS. The TMPC and TTWCS provide for command and control, targeting, mission planning, distribution of Tomahawk tactical and strike data, and post launch control of Block IV missiles.

Mission

The Joint Force Commander employs naval units equipped with the TWS for long-range, precision strikes against land targets. Planned MST upgrades will allow the Joint Force Commander to employ the TWS in anti-ship missions.

Major Contractors

- Missile Element: Raytheon Missile Systems – Tucson, Arizona
- Weapon Control System Element: Lockheed Martin – Valley Forge, Pennsylvania
- Mission Planning Element:
  - Vencore, Inc. – San Jose, California (Mission Distribution System)
  - Tapestry Solutions – St. Louis, Missouri (Tomahawk Planning System)
  - BAE Systems – San Diego, California (Targeting Navigation Toolset)

Activity

- In 2013, DOT&E removed the TWS from oversight. This decision was based upon TWS history of consistent satisfactory performance over the past 9 years in test planning, test execution, and in meeting reliability and performance requirements. In FY17, DOT&E placed the TWS back on operational testing oversight because of the intended mission capability change initiated by the MST development.
- In October 2016, based on direction by the Deputy Secretary of Defense, the Navy approved an acquisition strategy for a series of incremental upgrades that modify the Block IV TACTOM into an MST. The Navy plans to introduce this capability in a subset of the TACTOM population (Block IV) as these missiles are inducted into the recertification line.
- In December 2016, operational test event OT-D-8, which commenced on February 22, 2016, completed. Testing was conducted in accordance with a DOT&E-approved test plan. Testing included cybersecurity events, a reliability/maintainability maintenance demonstration, non-firing strike group scenarios, modeling and simulation, and a live fire flight test. The Navy's Operational Test and Evaluation Force (OPTEVFOR) issued a classified operational test report on February 6, 2017. As the program was not under T&E oversight at the time, DOT&E did not oversee these test events.

Assessment

- The Navy plans to introduce the MST capability into the Block IV TACTOM missiles as the missiles go through their modernization process. The Navy does not intend to develop an MST Capability Development Document/Capability Production Document or any other type of requirements document to guide the developmental or operational test planning. Bypassing the Joint Capabilities Integration and Development System process, the Navy issued a Memorandum of Capability on January 19, 2017. At present, this document is the sole requirements document supporting development, production, and operational testing.
- The Navy intends to field MST as an RDC. The Navy's fielding decision will be informed by a limited initial operational test known as a QRA. Traditionally, RDCs conduct QRAs in order to inform a decision to expeditiously field an initial capability, but then plan and execute a full operational test program to support a full-fielding decision. The Navy's plan to conduct operational or live fire (lethality) testing to support a full-fielding decision/capability deployment is unclear. OPTEVFOR is developing an integrated evaluation framework to facilitate development of operational test plans and to identify resource needs. A subset of this overall operational test to support full deployment of the capability will frame the QRA. Consistent with direction for programs on oversight, the Tomahawk Test and Evaluation Master Plan (TEMP) will undergo revision to capture the post-RDC testing strategy and the resources required to execute should the decision be made to continue forward with a full fleet-wide system release.
- During initial MST T&E planning discussions, DOT&E provided the Navy with an operational test design that utilized, as an analogy, the existing validated requirements for the Offensive Anti-Surface Weapon (OASuW) program. While the OASuW material solution is different (Long Range Anti-Ship Missile (AGM-158C LRASM)), the basic mission was assumed to be similar enough to act as a basis to develop a test design. Subsequent to providing this design, the Navy released the MST Memorandum of Capability and its contents did not require alteration of DOT&E's test design. To collect sufficient data for an adequate assessment of the capability, the test design identified the need for 16 test flights (refined from the initial 36 test flight design) conducted as integrated developmental and operational testing. This reduced number of live flight tests assumes the Navy will develop a tactical software-in-the-loop modeling and simulation test bed to support the maritime strike mission that is similar to the current Tomahawk modeling and simulation test bed for the land attack mission area. Because of the very different environments and target characteristics, the current modeling and simulation test bed, optimized for the land attack mission, is not adequate for the maritime strike mission.
- The Navy is not planning to assess the lethality of the MST against its intended target set. Since ships are a new class of targets for the Tomahawk, the lethality against these targets must be demonstrated prior to fielding. The MST will also retain the land-attack role, therefore the Navy must also assess the lethality of the MST against the legacy land targets.

Recommendations

- Status of Previous Recommendations. The Navy has partially addressed previous recommendations.
- FY17 Recommendation.
  1. The Navy should plan to conduct, and budget appropriately for, full operational and live fire testing of the MST capability. This should include development of a tactical software-in-the-loop modeling and simulation test bed, and functionality and lethality testing of the warhead for the Memorandum of Capability reference target set as well as legacy land attack missions. This planning must be documented in an approved TEMP.