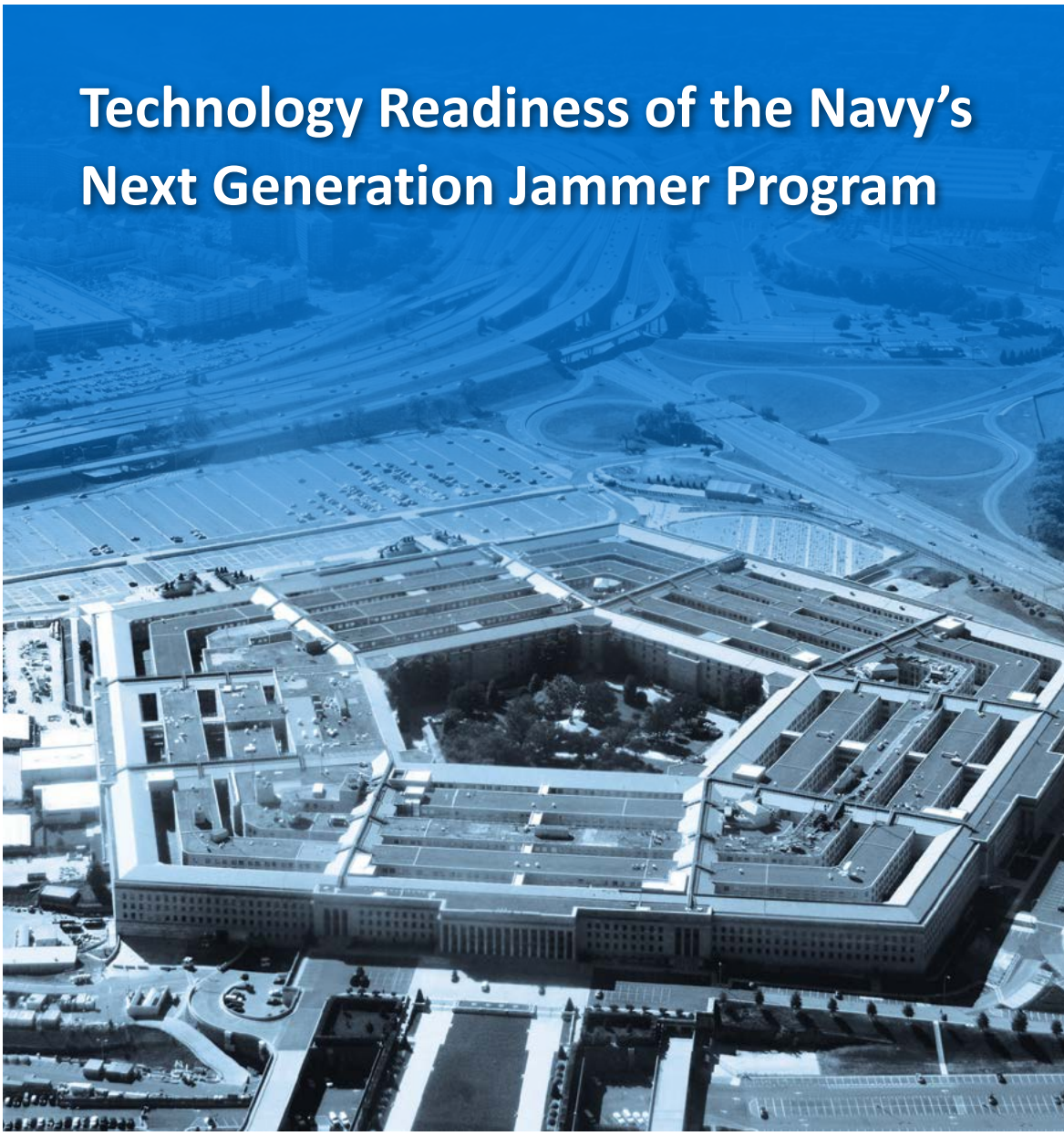
Report No. DODIG-2018-098

INSPECTOR GENERAL

U.S. Department of Defense

MARCH 30, 2018

Technology Readiness of the Navy's Next Generation Jammer Program



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Results in Brief

Technology Readiness of the Navy's Next Generation Jammer Program

March 30, 2018

Objective

We determined whether the Navy adequately planned and performed a technology readiness assessment (TRA) of the critical technologies for the Next Generation Jammer (NGJ) program before it progressed into the engineering and manufacturing development (EMD) phase of the acquisition.

Background

The Naval Air Systems Command (NAVAIR) Airborne Electronic Attack Systems and EA-6B Program Office is responsible for acquiring, delivering, and sustaining the Navy's airborne electronic attack systems, including the NGJ. The NGJ is an external, aircraft-mounted tactical jamming system intended to disrupt enemy air defenses and communications networks. The NGJ is being designed to replace 1970s-era technology with a more reliable system of electronic warfare technologies capable of combating current and emerging air defense systems. NAVAIR is pursuing a three-part incremental approach to acquire the NGJ system (Mid-Band, Low-Band, and High-Band) and at the time of our evaluation, NAVAIR had completed a TRA on the first increment. As a result, this evaluation focused on only the first increment of the program (NGJ Mid-Band).

A TRA is a systematic assessment of the critical technologies to be incorporated into a weapon system. A critical technology is an enabling technology that is deemed critical to meet operational performance

Background (cont'd)

of the system being acquired. It is also: (a) a technology or application of a technology that is considered either new or novel or (b) represents an area that poses a significant technological risk during product development. The purpose of a TRA is to inform decision makers whether a program's technologies are mature enough for entry into the EMD phase and to determine whether the intended technologies have been successfully demonstrated in a relevant environment. A relevant environment is a testing environment that simulates both the most important and most stressing aspects of the operational environment.

The purpose of the EMD phase is to develop, build, and test a product to verify that all operational and derived requirements have been met and to support production or deployment decisions. Programs that enter the EMD phase with immature technologies are likely to incur cost growth and schedule slippage—ultimately delaying the delivery of needed military capabilities to the warfighter.

Finding

We determined that NAVAIR adequately planned and performed a TRA of the critical technologies used on NGJ Mid-Band. NAVAIR established an independent team of subject matter experts (SMEs), referred to in this report as NAVAIR SMEs. The NAVAIR SMEs determined which of the program's technologies were critical and needed to be demonstrated (through test events) in a relevant environment before entry into the EMD phase of the acquisition. After the test events were completed, the Assistant Secretary of Defense for Research and Engineering (ASD[R&E]) established a separate independent team of SMEs, referred to in this report as ASD(R&E) SMEs. The ASD(R&E) SMEs reviewed the critical technologies identified by the NAVAIR SMEs, along with the test results, and completed the TRA. The ASD(R&E) SMEs determined that the critical technologies in NGJ Mid-Band were adequately demonstrated in a relevant environment and were ready to proceed to EMD.

Results in Brief

Technology Readiness of the Navy's Next Generation Jammer Program

Finding (cont'd)

We also evaluated the test results for the critical technologies in increment one and found that they met performance requirements under the stresses of the relevant environment. Therefore, we determined that NAVAIR adequately planned and performed a TRA of the critical technologies for NGJ Mid-Band.

Management Comments and Our Response

We did not make any recommendations; therefore, we did not require any comments and we are publishing this final report.

INSPECTOR GENERAL
DEPARTMENT OF DEFENSE
4800 MARK CENTER DRIVE
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March 30, 2018

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR RESEARCH AND ENGINEERING
NAVAL INSPECTOR GENERAL

SUBJECT: Technology Readiness of the Navy's Next Generation Jammer Program
(Report No. DODIG-2018-098)

We are providing this report for your information and use. We conducted this evaluation in accordance with the "Quality Standards for Inspections and Evaluations," published in January 2012 by the Council of the Inspectors General on Integrity and Efficiency.

We appreciate the courtesies extended to the staff. [redacted]

Randolph R. Stone
Deputy Inspector General
Policy and Oversight

Contents

Introduction

Objective

We conducted this evaluation to determine whether the Navy adequately planned and performed a technology readiness assessment (TRA) of the critical technologies for the Next Generation Jammer (NGJ) program before it progressed into the engineering and manufacturing development (EMD) phase of the acquisition.[1]

Specifically, we evaluated whether the Navy planned NGJ TRA activities, established an independent TRA panel of experts, and identified the program's critical technologies to be assessed in accordance with DoD and Navy policies and guidance. We also evaluated whether the Navy's definition of the relevant environment for each critical technology was in line with the system's intended operational environment and with each critical technology's role within the system.[2] In addition, we evaluated the results from test events that were used to determine whether each critical technology was demonstrated in its relevant environment.

Background

DoD Acquisition Milestones and Phases

The Defense Acquisition System consists of three milestones to manage major defense acquisitions.

- Milestone A initiates the technology maturation and risk reduction phase.
- Milestone B initiates the EMD phase.
- Milestone C initiates the low rate initial production and deployment phase.

This report focuses on Milestone B and the program's preparation for the EMD phase. The purpose of the EMD phase is to develop, build, and test a product to verify that all operational and derived requirements have been met and to support production or deployment decisions. Programs that enter the EMD phase with immature technologies are likely to incur cost growth and schedule slippage—ultimately delaying the delivery of needed military capabilities to the warfighter.

[1] Naval Air Systems Command (NAVAIR) Manual M-3910.1, "NAVAIR Technology Readiness Assessment Manual," February 7, 2017, defines a critical technology as an enabling technology that is deemed critical to meet operational performance of the system being acquired. It is also: (a) a technology or application of a technology that is considered either new or novel or (b) represents an area that poses a significant technological risk during product development.

[2] A relevant environment is a testing environment that simulates both the most important and most stressing aspects of the operational environment. Demonstration of a technology in a relevant environment typically consists of laboratory testing of a model or prototype system or subsystem that is near the desired configuration in terms of performance, weight, and volume.

A TRA provides an evaluation of the maturity of a program's technology to the Milestone Decision Authority to support the advancement of a program beyond Milestone B.[3]

Technology Readiness Assessments

At the time of the NGJ Mid-Band program TRA in November of 2015, section 2366b, title 10, United States Code (10 U.S.C. §2366b [2006]) required major defense acquisition programs to certify before Milestone B that, among other requirements,

> the technology in the program has been demonstrated in a relevant environment, as determined by the Milestone Decision Authority on the basis of an independent review and assessment by the Assistant Secretary of Defense for Research and Engineering.

Furthermore, DoD Instruction 5000.02, "Operation of the Defense Acquisition System," January 7, 2015, required the program manager to conduct a TRA for major defense acquisition programs to support certification of the program, in accordance with 10 U.S.C. §2366b. As such, the NGJ Mid-Band program was subject to a TRA before progressing into the EMD phase of the acquisition.

A TRA is a systematic, metrics-based process to assess the maturity of critical technologies and the risk associated with their use in major defense acquisition programs. The Assistant Secretary of Defense for Research and Engineering (ASD[R&E]) Guide, "Technology Readiness Assessment (TRA) Guidance," April 2011, establishes the process for conducting a TRA. The process includes creating a TRA plan and schedule, forming an independent team of subject matter experts (SMEs) to perform the assessment, identifying the technologies to be assessed, collecting evidence of maturity, and ultimately assessing the technology maturity. The purpose of a TRA is to provide decision makers with an independent assessment of the risk associated with the technologies incorporated in major defense acquisition programs—including whether the technologies have been demonstrated in a relevant environment.

A relevant environment is a testing environment that simulates both the most important and most stressing aspects of the operational environment. With the assistance of the independent subject matter expert team, the program manager defines the relevant environment for a program's critical technologies. Successful demonstration of a program's technologies in a relevant environment is an indicator that those technologies can be successfully developed for production and deployment.

[3] The Milestone Decision Authority is the designated individual with overall responsibility for a program. The Milestone Decision Authority has the authority to approve entry of an acquisition program in the next phase of the acquisition process and is accountable for cost, schedule, and performance reporting to higher authority, including Congress.

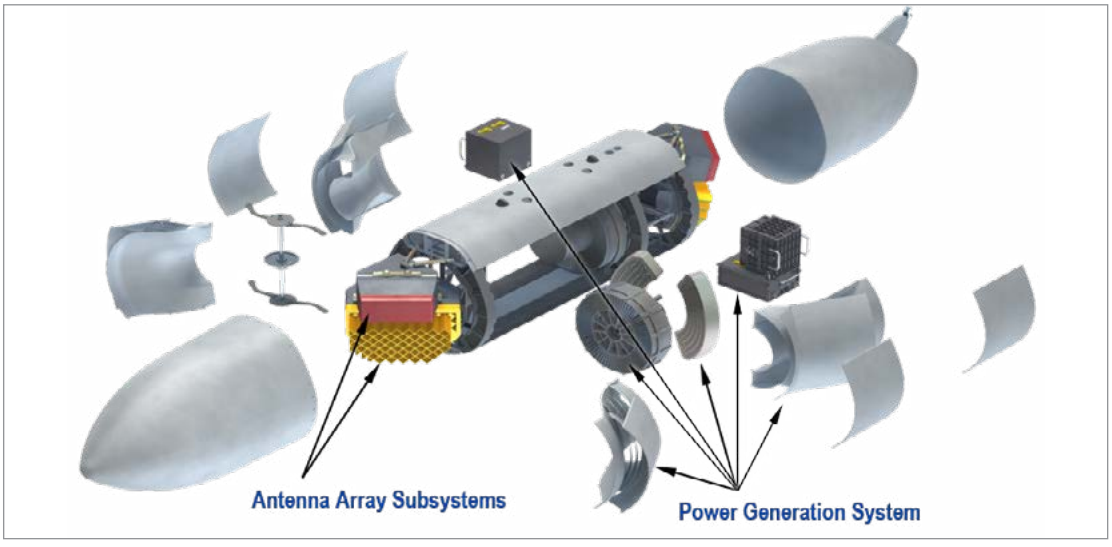
Next Generation Jammer System

The NGJ is a U.S. Navy external, aircraft-mounted tactical electronic jamming system intended to replace aging systems currently used on electronic attack aircraft. The Navy has used the current electronic jamming system since the early 1970s to disrupt enemy air defenses and communications networks. The NGJ will modernize the Navy's airborne electronic attack capability, making it capable of combating current and emerging air defense systems used by the enemy.

The Naval Air Systems Command (NAVAIR) program office is pursuing an incremental approach to acquire the NGJ and at the time of our evaluation, NAVAIR had completed a TRA on the first of three increments. As a result, this evaluation focused on only the first increment of the program (referred to as "NGJ Mid-Band" for the remainder of this report). The NGJ achieved Milestone B on April 5, 2016. See the DoD Acquisition Milestones section of this report for details on the Defense Acquisition System.

The NGJ Mid-Band system consists of two pods per aircraft—one pod per wing. The NGJ Mid-Band pod is modular, containing several major subsystems. However, this report focuses on the seven critical technologies that needed to be demonstrated in a relevant environment before the program progressed into the EMD phase of the acquisition. The power generation system is one of the critical technologies and the antenna array subsystems contain six additional critical technologies. The power generation system uses airflow while in flight to produce power for the pod. The antenna array subsystems enable the transmission of electromagnetic signals necessary to perform the intended tactical jamming of threat systems. See the Figure for details.

Figure. NGJ Mid-Band Pod Conceptual Design.



Source: NAVAIR

NGJ Program Management and Key TRA Participants

Under Secretary of Defense for Acquisition, Technology, and Logistics

The USD(AT&L) was the Milestone Decision Authority for the NGJ Mid-Band program.[4] The Milestone Decision Authority has the ability to approve entry of an acquisition program into the next phase of the acquisition process and is accountable for cost, schedule, and performance reporting to higher authority, including Congress.

Assistant Secretary of Defense for Research and Engineering

The ASD(R&E)—who, reported to the USD(AT&L)—provided science and technology leadership to shape strategic direction and strengthen research and engineering coordination efforts throughout the DoD. The ASD(R&E) was responsible for performing an independent review of a program's TRA results to advise the Milestone Decision Authority as to whether the technologies have been demonstrated in a relevant environment.

NAVAIR Airborne Electronic Attack Systems and EA-6B Program Office

The NAVAIR Airborne Electronic Attack Systems and EA-6B Program Office is responsible for acquiring, delivering, and sustaining airborne electronic attack systems. The NGJ is within the portfolio of programs that this program office manages.

[4] As of February 1, 2018, in accordance with Public Law 114-328, "National Defense Authorization Act for Fiscal Year 2017," Section 901, "Organization of the Office of the Secretary of Defense," the Office of the USD(AT&L) was reorganized to establish the Office of the Under Secretary of Defense for Research and Engineering and the Office of the Under Secretary of Defense for Acquisition and Sustainment.

Finding

NAVAIR Adequately Assessed the Readiness of Critical Technologies for the NGJ Mid-Band Program Before Entry into the Engineering and Manufacturing Development Phase of the Acquisition

NAVAIR ensured that all critical technologies used on the NGJ Mid-Band program were adequately matured and demonstrated in a relevant environment before progressing into the EMD phase of the acquisition. This occurred because NAVAIR properly performed a technology readiness assessment for the NGJ Mid-Band program in accordance with DoD and Navy requirements and employed sufficient engineering rigor, testing, and demonstration.

NAVAIR's Process for Planning Technology Readiness Assessment Efforts

On June 12, 2014, the NAVAIR initiated the TRA process for the NGJ Mid-Band program and created a TRA plan, which was approved on July 21, 2014. This TRA plan established an independent team of 20 SMEs, including members from the Office of Naval Research, Naval Research Laboratory, and the research and engineering competency of NAVAIR headquarters.

Identification of the Seven Critical Technologies

To identify the critical technologies used on a program, the system design is broken down into a list of components and subsystems. The NAVAIR TRA handbook provides a template for a technical work breakdown structure (TWBS) to be delivered as an annex to a contractor's proposal for the technology development phase. A TWBS is a tool used to define a product or program's discrete technical elements in a hierarchical format, including the systems, subsystems, and components that comprise the product or program. Accordingly, the NGJ Mid-Band prime contractor delivered a TWBS to NAVAIR, detailing the design of the proposed NGJ Mid-Band system. The NAVAIR SMEs identified the critical technologies based on an analysis of the TWBS and the maturity of the design elements.

The NAVAIR SMEs identified seven critical technologies used on NGJ Mid-Band. They identified the power generation system as one of the critical technologies and the antenna array subsystems as having six additional critical technologies.

The power generation system was defined by the NAVAIR SMEs as the combination of components that produces power for the antenna array subsystems and other components of the pod.[5] The NAVAIR SMEs determined that the power generation system was a critical technology due to the risks associated with the integration of its components and their ability to generate the required power in a widely varying aerodynamic environment. Constraints on the size and weight of the components compounded these risks.

The six antenna array components (the antennas, circulators, and transmit/receive modules) collectively enable the transmission of electromagnetic signals necessary to perform the intended tactical jamming of threat systems.[6] The NAVAIR SMEs determined that these antenna array components were critical technologies for the following reasons.

- The antenna array subsystems used new, state of the art semiconductor materials.
- The design had demanding size, weight, and power consumption constraints.
- The performance requirements pushed the limits of the capabilities of the technologies.

The antenna array subsystems and the six critical technologies they contain were integrated and tested collectively.

We evaluated the: (1) TWBS, (2) the criteria for identifying critical technologies, and (3) the rationale supporting which elements of the NGJ Mid-Band design were deemed critical technologies. Based on our evaluation, we agreed with NAVAIR on its selection of the seven technologies to include in the TRA.

The NGJ Mid-Band TWBS included 26 technology elements that made up the NGJ Mid-Band pod. We evaluated the details of all 26 technology elements, including their function in the pod and design heritage.[7] We found that 19 of the NGJ Mid-Band technologies were already mature based on their reuse of previously used materials in a similar environment, use of mature military standard equipment and repackaged commercial-off-the-shelf components, and reuse of existing software previously used on weapon systems in a similar environment.

We also found that the seven critical technologies used new materials and components that were integrated into the system in new and unproven ways. The performance expectations of the NGJ Mid-Band system pushed the limits of

[5] While in flight, the power generation system uses air to spin a turbine, which produces electrical energy for the system.

[6] In the NGJ Mid-Band system, a circulator is an electronic device that directs signals into and out of an antenna.

[7] The design heritage of a technology element was defined by NAVAIR as whether the design or development approach was a brand new design or the extent to which it was derivative of a design that was previously demonstrated in a laboratory or operational environment.

power generation and jamming capability while constraining the materials and components to stricter size and weight requirements than the previous systems. In addition, these seven technologies posed a significant technological risk to critical NGJ Mid-Band operational performance characteristics and required further development. Therefore, we agreed with the NAVAIR SMEs' identification of these seven technologies as critical.

Identification of the Relevant Environment for the Critical Technologies

The NGJ Mid-Band TRA plan defined the relevant environment based on the stresses each critical technology experiences under mission-relatable scenarios. While under these stresses, each critical technology must be demonstrated to function to an acceptable level of performance defined by the TRA plan.

For example, the power generation system needed to manage the turbine speed while subject to varying air speed and pressure and generate the electrical energy necessary to power the antenna array subsystems. The antenna array subsystems needed to transmit the required level of power while they were installed in the pod and were maintaining a specified operating temperature. Furthermore, the power generation system and antenna array subsystems needed to do all of this while being at or near the allocated size and weight requirements.

Based on our review of the NGJ Mid-Band documents, including the TRA plan, system performance specification, and technology maturation plans, we found that the relevant environment defined for each critical technology of the NGJ Mid-Band pod adequately represented the operational requirements of the NGJ and the manner in which the critical technologies interface within the pod.

Specifically, for the power generation system critical technology, we compared the TRA plan's definition of the electrical, aerodynamic, and logical aspects of the relevant environment to the NGJ system performance specifications and found that they matched. For example, the relevant electrical environment was defined as the electrical load representative of full power electromagnetic signal transmission. The relevant aerodynamic environment was defined as the flight envelope stated in the NGJ system performance specification. Additionally, the relevant logical environment was defined as the active software control of the turbine speed using data input from a pod component external to the power generation system (simulating normal operation).

For the antenna array subsystem critical technologies, we compared the TRA plan's definition of the electrical and thermal aspects of the relevant environment to the NGJ system performance specifications and found that they also matched.

For example, the relevant electrical environment was defined as the maximum transmitted electromagnetic signal power level over the required frequency range stated in the NGJ system performance specification. The relevant thermal environment was defined as antenna array subsystem operation in the relevant electrical environment while connected to a cooling system representative of that present in the pod external to the antenna array subsystems.

Therefore, we determined NAVAIR's definition of the relevant environment for each of the critical technologies was correct.

Conclusion of the Milestone B TRA Review

On November 19, 2015, the NGJ Mid-Band TRA process culminated in an onsite review of test results by the ASD(R&E) SMEs.[8] After meeting in November of 2015 and reviewing the results of the technology maturity demonstrations for the NGJ, the ASD(R&E) SMEs concluded that all NGJ Mid-Band critical technologies had been successfully demonstrated in a relevant environment.

Critical Technologies Testing

The conclusion of the NGJ Mid-Band TRA relied on the results of two key test events. The first test event, conducted in June of 2015, demonstrated that the power generation system had attained the level of maturity necessary to proceed into EMD. This test event demonstrated a prototype of the power generation system in a wind tunnel to simulate system-specification-required altitudes and speeds. The power generation system showed that it could control the speed of the turbine to generate the required amount of electrical power in a relevant environment.

A second key test event in July and August of 2015 demonstrated the maturity of the antenna array technologies. This test event demonstrated both antenna array subsystems in a test chamber, which simulated the relevant environment. The test results showed that the transmitted power from each antenna array subsystem met performance requirements. Therefore, this test event demonstrated the antenna array subsystem technologies in a relevant environment.

We reviewed documentation of the TRA and supporting evidence for the ASD(R&E) SMEs' determination regarding the maturity of the critical technologies. Specifically, we evaluated the results of the test events for the power generation system and the antenna array subsystems to determine whether the technical

[8] The final team that performed the NGJ Mid-Band Milestone B TRA was composed of six subject matter experts, including representatives of the ASD(R&E), office of the Deputy Assistant Secretary of Defense for Developmental Test and Evaluation, Office of Naval Research, Air Force Research Laboratory, and Naval Research Laboratory.

data used to support the TRA conclusions provided evidence that the technologies were demonstrated in a relevant environment. We found that NAVAIR successfully demonstrated prototypes of the critical technologies under the stresses of the relevant environment. Therefore, we agree with the ASD(R&E) SMEs' conclusion on the NGJ Mid-Band TRA.

Summary

We found that NAVAIR adequately planned and conducted a technology readiness assessment of the critical technologies used on the NGJ Mid-Band program. NAVAIR established an independent team of SMEs to assist the program office in determining what technologies needed maturation before entry into the EMD phase of the acquisition. The NAVAIR SMEs also assisted the program office in planning the necessary tests and subsystem demonstrations.

Based on the results of these efforts, ASD(R&E) established a separate team of SMEs which independently concluded that all of the program's critical technologies were successfully demonstrated in a relevant environment and therefore, were adequately matured. We agree with the ASD(R&E) SMEs' conclusion and found that it supported the MDA's approval for entry into the EMD phase of the acquisition.

Appendix

Scope and Methodology

We conducted this evaluation from August 2017 through March 2018 in in accordance with the "Quality Standards for Inspection and Evaluation," published in January 2012 by the Council of Inspectors General on Integrity and Efficiency. Those standards require that we adequately plan this evaluation to ensure that objectives were met and that we performed the evaluation to obtain sufficient, competent, and relevant evidence to support the findings, conclusions, and recommendations. We believe that the evidence obtained was sufficient, competent, and relevant to lead a reasonable person to sustain these findings, conclusions, and recommendations.

We interviewed key personnel at the Navy's Airborne Electronic Attack Systems and EA-6B Program Office (Naval Air Station Patuxent River, Maryland). We collected, reviewed, and analyzed technical data and documents related to the TRA for the NGJ Mid-Band program to determine whether the Navy adequately planned and performed the TRA, in accordance with DoD and Navy policies and guidance. Specifically, we:

- reviewed acquisition planning documentation to determine whether the NGJ program adequately planned the technology readiness assessment and assigned a team of independent SMEs to perform the assessment;
- reviewed the NGJ system's technical work breakdown structure and criteria for identifying critical technologies—technologies that are new or novel, expected to operate in a new environment or beyond its original design intention or demonstrated capability, or that pose a major development or demonstration risk—to determine whether the program adequately identified the critical technologies to be assessed; and
- reviewed documentation of the technology readiness assessment and supporting evidence for the independent SME team's determination regarding the technology maturity of the critical technologies (including records of tests or demonstrations of the technologies, technical papers, test reports, technical presentations). We reviewed the documentation to determine whether the technical data used to support the TRA conclusions provided evidence that the technologies were demonstrated in a relevant environment.

We based our evaluation on the following statutes, policies, and guidance.

- Section 2366b, title 10, United States Code, "Major defense acquisition programs: certification required before Milestone B or Key Decision Point B approval."
- DoD Instruction 5000.02, "Operation of the Defense Acquisition System," January 7, 2015, Incorporating Change 2, February 2, 2017.
- Assistant Secretary of Defense for Research and Engineering Guide, "Technology Readiness Assessment (TRA) Guidance," April 2011.
- Office of Naval Research Instruction 3900.40, "Office of Naval Research Process for Conducting Technology Readiness Assessments within the DON," April 18, 2012.
- Naval Air Systems Command Instruction 3910.1, "Technology Readiness Assessment Process," October 21, 2009.

Use of Computer-Processed Data

We did not use computer-processed data to perform this evaluation.

Prior Coverage

During the last 5 years, the DoD Office of Inspector General (DoD OIG) and the Naval Audit Service issued two reports discussing technology maturity issues and technology readiness assessments. Unrestricted DoD OIG reports can be accessed at http://www.dodig.mil/pubs/index.cfm. Naval Audit Service reports are not available over the Internet.

DoD OIG

Report No. DODIG-2016-107, "Advanced Arresting Gear Program Exceeded Cost and Schedule Baselines," July 5, 2016

> The Program Manager, Aircraft Launch and Recovery Equipment, did not effectively manage the acquisition to meet requirements and execute testing for the Advanced Arresting Gear program. Ten years after the program entered the EMD phase, the Navy had not been able to prove the capability or safety of the system to a level that would permit actual testing of the system on an aircraft carrier because of hardware failures and software challenges. This occurred because the Navy pursued a technological solution for its Ford-class carriers that was not sufficiently mature for the planned use, resulting in hardware failures to mechanical and electrical components and software modifications to accommodate those failures.

Navy

Report No. N2017-0004, "Technology Readiness Assessments at Marine Corps Systems Command and Affiliated Program Executive Offices," December 8, 2016

Marine Corps Systems Command (MARCORSYSCOM) and Program Executive Office-Land Systems (PEO LS) did not effectively execute their Technology Readiness Assessment (TRA) process for Acquisition Category (ACAT) II, III, and IV programs as required by Secretary of the Navy (SECNAV) regulations. Specifically, the Naval Audit Service found that, of the 41 ACAT programs reviewed, with a total value of about $17.1 billion, MARCORSYSCOM and PEO LS did not: (1) conduct TRAs on 13 (ACAT II, III, and IV) programs; (2) maintain sufficient documentation supporting assessments for 27 of 41 ACAT programs; (3) consistently form an Independent Review Panel (IRP) to assess the maturity of the technology; and (4) identify and finalize the list of critical technology elements (CTEs).

Acronyms and Abbreviations

ASD(R&E)	Assistant Secretary of Defense for Research and Engineering
EMD	Engineering and Manufacturing Development
NAVAIR	Naval Air Systems Command
NGJ	Next Generation Jammer
SME	Subject Matter Expert
TRA	Technology Readiness Assessment
TWBS	Technical Work Breakdown Structure
U.S.C.	United States Code
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics

Glossary

Critical Technology. An enabling technology that is deemed critical to meet operational performance of the system being acquired. It is also: (a) a technology or application of a technology that is considered either new or novel or (b) represents an area that poses a significant technological risk during product development.

Engineering and Manufacturing Development. Engineering and manufacturing development (EMD) is the third phase of the acquisition life cycle that begins after achieving Milestone B. The purpose of this phase is to develop, build, and test a product to verify that all operational and derived requirements have been met, and to support production or deployment decisions.

Major Defense Acquisition Program. There are two ways an acquisition program becomes a major defense acquisition program. The first is if the program is designated one by the Secretary of Defense. The second is if the Secretary of Defense estimates the program will require an eventual total expenditure for research, development, test and evaluation, including all planned increments, of more than $480 million in FY 2014 dollars, or for procurement, including all planned increments, of more than $2.79 billion in FY 2014 dollars.

Milestone. The purpose of a milestone is to carefully assess a program's readiness to proceed to the next acquisition phase and to make a sound investment decision committing the DoD's financial resources. For example, Milestone A approves entry into the technology maturation and risk reduction phase, Milestone B approves entry into the engineering and manufacturing development phase, and Milestone C approves entry into the production and deployment phase.

Milestone Decision Authority. The Milestone Decision Authority is the designated individual with overall responsibility for a program. The Milestone Decision Authority has the authority to approve entry of an acquisition program in the next phase of the acquisition process and is accountable for cost, schedule, and performance reporting to higher authority, including Congress.

Relevant Environment. A representation of the intended environment that the system or technology will be used in, including considerations of the physical environment, logical environment, data environment, security environment, and user environment.

Technical Work Breakdown Structure. A tool used to define a product or program's discrete technical elements in a hierarchical format, including the systems, subsystems, and components that comprise the product or program.

Technology Maturation and Risk Reduction. Technology maturation and risk reduction is the second phase of the acquisition lifecycle that begins after Milestone A. The purpose of this phase is to reduce technology, engineering, integration, and life cycle cost risk before detailed design and development for production.

Technology Readiness Assessment. The systematic, metrics-based process to assess the maturity of, and the risk associated with, critical technologies to be used in major defense acquisition programs.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