

Naval Audit Service



Audit Report



Technology Readiness Assessments at Naval Sea Systems Command and Affiliated Program Executive Offices

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N2015-0017
2 April 2015

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MEMORANDUM FOR COMMANDER, NAVAL SEA SYSTEMS COMMAND

Subj: **TECHNOLOGY READINESS ASSESSMENTS AT NAVAL SEA SYSTEMS COMMAND AND AFFILIATED PROGRAM EXECUTIVE OFFICES (AUDIT REPORT N2015-0017)**

Ref: (a) NAVAUDSVC memo 2013-082, dated 31 May 13
(b) SECNAV Instruction 7510.7F, "Department of the Navy Internal Audit"

1. The report provides the results of subject audit announced by reference (a). Section A of the report provides our findings and recommendations, summarized management responses, and our comments on the responses. Section B provides the status of recommendations. The full text of the management response is included in the Appendix.

2. Commander, Naval Sea System Command (NAVSEA) responded to Recommendations 1 and 2. Corrective actions planned by NAVSEA and Affiliated Program Executive Offices meet the intent of the recommendations, which are considered open pending completion of planned corrective actions. The open recommendations are subject to monitoring in accordance with reference (b). Management should provide a written status report on the recommendations within 30 days after the target completion date.

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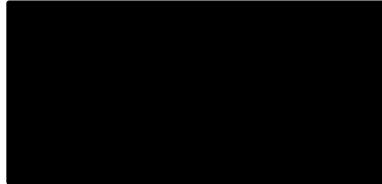
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5. Any request for this report under the Freedom of Information Act must be approved by the Auditor General of the Navy as required by reference (b). The report is also subject to followup in accordance with reference (b).
6. We appreciate the cooperation and courtesies extended to our auditors.



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Section A:

Finding, Recommendations, and Corrective Actions

Finding: Technology Readiness Assessment Process

Synopsis

Naval Sea Systems Command (NAVSEA) and its affiliated Program Executive Offices (PEOs) did not have an effective Technology Readiness Assessment (TRA) Program for Acquisition Category (ACAT) III and IV programs as required by the Department of Defense (DoD) and Secretary of the Navy (SECNAV) regulations. For example, NAVSEA and the PEOs did not: (1) conduct a TRA on 5 of 13 ACAT III and IV programs that we reviewed, and (2) establish TRA guidance to ensure participants on the Independent Review Panel are independent of the program.

In addition, program managers did not maintain sufficient documentation to support the assessments for 6 of 18 ACAT I - IV programs that we reviewed.

Overall, this condition occurred because: (1) NAVSEA and the PEOs had no designated Principal Points of Contact for TRA activities to provide oversight to ensure a consistent and disciplined process for NAVSEA acquisition programs; (2) NAVSEA had no internal policy established for implementing consistent practices when conducting TRA requirements; and (3) program managers for selected programs reviewed misunderstood TRA requirements for ACAT III and IV programs.

As a result of not having an effective TRA process, the Milestone Decision Authority (MDA) has less assurance that all critical technologies are identified and thoroughly assessed by independent experts prior to approving the program for entrance to the next acquisition phase. Furthermore, without an effective TRA process, stakeholders are more likely to accept immature technologies and experience significant cost and schedule increases that are related to problems with the technologies.

Reason for Audit

The audit objective was to verify that NAVSEA and its affiliated PEOs are effectively conducting technology readiness assessments for their respective acquisition programs in accordance with applicable DoD and Department of the Navy (DON) policies and procedures.

We conducted this audit because the Under Secretary of Defense for Acquisition Technology and Logistics stated in 2010 that the process for conducting TRAs strayed from its original intent and should be reformed. DoD Technology Readiness Assessment Guidance was published in April 2011. The Under Secretary stated in May 2011 that TRAs should only focus on technology maturity, as opposed to engineering and integration risks. He also said the responsibility for ensuring that technology maturity risk is adequately identified and mitigated should rest with the Program Manager, Program Executive Officer, and Component Acquisition Executive.

The FY 2010 Risk and Opportunity Assessment Report identified vulnerabilities impacting the overall management of weapon system acquisition. Also, since 1990, the Government Accountability Office has identified weapons system acquisition as a high-risk area.

Discussion of Details

Background

A TRA is a formal, systematic, metrics-based process and accompanying report that identifies and assesses the maturity of certain technologies called critical technology elements (CTEs) to be used in systems. Technology elements are critical if the system being acquired depends on this technology to meet operational requirements. The purposes of the TRA are (1) to provide the program manager with a comprehensive assessment of program technical risk, and (2) to support an independent assessment of the risk associated with the technologies incorporated in the program so that the MDA is informed as to whether certification can be accomplished, whether a waiver is appropriate, and whether risk-mitigation plans are adequate.

In 2001, the Deputy Under Secretary of Defense for Science and Technology issued a memorandum that endorsed the use of Technology Readiness Levels¹ for new acquisition programs. In 2003, DoD issued the first Technology Readiness Assessment Deskbook as guidance for conducting TRAs that applies to all the Services.

Effective 19 June 2012, Assistant Secretary of the Navy for Research, Development and Acquisition (ASN (RD&A)) no longer requires a TRA as part of a Major Defense Acquisition Program (MDAP) Milestone C review. This decision is consistent with current Office of the Secretary of Defense policy and DoD efforts to streamline the acquisition process. However, ASN (RD&A) requires Non-MDAP programs (ACAT II-IV) to conduct TRAs in accordance with the current guidance found in Secretary of the Navy Instruction 5000.2E.

¹ The technology readiness level of a CTE establishes the technological maturity of that CTE. Technology Readiness Levels are described by a number, 1 to 9, that corresponds to the degree of technology risk and demonstration of a technology in a relevant environment, with Technology Readiness Level 1 being the lowest or least level of technology readiness.

TRAs and technology maturity are subjects that have been addressed by the Government Accountability Office, DoD Inspector General's Office, and the Army Audit Agency. Congress has also voiced its concern about technology maturity in acquisition programs. Each year, DoD is required to submit to Congress a report that describes and justifies each case where an MDAP began system development with a technology that had not been demonstrated in a relevant environment.

A detailed background discussion is presented in Exhibit A.

Pertinent Guidance

DoD Instruction 5000.02, "Operation of the Defense Acquisition System," dated 12 May 2003. This instruction prescribes regulatory requirements to conduct TRAs on MDAP programs. Also in 2004, the Secretary of the Navy mandated TRAs for all Naval acquisition programs -- both MDAP and non-MDAPs -- applying the statutory requirement only to MDAPs. The TRA process is comprised of six major steps: (1) identifying CTEs, (2) collecting CTE data, (3) finalizing CTEs, (4) performing the TRA, (5) submitting the TRA, and (6) approving the TRA. Programs managers are responsible for identifying CTEs; the Independent Review Panel is responsible for finalizing CTEs and performing the TRA itself. The appropriate DoD or designated DoD authority approves the TRAs.

DoD Instruction 5000.02, "Operation of the Defense Acquisition System," dated 8 December 2008. This instruction prescribes mandatory Defense acquisition system policy. Specifically, instruction requires that a TRA be conducted for MDAPs at Milestone B, and whenever otherwise required by the MDA.

Assistant Secretary of Defense for Research and Engineering, "DoD Technology Readiness Assessment Guidance," dated April 2011. This prescribes procedures for meeting MDAPs' TRA requirements. This guidance was first prepared in September 2003 by the Office of the Secretary of Defense and experienced three updates (2005, 2009, and 2011). A TRA is required by DoD Instruction 5000.02 for MDAPs at Milestone B (or at a subsequent milestone if there is no Milestone B). TRAs are also conducted whenever otherwise required by the MDA. MDAs for non-ACAT I programs (Non-MDAPs) should consider requiring TRAs for those programs when technological risk is present.

Secretary of the Navy Instruction 5000.2E, "DON Implementation and Operation of the Defense Acquisition System and the Joint Capabilities Integration and Development System," dated 1 September 2011. This prescribes instructions for TRAs to be conducted on all ACAT I-IV programs at Milestones B and C, and at program initiation for ships. It further directs that DON approval authority for ACAT I/IA/II TRAs will be the Chief of Naval Research. DON approval for ACAT III/IV TRAs will be the appropriate PEO/System Command. This instruction also communicates that the

Office of Naval Research will provide amplifying information and guidance on the conduct of TRAs within DON.

ASN (RD&A) Memorandum dated 19 June 2012. This memorandum states that “Assistant Secretary of the Navy for Research, Development and Acquisition (ASN (RD&A)), will no longer require a Technology Readiness Assessment (TRA) as part of a Major Defense Acquisition Program (MDAP) Milestone (MS) C review. Non-MDAP programs should conduct TRAs in accordance with current SECNAVINST [Secretary of the Navy Instruction] 5000.2E guidance.”

Office of Naval Research (ONR) Instruction 3900.40, “Office of Naval Research Process for Conducting Technology Readiness Assessments within the DON,” dated 18 April 2012. This prescribes amplifying guidance on the conduct of TRAs within DON for all ACAT programs (ACAT I-IV). Office of Naval Research Director of Transition is responsible for the execution of ACAT I and II TRAs conducted for the Navy and Marine Corps. TRAs are to be implemented using a systematic, metric-based process that assesses the technological maturity of, and identifies potential risk associated with, critical technologies to be used in Defense acquisition programs (ACAT I-IV). The appropriate PEO/System Command is responsible for execution of ACAT III and IV TRAs.

Title 10 U.S. Code § 2366b establishes the requirement for the MDA to certify that all immature technologies for MDAPs have been demonstrated in a relevant environment (i.e., Technology Readiness Level 6) prior to entering the development acquisition life cycle phase (Milestone B).

Audit Results

Office of Naval Research guidance provides specific TRA requirements and instructions for ACAT I and II programs, but does not specifically address the TRA process required for ACAT III and IV programs. For ACAT I and II programs reviewed, the Chief of Naval Research provided adequate oversight and conducted effective TRAs. However, NAVSEA and its affiliated PEOs did not have an effective TRA program for ACAT III and IV programs as required by DoD and SECNAV regulations.

ACAT III and IV Programs without TRAs

We found that TRAs were not conducted for 5 of 13 ACAT III and IV programs reviewed. Managers responsible for these programs believed TRAs were not required because their programs consisted of commercial-off-the-shelf items (COTS), were based on Urgent Operational Needs, or were not an MDAP. The five ACAT programs are identified in Table 1:

Table 1.

	<i>ACAT Program- No TRA Conducted</i>	<i>ACAT Level</i>	<i>PEO</i>	<i>Reasons</i>
1	Navy Nonlethal Effects, Family of Systems (NNLE/FOS)	III	Sea 06 EXM	COTS*
2	Electronic Surveillance Enhancement Process Upgrade (V) 4ESE	IVT	Integrated Warfare Systems	COTS
3	Counter Radio-Controlled Improvised Explosive Device Electronic Warfare/Marine Expeditionary Units CREW MEU	IVM	Sea 06 EXM	COTS and technical similarities with another program
4	Modification of Torpedo Block Upgrade/Lightweight Torpedoes Program (MK 54 BUG)	III	Subs	Urgent Need
5	Submarine Combat Control System (SCCS AN/BYG-1)	IVT	Subs	Not MDAP

*Program included COTS components and ACAT designation rescinded on 24 June 2014 before a milestone decision.

In 2004, SECNAV made it mandatory to conduct TRAs on all Naval acquisition programs, whether they were MDAP (ACAT I) or non-MDAP (ACAT II-IV). SECNAV Instruction 5000.2E, dated 1 September 2011, requires that TRAs be conducted on all ACAT I - IV programs at Milestones B and C, and at program initiation for ships. On 19 June 2012, ASN (RD&A) reemphasized that program managers and their chain of command remain responsible for assessing, managing, and mitigating technological and manufacturing risks prior to a Milestone C review.

In June 2008, PEO Integrated Warfare Systems (IWS) delegated the MDA responsibilities to IWS 2.0 (Program Manager) for the (V) 4 Electronic Surveillance Enhancement (ESE) Processor Upgrade program. Although no TRA was performed, IWS 2.0 concluded there were no CTEs or technology risks because the upgrade involved engineering changes and COTS-related items. We found no evidence that an independent review panel convened and agreed with the IWS 2.0 conclusion that no CTEs existed for the program. In July 2009, the MDA made a Milestone B decision to proceed into the Engineering and Manufacturing Development phase without conducting a TRA. IWS 2.0 was unable to identify any DON policy that supported the exclusion of TRA requirements for ACAT programs that included COTS items.

In another example, the Deputy Assistant Program Manager for the Counter Radio-Controlled Improvised Explosive Device Electronic Warfare Program explained that the acquisition was COTS items in support of urgent needs and did not require a

TRA. Managers also explained that PMS-408 (Program Manager) decided not to conduct a specific TRA for CREW MEU due to duplication with JCREW I1B1 TRA (dated 20 August 2008). The two programs had different ACAT designations, and each required a TRA prior to milestone decisions.

The Deputy Program Manager for the Modification of Torpedo Block Upgrade/Lightweight Torpedo Program (MK 54 BUG) believed TRA requirements do not apply because MK 54 BUG is a Rapid Fielding Program supporting urgent operational need requirements. As a result, the Program Office for the MK 54 BUG planned no TRA event.

The senior acquisition manager for the Submarine Combat Control System believed that because the ACAT program (IVT) is not an MDAP and has no critical technology, a TRA was not required. This senior manager did not identify any approving authority for the lack of TRA activities, and provided no supporting evidence of subject matter experts concluding that the program has no critical technology.

For the five ACAT programs, managers identified no plans to conduct TRAs. The PEO or system command is the approval authority for ACAT III and IV TRAs.

Independent Review Panel

NAVSEA did not have a process in place to ensure personnel selected to the Independent Review Panel were independent of the program being reviewed. Without complete independence for members of the Independent Review Panel, there is less assurance of objectivity when assessing the CTEs and the associated Technology Readiness Levels. For ACAT I and II programs, the Office of Naval Research has communicated clear direction on the responsibilities of all players in the execution of TRAs and a formal process to insure comprehensiveness and independence in execution. This was not the case for ACAT III and IV programs where the program manager ran the TRA process. Office of Naval Research guidance does not directly cover the execution of TRAs for ACAT III and IV programs. DoD's Technology Readiness Assessment Deskbook provides the general roles and responsibilities of the Independent Review Panel, but not the details of how panel members operate within NAVSEA and its associated PEOs. Four out of the 23 programs reviewed either had program personnel on the panel or could not provide documentation to support that a panel was formed. Those four programs are identified in Table 2.

Table 2.

	<i>ACAT Programs</i>	<i>ACAT Levels</i>	<i>PEOs</i>	<i>Panel Members</i>
1	Ocean Class, Auxiliary General Oceanographic Research Vessel (OC AGOR)	III	Ships	Included staff in the Program Office
2	AN/PYX-1 Identity Dominance System (IDS)	IVT	Sea 06-EXM	Included staff in the Program Office
3	Future Radiographic Systems (FRS) Program	IVM	Sea 06-EXM	No record of members
4	Low Cost Conformal Array (LCCA)	IV	Subs	No record of members

For the four ACAT programs noted above, there was no evidence that the TRAs were certified as using a verifiable process and that execution was conducted independent of the program office in a comprehensive manner. The MDA had no assurance that the Independent Review Panel made objective and unbiased assessments of CTEs and their associated Technology Readiness Level.

TRA Documentation

NAVSEA’s Program Offices did not maintain sufficient supporting documentation for TRA activities. Specifically, the Program Offices for 6 of the 18 ACAT programs reviewed did not maintain sufficient TRA documentation for: identifying and finalizing CTEs, selecting and approving Independent Review Panel members, documenting data provided to the panel, and documenting data supporting the assessment results. We found three program offices could not provide requested technical documentation used by Independent Review Panels to identify, review, and concur with CTE evaluations. Program managers explained that there is no centralized storage of documentation. One program manager was not aware of the location of technical documentation and thus, could not provide the information requested. Another program manager stated that while there was documentation available at the time of the assessment, there was not a record of what was reviewed. Office of Naval Research senior officials stated that DON recognized centralized storage of TRA documentation as a best practice.

Principal TRA Point-of Contact for ACAT Programs

We found there was no designated principal TRA point-of-contact at NAVSEA with responsibilities for coordination, planning, conducting, documenting, and reporting of TRAs. Implementation of TRA activities at NAVSEA was inconsistent, best practices were not used, and TRA policy was not established for ACAT I-IV programs. NAVSEA and its associated PEOs had no internal instruction to ensure TRA activities were consistent with the policy and expectations of DON policy.

Senior managers within NAVSEA Engineering group (NAVSEA 05T) stated they have participated with the Office of Naval Research during TRA events for ACAT I and II programs only. NAVSEA 05T managers stated that their staff was not large enough to support program managers during the TRA activities for ACAT III and IV programs. Senior managers explained that efforts were ongoing to draft a charter that defines the roles and responsibilities of NAVSEA 05T for TRAs. Managers believed that an Office of the Secretary of Defense memorandum, “Improving Technology Readiness Assessment Effectiveness,” dated 11 May 2011, caused a shift of TRA responsibility to Program Managers, and led to SEA 05T no longer providing support for TRAs. NAVSEA 05T managers stated that SEA 05T had not participated in a TRA for any NAVSEA ACAT programs since April 2011. We confirmed that at least 11 ACAT programs (6 ACAT I and II programs, and 5 ACAT III and IV programs) were conducted after April 2011. We reviewed available TRA documentation maintained by various program offices within NAVSEA.

In our judgment, a principal TRA point-of-contact for all NAVSEA programs would help ensure there is a separation of functions, and that members serving on Independent Review Panels are independent. We believe this point-of-contact should work closely with the Office of Naval Research and designate staff to work closely with the Program Executive Officers and program managers to interface and coordinate TRA activities and events.

TRA Practices

We also found that NAVSEA had not established and implemented consistent practices for conducting TRAs, particularly for ACAT III and IV programs, in support of the Milestone Decision Authority’s decision process. The absence of NAVSEA’s TRA policy, particularly for ACAT III and IV programs, has contributed to acquisition managers’ misunderstanding of the TRA requirements and responsibilities.

Some PEO managers believed Office of Naval Research guidance was sufficient to govern the TRA process for all ACAT programs and concluded an internal (system command) TRA policy was not necessary. However, senior personnel at the Office of Naval Research told us that TRA guidance prescribed by their office does not specifically address the TRA process required for ACAT III and IV programs. Their guidance provides specific TRA requirements and instructions only for ACAT I and II programs.

For the eight ACAT III and IV programs reviewed that did conduct TRAs, we found no consistent practices used by the program managers to identify CTEs, form Independent Review Panels, and conduct TRAs. The Office of the Secretary of Defense emphasized the importance of the program manager preparing an initial list of critical technologies to be assessed. For 4 of the 8 ACAT III and IV programs with TRAs, there was no evidence of an initial list of CTEs identified by the program managers. Also, managers of these programs were unable to provide sufficient evidence that the TRAs were

conducted using a verifiable process and that execution was conducted independent of the program office in a comprehensive manner.

Prior to this audit, the Office of Naval Research had reviewed TRA policies submitted by Naval Air, Space and Warfare and Marine Corps system commands that were consistent with the policy and expectations within DON. However, the Office of Naval Research noted, and we observed that the NAVSEA System Command had not developed policy for program managers to reference as guidance to ensure a consistent and disciplined TRA process for all ACAT programs.

TRA Best Practices

During our review, the Office of Naval Research representatives shared with us the Naval Air Systems Command's (NAVAIR's) TRA best practices. They believed NAVAIR's practices to be the best within DON. We met with the NAVAIR Director of Independent Technical Reviews and identified the following practices:

- NAVAIR established a dedicated Independent Technical Review Office (ITRO) that is responsible for planning and conducting TRAs for all NAVAIR ACAT (I - IV) programs;
- Program offices are required to prepare and submit to the ITRO a comprehensive breakdown of the program's technical work breakdown structure. ITRO uses the data to verify what is or is not a CTE;
- Programs offices must prepare and submit to the ITRO a maturation plan for all CTEs, including CTEs that are considered mature;
- ITRO performs all TRAs with assistance from TRA panel members consisting of Senior Executive Service-level representatives, NAVAIR Research and Engineering Fellows, and subject matter experts from other Services, industry and academia; and
- ITRO prepares a TRA report that includes each IRT member's Technology Readiness Level rating and the ITRO chairman's overall Technology Readiness Level rating for each CTE.

In our judgment, NAVSEA and its affiliated PEOs could improve its TRA process for all ACAT (I - IV) programs by incorporating some of NAVAIR's best practices. As such, we encourage NAVSEA to coordinate with NAVAIR to develop TRA policy and implement TRA best practices used by NAVAIR and identified in the DoD Technology Readiness Assessment Deskbook.

Summary, Impact and Conclusion

Opportunities exist for improvements in the TRA process for ACAT I - IV programs aligned to NAVSEA. We found NAVSEA was working with the Office of Naval Research to conduct TRAs that were consistent with DON policy and expectations for ACAT I and II programs. However, they did not have sufficient controls in place to ensure a consistent and disciplined process for NAVSEA acquisition programs, whether they were MDAP or non-MDAP programs.

The need to establish policy and assign responsibilities for the planning, conducting, and certifying of TRAs for ACAT programs are important. The Assistant Secretary of Defense, Research and Engineering and ASN (RD&A) have conveyed the importance of conducting TRAs for all ACAT programs. This includes focusing on technology maturity, assessing, managing, and mitigating technological risks. Establishing system command TRA policy aligned with DON TRA policy will reduce misunderstandings about requirements and provide a disciplined process for all NAVSEA acquisition programs in support of the MDA decision process.

Communication with Management

Throughout the audit, we kept senior management officials informed of the conditions noted, including officials from: Office of Naval Research; NAVSEA System Command; PEO Integrated Warfare Systems; PEO Littoral Combat Ship; PEO Ships, PEO Submarines; and PEO Sea.

We held entrance conferences with NAVSEA on 4 April 2013 and the Office of Naval Research on 5 April 2013. During the entrance conferences, we briefed management on the audit's objective, scope, and methodology.

In addition, we held interim meetings on 20 February 2014, 8 April 2014, 11 April 2014, and 13 February 2015 with PEO officials at NAVSEA. Throughout the audit, we provided the audit liaison at NAVSEA System Command with audit status updates.

We also provided a briefing on our preliminary audit results to executive and senior-level acquisition personnel on 2 October 2014. We disclosed issues regarding ACAT programs with: (1) no TRAs conducted, (2) insufficient documentation to support the TRAs, and (3) an undocumented TRA policy and process.

Recommendations and Corrective Actions

We recommend that Commander, Naval Sea Systems Command:

Recommendation 1. Establish Technology Readiness Assessment oversight for all Acquisition Category programs and establish System Command-level guidance for: conducting Technology Readiness Assessments, documenting processes for

identifying Critical Technology Elements, assessing Critical Technology Elements' maturity and the qualifications of Independent Review Panel members, and clarifying Technology Readiness Assessment requirements for commercial-off-the-shelf items.

Management response to Recommendation 1. Concur in principle. Naval Sea Systems Command (NAVSEA) will update NAVSEA Instruction 5000 to include guidance for the conduct of Technology Readiness Assessments for Acquisition Category (ACAT) III and IV programs. NAVSEA considers existing instructions – Department of Defense Instruction 5000.02, Secretary of the Navy Instruction 5000.2, and Office of Naval Research Instruction 3900.40 – to be sufficient for the conduct of Technology Readiness Assessments (TRAs) for ACAT I and II programs. The estimated completion date is 30 September 2015.

Naval Audit Service comment on response to Recommendation 1. Although our recommendation addressed all ACAT Programs, our primary emphasis was on the ACAT III and IVs Programs; therefore, the action planned by the Commander, Naval Sea Systems Command is satisfactory and meets the intent of the recommendation. The recommendation is open pending completion of agreed-to actions.

Recommendation 2. Coordinate with the affiliated Program Executive Offices to conduct Technology Readiness Assessments for all active Acquisition Category programs as required.

Management response to Recommendation 2. Concur. NAVSEA will coordinate with affiliated Program Executive Offices to ensure future TRAs are conducted for all active ACAT programs, as required. Guidance to coordinate will be included in the update to the NAVSEA 5000 instruction. The estimated completion date is 30 September 2015. NAVSEA disagrees with the Naval Audit Service's determination that a Technology Readiness Assessment (TRA) was not conducted for one ACAT program, because the TRA was documented in the Single Acquisition Management Plan (SAMP).

Naval Audit Service comment on response to Recommendation 2. Action planned by the Commander, Naval Sea Systems Command meet the intent of the recommendation, and the recommendation is open pending completion of agreed to actions. We do not agree with NAVSEA's contention that our determination that a TRA was not conducted for one ACAT program was incorrect. At the time of the audit we were provided with a copy of the SAMP from the Submarine Combat Control System, and did not find that a Technology Readiness Assessment was included in the plan.

Section B:

Status of Recommendations

Recommendations							
Finding ²	Rec. No.	Page No.	Subject	Status ³	Action Command	Target or Actual Completion Date	Interim Target Completion Date ⁴
1	1	11	Establish Technology Readiness Assessment oversight for all Acquisition Category programs and establish System Command-level guidance for: conducting Technology Readiness Assessments, documenting processes for identifying Critical Technology Elements, assessing Critical Technology Elements' maturity and the qualifications of Independent Review Panel members, and clarifying Technology Readiness Assessment requirements for commercial-off-the-shelf items.	O	Commander, Naval Sea Systems Command	9/30/15	
1	2	12	Coordinate with the Affiliated Program Executive Offices to conduct Technology Readiness Assessments for all active Acquisition Category programs as required.	O	Commander, Naval Sea Systems Command	9/30/15	

² / + = Indicates repeat finding.

³ / O = Recommendation is open with agreed-to corrective actions; C = Recommendation is closed with all action completed; U = Recommendation is undecided with resolution efforts in progress.

⁴ If applicable.

Exhibit A:

Background

The Technology Readiness Assessment (TRA) process is a management tool used to measure the maturity of technologies and ensure that only mature technologies are employed into systems. Mature technologies are important to developing new weapon systems. The Department of Defense (DoD) and Department of the Navy have communicated the importance of technology maturity in their directives, instructions, and guidance. TRA requirements for DON are governed by DoD Instruction 5000.02, Secretary of the Navy Instruction 5000.2E, and Office of Naval Research Instruction 3900.40. Exhibit F shows the TRA process for Acquisition Category I and II programs.

The Technology Readiness Assessment (TRA) Deskbook dated July 2009 states that, ideally, critical technology elements (CTEs) are assessed by subject matter expert Independent Review Panel members applying Technology Readiness Levels to the CTEs. Technology Readiness Levels are defined, knowledge-based measures used to assess the maturity of evolving CTEs in a program. They help management in making decisions concerning technology maturity, but they must also be supplemented with subject matter expert professional judgment.

Requirements for the technology readiness assessments were established in 2002 with the DoD Regulation 5000.2-R, “Mandatory Procedures for Major Defense Acquisition Programs and Major Automated Information System Acquisition Programs.” The regulation states that a TRA will examine program concepts, technology requirements, and demonstrated technology capabilities to determine technological maturity.

The requirements continued with DoD Instruction 5000.2, requiring all major defense acquisition programs to have the assessments performed on them at Milestones B and C. Secretary of the Navy Instruction 5000.2E expounded on the requirements, stating that the assessments are to be performed for all Acquisition Category programs and charging the Office of Naval Research with providing guidance and instruction as required. The Secretary of the Navy Manual implements requirements of the instruction.

DoD published several versions of a Technology Readiness Assessment Deskbook from 2003 to 2009, with the purpose of providing a greater understanding of how TRAs fit into the defense acquisition process, as well as what is expected by the Deputy Under Secretary of Defense for Science and Technology. The Technology Readiness Assessment Deskbook also included advice and best practices obtained from interviews with people involved in the TRA process.

In May 2011, the Assistant Secretary of Defense for Research and Engineering issued the Technology Readiness Assessment Guidance, an update of the Technology Readiness Assessment Deskbook. This document provides guidance on the planning, conducting, and reporting formats of the TRA process, as well as emphasizes the roles and responsibilities of the key players in the technology readiness assessment process.

In 2010, the Under Deputy Secretary of Defense for Acquisition Technology and Logistics expressed concern about the state of the TRAs and assessing technology maturity. He stated that the Technology Readiness Level reviews and certification were growing beyond their original intent and that the reviews should be reoriented to an assessment of technology risk as opposed to engineering or integration risk. In 2011, a memorandum from the Under Secretary of Defense for Acquisition, Technology, and Logistics, “Improving Technology Readiness Assessment Effectiveness,” dated 11 May 2011, was issued where he re-emphasized the TRAs’ reformation to focus on technology maturity risk, as well as issued changes and updates to current TRA guidance. The memo stated that the changes would be effective immediately.

TRAs and technology maturity are subjects that have been addressed by the DoD Inspector General’s Office, the Government Accountability Office, and the Army Audit Agency. Together, these agencies have issued several reports that assessed the technology maturity and the TRA process of the DoD Acquisition Category programs. The offices have identified immature technology, technology on its way to maturity, and inadequate TRA process implementation. These agencies also provided analysis of DoD Acquisition Category programs

Title 10 US Code, Paragraph 2366b establishes the requirement for the Milestone Decision Authority to certify that all immature technologies for Major Defense Acquisition Programs have been demonstrated in a relevant environment (i.e., Technology Readiness Level 6) prior to entering the development acquisition life cycle phase (MS B).

Exhibit B:

Scope and Methodology

We conducted our audit of Technology Readiness Assessments (TRAs) for Naval Sea Systems Command (NAVSEA) Acquisition Category (ACAT) programs from 31 May 2013 through 22 December 2014. Our audit universe consisted of all ACAT programs managed by NAVSEA. We visited and/or contacted personnel at each of the offices identified in Exhibit C.

On 4 June 2013, we submitted a Data Call to NAVSEA Program Executive Offices (PEOs) in order to obtain a complete listing of ACAT programs. NAVSEA managers identified 64 active ACAT programs at NAVSEA. The breakdown of programs by ACAT level was the following: 14 ACAT I; 12 ACAT II; 18 ACAT III; and 20 ACAT IV.

We used judgmental sampling to conduct the audit. Out of the 64 active ACAT programs, program managers had TRAs conducted for 36 of them. We judgmentally selected and reviewed 18⁵ of the 36 ACAT programs that had TRAs performed. The 18 ACAT programs reviewed included ACAT I to ACAT IV and represent 5 PEOS and 12 Program Offices within NAVSEA.

Of the remaining 28 ACAT programs with no TRAs, 5 programs were within the scope of the audit because they should have had TRAs. The audit team met with the appropriate managers responsible for these programs.

In total, 23 active ACAT programs were reviewed for this audit. Exhibit E includes a list of the ACAT programs reviewed. We interviewed personnel (e.g., Program Managers, Assistant Program Managers, Subject Matter Experts, and Independent Review Panel members) responsible for the appropriate ACAT program. We reviewed the available TRA documentation used during the assessments and TRA results communicated to the Milestone Decision Authority.

We conducted this performance audit in accordance with generally accepted Government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. The evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

⁵Our judgmental sampling included TRAs conducted within each PEO (excluding PEOs Sea05 and Carriers) before and after the Office of the Secretary of Defense issued new TRA guidance in April 2011. Three (3) ACAT Programs related to PEO 05T and PEO Carriers were not included in our judgmental sample because milestone decisions were made before TRA requirements were established for the Department of the Navy and the multiple components related to the program.

We reviewed Naval Audit Service, Department of Defense Inspector General (DoDIG), and Government Accountability Office (GAO) reports, and found there were no reports published in the past 5 years covering TRAs for NAVSEA ACAT programs. Also, DoDIG and GAO reports that we reviewed dealing with TRAs did not include NAVSEA programs; therefore, no followup was required.

Exhibit C:

Activities Visited and/or Contacted

Office of Naval Research, Arlington, VA

Naval Sea Systems Command, Washington, DC

Program Executive Office-Integrated Warfare Systems

Program Executive Office-Littoral Combat Ships

Program Executive Office- Ships

Program Executive Office-Submarines

Program Executive Office-Sea 05

Program Executive Office-Sea 06-EXM

Exhibit D:

Acquisition Category Program Breakdown with Technology Readiness Assessments Performed

This table represents Naval Sea Systems Commands Acquisition Category (ACAT) programs, as well as the number of Technology Readiness Assessments (TRAs) performed for the programs.

Program Executive Office	ACAT I		ACAT II		ACAT III		ACAT IV		Total	
	Programs	TRAs	Programs	TRAs	Programs	TRAs	Programs	TRAs	Programs	TRAs
Carriers	1	1	0	0	0	0	0	0	1	1
Integrated Warfare Systems	2	2	6	4	2	0	4	1	14	7
Littoral Combat Ships	3	3	3	3	2	2	2	2	10	10
SEA 06-EXM	0	0	1	1	1	0	6	4	8	5
SEA 05	0	0	0	0	1	0	1	0	2	0
Ships	7	3	2	2	3	1	0	0	12	6
Subs	1	0	0	0	9	3	7	4	17	7
Totals	14	9	12	10	18	6	20	11	64	36

Exhibit E:

Naval Sea Systems Command Acquisition Category Programs Reviewed

This table lists 23 Naval Sea Systems Command (NAVSEA) Acquisition Category (ACAT) programs reviewed by the audit team. This review included 4 ACAT I programs, 6 ACAT II programs, 4 ACAT III programs, and 9 ACAT IV programs.

	<i>Program Name</i>	<i>Acronym</i>	<i>ACAT Level</i>	<i>Program Executive Office</i>
1	Ocean Class, Auxiliary General Oceanographic Research Vessel	OC AGOR	III	Ships
2	Surface Electronic Warfare Improvement Program Block 1	SEWIP Block 1	II	Integrated Warfare Systems
3	Surface Electronic Warfare Improvement Program Block 2	SEWIP Block 2	II	Integrated Warfare Systems
4	Rolling Airframe Missile Weapons Systems Program Block 2	RAM BLK 2	II	Integrated Warfare Systems
5	Rolling Airframe Missile Weapons Systems Program Block 1 Upgrade	RAM BLK 1 UPGD	II	Integrated Warfare Systems
6	Remote Multi-Mission Vehicle	RMMV	ID	Littoral Combat Ships
7	Littoral Combat Ship Mission Modules Program	LCS MM	IC	Littoral Combat Ships
8	Future Radiographic Systems	FRS	IVM	Sea 06-EXM
9	Advanced Explosive Ordnance Disposal Robotic System Increment 1	AEODRS Increment 1	IVM	Sea 06- EXM -
10	Advanced Explosive Ordnance Disposal Robotic System Increment 2/3	AEODRS Increment 2&3	IVM	Sea 06-EXM
11	AN/PYX-Identity Dominance System	IDS	IVT	Sea 06-EXM

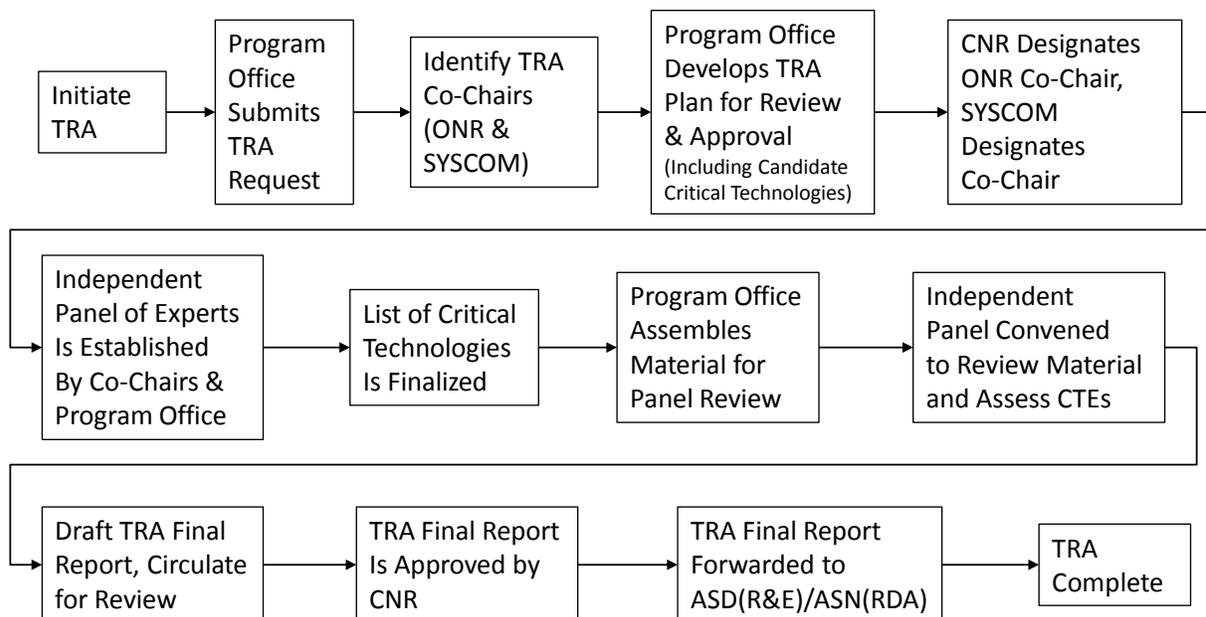
	Program Name	Acronym	ACAT Level	Program Executive Office
12	Joint Counter Radio Controlled Improvised Explosive Device Electronic Warfare	JCREW	II	Sea 06-EXM
13	Ship to Shore Connector	SSC	ID	Ships
14	Cooperative Engagement Capability	CEC	IC	Integrated Warfare Systems
15	Mobile Landing Platform	MLP	II	Ships
16	Low Cost Conformal Array	LCCA	IV	Subs
17	Anti-Torpedo Torpedo Defense System	ATTDS	III	Subs
18	AN/SQQ-32(V)4 High Frequency Wide Band Upgrade	AN/SQQ-32(V)4 HFWB Upgrade	IVM	Littoral Combat Ships
19	Navy Nonlethal Effects, Family of Systems	NNLE/FOS	III	Sea 06-EXM
20	Electronic Surveillance Enhancement Process Upgrade	(V) 4ESE	IVT	Integrated Warfare Systems
21	Submarine Combat Control System	SCCS AN/BYG-1	IVT	Subs
22	Modification of Torpedo Block Upgrade/Lightweight Torpedoes Program	MK 54 BUG	III	Integrated Warfare Systems
23	Counter Radio-Controlled Improvised Explosive Device Electronic Warfare/Marine Expeditionary Units	CREW MEU(SOC)	IVM	Sea 06-EXM

Exhibit F:

Technology Readiness Assessment Process, Acquisition Category I and II Programs

This flowchart shows the Technology Readiness Assessment (TRA) process for Acquisition Category (ACAT) I and II programs. The flowchart slide is provided to programs by the Office of Naval Research (ONR) as part of a TRA briefing.

TRA Process – ACAT I/II Programs



Key

TRA- Technology Readiness Assessment
ACAT- Acquisition Code
ONR- Office of Naval Research
CNR- Chief of Naval Research
CTEs- critical technology elements
SYSCOM- Systems Command
ASD(R&E)/ASN(RDA)- Assistant Secretary of Defense (Research and Engineering)/Assistant Secretary of the Navy (Research, Development, and Acquisitions)

Appendix:

Management Response from Commander, Naval Sea Systems Command



DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
1333 ISAAC HULL AVE SE
WASHINGTON NAVY YARD DC 20376-6061

IN REPLY REFER TO:
7500
Ser 00N/73
24 Mar 15

From: Commander, Naval Sea Systems Command
To: Auditor General of the Navy (Attn: AUD-3)

Subj: DRAFT AUDIT REPORT ON TECHNOLOGY READINESS ASSESSMENTS AT
NAVAL SEA SYSTEMS COMMAND AND AFFILIATED PROGRAM
EXECUTIVE OFFICES (2013-082)

Ref: (a) NAVAUDSVC ltr 7510 N2013-082 31 May 13

Encl: (1) NAVSEA Response to the Subject Report

1. In response to reference (a), enclosure (1) provides the NAVSEA response to the subject report. Based on our review of the subject report, we concur with the report's recommendations.

2. The point of contact for this audit is [REDACTED]
can be reached at [REDACTED] or via email at [REDACTED]

[REDACTED]
[REDACTED]
[REDACTED]
Inspector General

Copy to:
NAVINGEN (N41)
NAVSEA (PEO IWS, PEO LCS, PEO SHIPS, PEO SUBS, SEA 05, SEA 06)

FOIA (b)(6)

FOIA (b)(6)

**NAVSEA Response to
Naval Audit Service Draft Report on
Technology Readiness Assessments at Naval Sea Systems
Command and Affiliated Program Executive Offices
2013-082
24 March 2015**

NAS Recommendation # 1: Establish Technology Readiness Assessment oversight for all Acquisition Category programs and establish System Command-level guidance for: conducting Technology Readiness Assessments, documenting processes for identifying Critical Technology Elements, assessing Critical Technology Elements' maturity and the qualifications of Independent Review Panel members, and clarifying Technology Readiness Assessment requirements for commercial-off-the-shelf items.

Management Response: Concur in principle. NAVSEA will update NAVSEA Instruction 5000 to include guidance for the conduct of Technology Readiness Assessments for ACAT III and IV programs. NAVSEA considers existing instructions, DoDI 5000.02, SECNAVINST 5000.2, and ONR Instruction 3900.40, to be sufficient for the conduct of TRAs for ACAT I and II programs.

Establishing additional guidance, oversight, and tracking at the Echelon 2 level would be duplicative, in contrast to the instructions cited above that give the responsibility to the Program Manager and require coordination with ONR. This duplication would add cost. Additional NAVSEA Command oversight and guidance for ACAT I and II would also run counter to DoDI 5000.02 guidance that states, "The structure of a DoD acquisition program and the procedures used should be tailored as much as possible to the characteristics of the product being acquired, and to the totality of circumstances associated with the program including operational urgency and risk factors."

Target Completion Date: 30 September 2015

Enclosure (1)

NAS Recommendation # 2: Coordinate with the Affiliated Program Executive Offices to conduct Technology Readiness Assessments for all active Acquisition Category programs as required.

Management Response: Concur. NAVSEA will coordinate with affiliated PEOs to ensure future TRAs are conducted for all active ACAT programs, as required. Guidance to coordinate will be included in the aforementioned update to the NAVSEA 5000 instruction.

Target Completion Date: 30 September 2015.

Specific Comment: NAVSEA does not agree with the determination that Submarine Combat Control System (SCCS AN/BYG-1) did not conduct a Technology Readiness Assessment (TRA). The ACAT III program documented the TRA requirement in their SAMP which is prepared by Program Manager and approved by the Milestone Decision Authority.

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