Report No. DoDIG-2012-101 June 13, 2012

Inspector General
United States Department of Defense

Acquisition of the Navy Organic Airborne and Surface Influence Sweep Needs Improvement

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Acronyms and Abbreviations

AMCM	Airborne Mine Countermeasures
COMOPTEVFOR	Commander, Operational Test and Evaluation Force
CPD	Capability Production Document
EMD	Engineering and Manufacturing Development
JCIDS	Joint Capabilities Integration and Development System
LRIP	Low-Rate Initial Production
N8	Deputy Chief of Naval Operations for Integration of Capabilities and Resources
NSWC-PC	Naval Surface Warfare Center-Panama City
OASIS	Organic Airborne and Surface Influence Sweep
PEO	Program Executive Officer
PEO (LCS)	Program Executive Officer, Littoral Combat Ships
PM	Program Manager
TEMP	Test and Evaluation Master Plan

INSPECTOR GENERAL
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JUN 13 2012

MEMORANDUM FOR UNDER SECRETARY OF DEFENSE FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS
NAVAL INSPECTOR GENERAL

SUBJECT: Acquisition of the Navy Organic Airborne and Surface Influence Sweep Needs Improvement (Report No. DoDIG-2012-101)

We are providing this report for review and comment. The Organic Airborne and Surface Influence Sweep (OASIS) is a minesweeping system the Navy will use when mines are difficult to detect and when avoiding mined areas is not an option. This is the second of two reports addressing the acquisition of the OASIS. The overall expected cost for developing and procuring the OASIS was $290.5 million. In this report, we determined that the Navy did not finish defining the capability requirements for the minesweeping system and planned to enter the low-rate initial production decision review without completing all testing and assessments to show that procured production units will meet warfighter needs.

DoD Directive 7650.3 requires that recommendations be resolved promptly. We did not receive management comments from the Navy; however, we revised Recommendation A.2 from the draft report to clarify that the draft capability production document (CPD) should assess whether the OASIS program, with reduced shock resistance capacity, is worth the additional investment required to continue to completion. We also added a recommendation for reprogramming OASIS funding if the draft CPD assessment showed that the OASIS should not continue to completion. Therefore, we request that the Navy provide comments on this report by July 13, 2012. The comments should state whether you agree or disagree with the findings and recommendations. If you agree with our recommendations, describe what actions you have taken or plan to take to accomplish the recommendations and include the completion dates of your actions. If you disagree with the recommendations or any part of them, please give specific reasons why you disagree and propose alternative action, if that is appropriate.

If possible, send a portable document format (pdf) file containing your comments to audacm@dodig.mil. Portable document format copies of your comments must have the actual signature of the authorizing official. We are unable to accept the /Signed/ symbol in place of the actual signature. If you arrange to send classified comments electronically, you must send them over the SECRET Internet Protocol Router Network (SIPRNET).

We appreciate the courtesies extended to the staff. Please direct questions to me at (703) 604-9077 (DSN 664-9077).

Deborah L. Culp for

Jacqueline L. Wicecarver
Assistant Inspector General
Acquisition and Contract Management

Results in Brief: Acquisition of the Navy Organic Airborne and Surface Influence Sweep Needs Improvement

What We Did

As part of an audit of the Navy's preparation of the Organic Airborne and Surface Influence Sweep (OASIS) program for the low-rate initial production (LRIP) decision, we reviewed the Navy's efforts to define system requirements and to develop a testing plan to support procuring the OASIS. The overall expected cost for developing and procuring the OASIS was $290.5 million.

What We Found

The Navy did not update capability requirements in the draft capability production document (CPD) after a contractor's analysis showed the OASIS would not work after sustaining a shock wave of 65 percent of the shock capability requirement. This condition occurred because the Navy delayed providing funds for completing studies to determine the lowest shock requirement needed for OASIS mission effectiveness. Without fully defined capability requirements, the Navy cannot determine whether OASIS is effective, suitable, and affordable to produce and deploy.

The Program Manager (PM), Mine Warfare, planned the LRIP decision review to occur before the system completed shock testing and iterative (periodically repeated) production readiness reviews. This condition occurred because the PM stated that shock testing would delay other testing efforts and considered a single production reliability review with earlier design reviews as negating the need for the iterative production readiness reviews. Additionally, the PM canceled and did not reschedule an operational assessment because of delays in completing predecessor testing. The PM and her staff did not review the draft Test and Evaluation Master Plan (TEMP) to verify that testing schedules were synchronized with test planning for the MH-60S helicopter and that the TEMP addressed reliability growth. As a result, the Navy could commit to acquiring four LRIP units, costing $15 million, which may not meet testing needs to support the full-rate production decision in FY 2015. In addition, the Navy plans to acquire 38 more units at a cost of $140.6 million.

What We Recommend

We recommend the Navy:

- revise the draft OASIS CPD to establish a realistic shock capability requirement, with cost and mission impacts, and add required manufacturing, joint capabilities, and threat information to determine whether the program should continue to completion.
- revise OASIS exit criteria for the LRIP review to include the OASIS demonstrating that it meets revised and realistic shock capability requirements.
- update test planning to schedule the operational assessment of the OASIS integrated with the MH-60S helicopter, to include shock testing, to synchronize with test planning for the MH-60S helicopter and to include a reliability growth plan to support the LRIP decision review.

Management Comments and Our Response

Navy did not provide comments to the draft report issued March 29, 2012. Therefore, we request the Navy provide comments by July 13, 2012. See the recommendations table on page ii.

Recommendations Table

Management	Recommendations Requiring Comment	No Additional Comments Required
Deputy Chief of Naval Operations for Integration of Capabilities and Resources	A.1.a, A.1.b, A.1.c.1, A.1.c.2, A.1.c.3, A.2	
Assistant Secretary of the Navy (Research, Development, and Acquisition)	B.1.a, B.1.b	
Program Manager, Mine Warfare	B.2.a, B.2.b.1, B.2.b.2, B.2.b.3	

Please provide comments by July 13, 2012.

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Introduction

Objective

This is the second of two reports addressing the acquisition of the Organic Airborne and Surface Influence Sweep (OASIS). The overall audit objective was to determine whether the Navy was effectively preparing the program for the low-rate initial production (LRIP) phase of the acquisition process. In this report, we discuss the Navy's effectiveness in establishing requirements and planning testing to support procuring the OASIS after the LRIP decision review. In our first draft report, Report No. DoDIG-2012-081, "Navy Organic Airborne and Surface Influence Sweep Program Needs Defense Contract Management Agency Support," April 27, 2012, we determined whether the Defense Contract Management Agency support of the OASIS development contract was effective. See Appendix A for a discussion of the audit scope and methodology and prior coverage.

Background

The OASIS is an Acquisition Category II major defense system that is in the engineering and manufacturing development (EMD) phase of the acquisition process. The Navy established the OASIS as an acquisition program in April 2002. As of January 2012, the OASIS program management spent $111.6 million of research, development, test, and evaluation funds. The Navy is developing the OASIS in preparation for the LRIP decision planned for the second quarter of FY 2013.

The OASIS program experienced a significant schedule delay and cost growth in system development since the Assistant Secretary of the Navy for Research, Development, and Acquisition initiated the program in April 2002. Specifically, at program initiation, the Navy scheduled the LRIP decision to occur between January and July 2005 and estimated the research, development, test, and evaluation cost to be $55.1 million. As of January 2012, the program budget document showed that the OASIS LRIP was scheduled for the second quarter of FY 2013 and estimated the research, development, testing, and evaluation cost to be $135.4 million. The schedule delay and cost increase resulted from system design changes, most notably the development of the body-mounted electrode needed to alleviate corrosion, towing, and electrical-related problems. As of January 2012, the total expected cost to develop and procure the OASIS was $290.5 million.

Funding and Contract Data

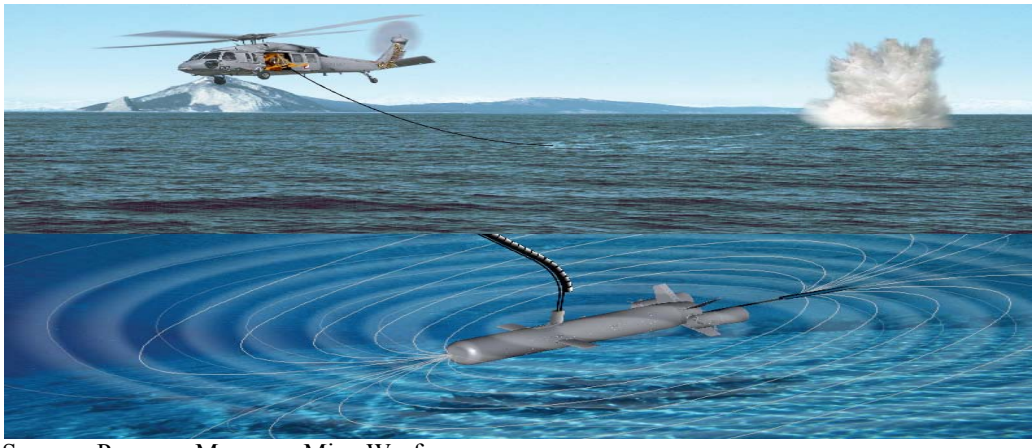
As of January 2012, the program's budget to develop and procure the system totaled $135.4 million in research, development, test, and evaluation funds, including three OASIS engineering development models. On April 26, 2002, the Navy awarded a $25 million contract to develop the OASIS to EDO (now known as ITT Exelis, Inc.). As of November 2011, the contract was valued at $55.6 million.

Mission and System Description

The OASIS is a minesweeping system designed to be towed by the MH-60S Multi-Mission Combat Support helicopter (the MH-60S helicopter) deployed from the Littoral Combat Ship. When fielded, the OASIS will generate and impart underwater magnetic and acoustic signature

fields to provide a high-speed influence minesweeping[1] capability. The Navy will use OASIS when mine hunting is not feasible, mines are difficult to detect, and avoiding mined areas is not an option. The Navy plans to install the Airborne Mine Countermeasures (AMCM) mission kit to integrate OASIS hardware and software with the MH-60S helicopter.

Figure. MH-60S Helicopter Towing the OASIS



Source: Program Manager, Mine Warfare

Related Organic Airborne Mine Countermeasure Systems

The Navy plans to develop and separately install three additional organic AMCM systems on the MH-60S helicopter. The AMCM systems are the:

- Sonar Mine-Detecting Set (AQS-20A),
- Airborne Laser Mine Detection System, and
- Airborne Mine Neutralization System.

The OASIS, the three AMCM systems, and the MH-60S helicopter will work together from the Littoral Combat Ship to meet the Navy's AMCM requirements, which include detecting, identifying, and neutralizing mines. Appendix B provides details on the OASIS and the other AMCM systems, including an illustration of the systems working together to perform the AMCM mission.

Program Management

Until July 2011, Program Executive Officer (PEO) for Littoral and Mine Warfare and the Program Manager, Mine Warfare (PM-Mine Warfare) were responsible for OASIS program management, to include system-specific test and evaluation. In July 2011, the Assistant Secretary of the Navy for Research, Development, and Acquisition disestablished the PEO for Littoral and Mine Warfare and established the PEO for Littoral Combat Ships (PEO [LCS]). He then aligned the PM-Mine Warfare and other program managers responsible for delivering Littoral Combat Ship mission systems, under the newly established PEO (LCS).

[1] Influence minesweeping is the ability of the OASIS to mimic a ship's magnetic or acoustic signature, which then causes mines to explode.

The PEO for Air Antisubmarine Warfare, Assault, and Special Mission Programs and the Program Manager, Multi-Mission Helicopter (PM-Multi-Mission Helicopter), were responsible for integrating OASIS into the MH-60S helicopter. The PM-Multi-Mission Helicopter and the PM jointly participate in activities to determine whether the OASIS, integrated with the MH-60S helicopter, can meet specifications and perform the minesweeping mission. To maximize the overall effectiveness of test and evaluation, the "Test and Evaluation Master Plan for the Multi-Mission Combat Support Helicopter," February 1, 2011, states that representatives from both program offices will work together through the integrated test team.

The Naval Surface Warfare Center-Panama City (NSWC-PC) is the Navy's technical agent for all aspects of mine warfare. NSWC-PC provided technical advice to the PM during OASIS development to define system capability, engineering, testing, logistics support, and training requirements. NSWC-PC also assisted the PM, and PM-Multi-Mission Helicopter, in integrating OASIS with the MH-60S helicopter.

Defining Capability Requirements Policy and Guidance

Chairman of the Joint Chiefs of Staff Instruction 3170.01H, "Joint Capabilities Integration and Development System," January 10, 2012, provides a framework for the process of identifying, validating, and prioritizing capability requirements through the Joint Capabilities Integration and Development System (JCIDS). The Instruction requires the program sponsor to complete the Capability Production Document (CPD) during the EMD phase. The CPD describes the actual performance of the primary system that will deliver the required capability.

Chairman of the Joint Chiefs of Staff, "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012 (the JCIDS Manual), provides guidelines and procedures for operating the JCIDS. The JCIDS Manual includes procedures for conducting an analysis and for developing and staffing the documents that define system capability requirements, including the CPD. The JCIDS Manual states that the CPD provides testable required capabilities for the production and deployment phase of an acquisition program.

Planning LRIP Policy and Guidance

DoD Instruction 5000.02, "Operation of the Defense Acquisition System," December 2008, establishes a management framework for translating approved capability needs and technology opportunities into stable and well-managed weapon system acquisition programs. Before an acquisition program transitions from the EMD phase of the acquisition process to LRIP, DoD Instruction 5000.2 requires that program achievements include:

- acceptable system performance in developmental test and evaluation and in operational assessment,
- mature software capability,
- insignificant manufacturing risks,
- acceptable interoperability,
- demonstrated system affordability throughout the life cycle, and
- approved CPD.

The Defense Acquisition Guidebook complements the policies provided in DoD Instruction 5000.2 by providing discretionary best practices that program managers should tailor to the needs of each program. Each chapter lists potential ways the PM can satisfy mandatory process requirements, such as those associated with LRIP planning.

The Navy's Commander, Operational Test and Evaluation Force (COMOPTEVFOR) Instruction 3980.1, "Operational Test Director's Manual," April 23, 2008, provides policies and procedures for planning and conducting operational test and evaluation of new and improved weapon systems. The Instruction includes policies and procedures for performing operational assessments in support of the LRIP decision. The focus of the operational assessment includes assessing the capability of a system to meet performance goals in operational effectiveness and suitability.

Review of Internal Controls

DoD Instruction 5010.40, "Managers' Internal Control Program (MICP) Procedures," July 29, 2010, requires DoD organizations to implement a comprehensive system of internal controls that provides reasonable assurance that programs are operating as intended and to evaluate the effectiveness of the controls. We identified control weaknesses in defining system requirements and test planning. Specifically, we determined that the Navy did not update capability requirements in the draft CPD and did not verify that the draft CPD included required information on technology and manufacturing readiness, joint capability areas, and threat environment. Also, we determined that the Navy planned the LRIP decision review to occur in the second quarter of FY 2013 before the system completed shock testing and iterative (periodically repeated) production readiness reviews and did not fully plan the testing of OASIS to integrate with the MH-60S helicopter. We will provide a copy of the report to the senior official responsible for internal controls in the Department of the Navy.

Finding A. Incomplete Capability Requirements

The Deputy Chief of Naval Operations for Integration of Capabilities and Resources (N8) did not finish defining capability requirements for the OASIS in the draft CPD to support the low-rate initial production decision program review proposed for second quarter FY 2013. Specifically, the N8 did not update the draft CPD after a contractor analysis showed that the OASIS would not work after sustaining a shock wave of 65 percent of the required capability for resisting shock. Additionally, the draft CPD did not contain information required by the JCIDS Manual, including:

- a Technology and Manufacturing Readiness Assessment section,
- the joint capability areas to which OASIS will contribute, and
- the latest threat assessment.

N8 and the NSWC-PC Mine Warfare Systems Division did not complete an analysis in a timely manner to determine the lowest shock capability requirement compatible with OASIS mission effectiveness. Specifically, on June 15, 2011, the OASIS Systems Engineer at NSWC-PC stated that N8 had not funded additional analyses to determine a defensible and realistic shock requirement. On November 28, 2011, the AMCM requirements officer for N8 stated that the NSWC-PC had completed an OASIS shock analysis. The incomplete and outdated CPD occurred because N8 and the NSWC-PC did not review the draft CPD to verify that it was current and prepared in accordance with the JCIDS Manual.

Without defined shock capability requirements and a revised CPD, the Navy may not be able to determine whether the OASIS system is operationally effective and suitable, as well as affordable to produce and deploy. Reducing the existing shock capability requirement will put the OASIS at risk of increased system failures during minesweeping operations. Increased system failures will require the Navy to procure, stock, and maintain additional numbers of the most shock vulnerable subsystems on the LCS to allow for timely replacement. Additionally, N8 must update the draft CPD to include required information on technology and manufacturing readiness, joint capabilities areas, and the threat environment to capture the information necessary to support testing, developing, and producing an affordable and supportable system.

Final Shock Capability Requirements Not Updated in the Capability Production Document

The N8 did not update the draft, "Capability Production Document for Organic Airborne and Surface Influence Sweep," December 15, 2008, after the contractor's analysis showed that the OASIS would likely not meet the shock capability requirement. The shock capability requirement is a system attribute that measures the OASIS capability to continue working, without degradation, after it has induced a mine to explode and has been hit with the resultant shock wave. When drafting the CPD, N8 carried over the shock requirement from the, "Operational Requirements Document for Organic Airborne and Surface Influence Sweep," January 10, 2001. In June 2011, the NSWC-PC Mine Warfare Systems Division systems engineer for OASIS stated that N85 had not funded further analysis to determine a defensible and realistic shock requirement based on the use of OASIS and anticipated operational analysis.

According to the NSWC-PC systems engineer, the contractor analysis showed that the most vulnerable component of the OASIS, the Inverter Power Source,[2] would remain functional after sustaining a shock wave at 45 percent of the threshold (minimally acceptable) shock capability requirement, but would not work after sustaining a shock wave at 65 percent of the threshold requirement. The systems engineer stated that the contractor's analysis further showed that the control electronics subsystem would remain functional after sustaining a shock wave at 65 percent of the threshold shock capability requirement but would not work after sustaining a shock wave at 85 percent of the threshold requirement.

The JCIDS Manual states that a CPD is finalized after a critical design review of the system. Specifically, after the critical design review, the sponsor, in collaboration with the acquisition community, should make tradeoff decisions to refine the threshold and objective (desired) values from earlier requirements documents and precisely state acceptable performance levels in the CPD. According to the PM, the Navy conducted the last critical design review for OASIS in February 2009.

According to the Branch Head of Mine Warfare Division, N8 and NSWC-PC have discussed design changes that could make the Inverter Power Source and control electronics more resistant to shock. However, contractor staff stated that a redesign of the Inverter Power Source could cause complications through electronics overheating and exceed the weight requirement established for the OASIS system.

Delay in Finalizing Shock Requirement

The delay in finalizing the OASIS shock requirement occurred because N8 and NSWC-PC did not complete in a timely manner the analysis needed to determine whether a lower threshold shock requirement would still provide sufficient operational effectiveness. Specifically, on June 15, 2011, the systems engineer at NSWC-PC stated that the analysis to determine a defensible and realistic shock capability value for anticipated OASIS operational use was still in progress.

In response to an audit discussion of preliminary results we presented on August 2, 2011, program office and N8 staff provided updates concerning finalizing the shock requirement:

- August 19, 2011 - The PM stated that the Navy was fully aware of the need for an analysis of the shock requirement and that the analysis was ongoing at NSWC-PC and was expected to result in an adjusted requirement.
- September 13, 2011 - The Deputy PM acknowledged that the current design of the OASIS would not completely achieve the shock capability requirement established in the 2001 operational requirements document. He further stated that the current threat analysis showed that the OASIS could meet the shock requirement in most scenarios, and that the Navy was considering the cost and benefits of design changes to increase the current OASIS shock resistance.

[2] According to prime contractor staff, the Inverter Power Source is a key OASIS component that transforms electric power into forms compatible with the internal electronics of the tow-body, including the magnetic sweep and the control electronics.

Additionally on November 28, 2011, the AMCM Requirements Officer for N8 stated that NSWC-PC had completed an OASIS shock analysis. Specifically, NSWC-PC, Mine Warfare Systems Division staff analyzed the shock levels generated by various mine threats, combined with a contractor analysis of the shock resistance capabilities of OASIS subsystems. The Requirements Officer then stated that the recommended "way forward" for N8 was to buy more OASIS nose sections (which contain the shock-vulnerable Inverter Power Source and control electronics) as spares to support minesweeping operations. Further, he stated that the PEO (LCS) would investigate reducing the cost of the nose sections to make spares more affordable.

NSWC-PC personnel stated that since September 2011**,** N8 has known that OASIS will be more vulnerable to shock than originally planned and will not satisfy the shock capability requirements in the 2001 operational requirements document and the draft CPD. Therefore, N8 must follow the procedures specified in the JCIDS Manual to justify a reduced shock value in the CPD. The JCIDS Manual allows the Services to revise CPD threshold values for system attributes, such as shock capability. However, the JCIDS Manual states that threshold values for system performance attributes in the CPD are generally expected to be equal or better than those in earlier requirements documents. When threshold adjustments, such as those for OASIS, involve reducing values specified in an earlier requirements document, the Manual requires the Services to answer the following questions in the CPD.

- Will the reduced capability still provide sufficient military utility?
- If the new capability will replace a fielded capability, will it still provide more military utility than the fielded capability?
- Is this proposal still a good way to close the capability gap or should another materiel or nonmateriel alternative be pursued?
- Is the reduced capability worth the additional investments required to continue the program to completion?

Therefore, we recommend that the N8 revise the draft CPD to establish and define a realistic shock capability requirement against which to test the OASIS. Further, the N8 should include in the draft CPD revision the cost and mission impacts of reducing the system shock capability requirement, including the system's ability to meet key performance parameters for mission performance, to enable the Joint Requirement Oversight Council, or its designated validation authority, to fully assess whether the OASIS provides acceptable military utility and is worth the additional investments required to continue the program to completion, in accordance with the "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012. With the above information, Joint Requirement Oversight Council, or its designated validation authority, uses the deliberate staffing process[3] defined in the Manual to determine whether to validate or terminate the CPD requirement. If the Joint Requirements Oversight Council determines that the OASIS does not provide acceptable military utility or is not worth the additional investment required to continue the program to completion, the Council should coordinate with the Assistant Secretary of the Navy for Research, Development, and Acquisition to identify funding available for reprogramming to other weapons acquisition

[3] As discussed in the JCIDS Manual, the Joint Requirement Oversight Council uses the deliberate staffing process to review and evaluate CPDs and other submitted requirements documents.

programs. For the OASIS, the shock capability requirement is a system attribute that directly contributes to meeting the key performance parameter requirements for effectively performing the minesweeping function. Specifically, if the OASIS does not work after sustaining shock from inducing a mine to explode, it cannot complete its mission. If the deliberate staffing process determines that OASIS will not provide acceptable military utility or is not worth the additional investments required to continue the program to completion, the Deputy Chief of Naval Operations for Integration of Capabilities and Resources could then coordinate with the Assistant Secretary of the Navy for Research, Development, and Acquisition to identify funding available for reprogramming to other weapons acquisition programs.

. . . the shock capability requirement is a system attribute that directly contributes to meeting the key performance parameter requirements for effectively performing the minesweeping function.

Draft Capability Production Document Needs to Include All Required Information

N8 staff did not include information requirements established in the JCIDS manual for preparing the CPD and did not review the draft CPD to verify that it contained those requirements and complete, up-to-date references.

The JCIDS Manual requires the CPD to include:

- Technology and Manufacturing Readiness Assessment section, which discusses the program's critical technology elements in accordance with the, "DoD Technology Readiness Assessment Guidance," May 13, 2011. The section must identify any manufacturing readiness challenges linked to the program's key performance parameters;
- Joint capability areas, which the DoD uses to review and manage defense capabilities. As defined in the, "Joint Capability Area Management Plan," January 27, 2010, joint capability areas are collections of like DoD capabilities functionally grouped to support capability analysis, strategy development, investment decision making, capability portfolio management, capabilities-based force development, and operational planning; and
- Latest threat assessment, which summarizes the projected threat environment and the specific threat capabilities to be countered. The draft CPD does not reference the latest threat assessment.

However, the draft CPD from N8 did not contain the required information. N8 must update the draft CPD to include required information on technology and manufacturing readiness, the joint capabilities areas assessed, and the threat environment to capture the information necessary to support testing, development, and production of an affordable and supportable system. On November 28, 2011, the AMCM Requirements Officer for N8 stated that he expected that N8 would have the OASIS CPD finalized, staffed, and approved by June 2012.

Conclusion

Without defined capability requirements and a revised CPD, the Navy will be hindered in its ability to determine whether the OASIS system is operationally effective, suitable, and affordable to produce and deploy. The most significant impact on operational effectiveness and system affordability for the OASIS will most likely result from the expected shortfall in the ability to meet the threshold shock capability requirement established in the 2001 operational requirements document. Specifically, because of lowered shock resistance, staff at N8 and NSWC-PC stated that they must now consider system failures during minesweeping operations, which would necessitate stocking the most shock-vulnerable subsystems on the LCS to allow for timely replacement. The Inverter Power Source is the most costly of the shock-vulnerable subsystems, with an estimated unit cost of $750,000, representing approximately 20 percent of the unit cost of an OASIS production unit. During our audit, prime contractor staff mentioned two potential options for design changes that could increase the shock resistance of the Inverter Power Source, but provided no cost estimates for either option. At the time of our audit, the N8 staff had not determined how many additional OASIS nose sections (which contain the shock-vulnerable Inverter Power Source and control electronics) were needed to meet the mission with a reduced shock capability. The N8 also had not determined whether the LCS would have sufficient storage for the additional spares.

Revised, Added, and Renumbered Recommendations

Revised Recommendation

In order to clarify Recommendation A.2 in the draft report concerning the cost and mission impacts of reducing the system shock capability requirement into the draft CPD, we revised the recommendation to state that the CPD should address whether the program is worth the additional investments required to continue to completion, in accordance with the JCIDS Manual.

Added Recommendation

To ensure that the Navy makes the most beneficial use of acquisition funds, we added a recommendation (Recommendation A.2) that relates to the potential results of implementing our recommendation for including the cost and mission impacts of reducing the system shock capability requirement into the draft CPD. Specifically, Recommendation A.2 states that the Navy should identify funding available for reprogramming to other weapons acquisition programs if the impact of reducing the OASIS shock capability requirement is that the OASIS does not provide acceptable military utility or is not worth the additional investments required to continue the program to completion.

Renumbered Recommendations

Because Recommendations A.1, A.2, and A.3 in the draft report involved modifying the draft CPD, we have combined them all under Recommendation A.1 as A.1.a, A.1.b, and A.1.c.

Recommendations

We recommend that the Deputy Chief of Naval Operations for Integration of Capabilities and Resources:

A.1. Revise the draft Organic Airborne and Surface Influence Sweep Capability Production Document to:

A.1.a. Establish and define a realistic shock capability requirement against which to test the Organic Airborne and Surface Influence Sweep.

A.1.b. Include the cost and mission impacts of reducing the system shock capability requirement, including the system's ability to meet key performance parameters for mission performance, to enable the Joint Requirement Oversight Council, or its designated validation authority, to fully assess whether the Organic Airborne and Surface Influence Sweep provides acceptable military utility and is worth the additional investments required to continue the program to completion in accordance with the "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012.

A.1.c. Include the following information as required by the "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012:

1). A Technology and Manufacturing Readiness Assessment section.

2). The joint capability areas to which the Organic Airborne and Surface Influence Sweep will contribute.

3). The latest threat assessment.

A.2. If, as a result of Recommendation A.1.b, the Joint Requirement Oversight Council determines the Organic Airborne and Surface Influence Sweep does not provide acceptable military utility or is not worth the additional investments required to continue the program to completion, the Council should coordinate with the Assistant Secretary of the Navy for Research, Development, and Acquisition to identify funding available for reprogramming to other weapons acquisition programs.

Management Comments Required

The Navy did not comment on a draft of this report. We request that the Navy provide comments on the final report.

Finding B. Shortfalls in Test Planning to Support the Low-Rate Initial Production Decision

The PM planned the LRIP decision review to occur in the second quarter of FY 2013 before the system completed shock testing and iterative (periodically repeated) production readiness reviews. Specifically, the PM:

- delayed shock testing because she did not want to delay other testing efforts if OASIS models were destroyed or disabled; and
- did not schedule iterative production readiness reviews because she considered the single production readiness review included in the OASIS contract, with producibility (the ability to manufacture a product) considerations during a 2003 critical design review, and found the producibility trade-offs made within the design process to be adequate.

Additionally, the PM canceled and did not reschedule an independent operational assessment because of delays in completing predecessor testing, including air worthiness and contractor testing with the OASIS integrated with the MH-60S helicopter. Further, the PM did not synchronize and fully define test planning for the OASIS. Specifically, the PM did not update the draft OASIS Test and Evaluation Master Plan (TEMP), January 2009, to:

- synchronize the planned schedule for developmental testing of OASIS, integrated with the MH-60S helicopter, with the developmental test schedule in the February 1, 2011, TEMP for the Multi-Mission Helicopter (the MH-60S TEMP); and
- address a reliability growth plan[4] in accordance with the "DoD Guide for Achieving Reliability, Availability, and Maintainability."

The PM and her staff did not review the draft OASIS TEMP to verify that testing schedules were synchronized with MH-60S test planning and that the TEMP was prepared in accordance with the "DoD Guide for Achieving Reliability, Availability, and Maintainability" because they delayed all TEMP revisions until N8 finalized OASIS requirements (discussed in Finding A) needed to support test planning.

As a result, the Navy could commit to acquiring four LRIP OASIS units of unknown operational performance and producibility at an estimated cost of $15 million. These LRIP units could require costly retrofits and may not satisfy test requirements in support of the full-rate production decision, scheduled to occur in the third quarter of FY 2015. In addition, the Navy plans to acquire 38 more units at a cost of $140.6 million.

[4] A reliability growth plan provides a feasible growth path from a current estimate of reliability to a value of reliability that is sufficiently high to demonstrate that the system will meet system requirements during Initial Operational Test and Evaluation.

Program Office Plans to Delay Shock Testing

On April 26, 2005, in the memorandum, "Revision to the Organic Airborne and Surface Influence Sweep (OASIS) Acquisition Decision Memorandum Dated 15 Apr 2002" (the 2005 program exit criteria[5]), the Assistant Secretary of the Navy for Research, Development, and Acquisition, as the milestone decision authority, approved a revised exit criteria for the LRIP decision. The criteria required the OASIS to survive shock from nearby detonations to the level of the required shock factor threshold designated in the 2001 operational requirements document. However, the PM planned to delay shock testing until after the second quarter of FY 2013 LRIP decision because she did not want to delay other testing efforts, such as the planned air worthiness and ongoing contractor weapon system integration tests, if OASIS models were destroyed or disabled. On June 15, 2011, the Mine Warfare Systems Division Systems Engineer, NSWC-PC, stated that his staff had only low to medium confidence in the accuracy of shock performance predictions for OASIS components, including the Inverter Power Source and electronics control assembly. The PM stated that she may recommend schedule changes for shock testing to the milestone decision authority, after she has sufficient test results to support such a decision.

In addition to not meeting the approved exit criteria for the LRIP decision, the Navy's delay of shock testing until after the LRIP decision is contrary to requirements in DoD Instruction 5000.02. The System Capability and Manufacturing Process Demonstration phase that precedes the LRIP decision is intended to demonstrate the ability of the system to operate in a useful way consistent with the approved key performance parameters and to demonstrate that system production can be supported. The demonstration ends when the system meets approved requirements and performs in its intended environment, using production representative articles. The intended environment for the OASIS includes withstanding underwater shocks resulting from exploding influence mines.[6] As discussed in Finding A, the OASIS shock capability requirement is a system attribute that directly contributes to the OASIS ability to meet the key performance parameter requirements for effectively performing the minesweeping function. As also discussed in Finding A, the Navy no longer considers the shock threshold designated in the 2001 operational requirements document as realistic. Because of the need for the N8 to revise the draft OASIS CPD to establish and define a realistic shock capability requirement, as provided in Recommendation A.1., the Assistant Secretary of the Navy for Research, Development, and Acquisition should revise the exit criteria his predecessor defined in the 2005 program exit criteria to require the program to meet the updated shock value threshold.

> *. . . delay of shock testing until after the LRIP decision is contrary to requirements in DoD Instruction 5000.02.*

[5] Before each acquisition milestone decision point, the program manager will propose, and the milestone decision authority will approve, exit criteria (program accomplishments related to important technical, schedule, or management risk areas) appropriate for proceeding to the next acquisition phase of the program. Unless the milestone decision authority waives or modifies the approved exit criteria, the program manager must meet the exit criteria in order to proceed into the next acquisition phase.

[6] Influence mines have sophisticated sensors and firing mechanisms that do not require the target (ship) to make contact with the mine before the mine explodes. These mines may be fitted with one or a combination of magnetic, acoustic, or other types of sensors.

Operational Assessment Canceled

The PM and the Navy COMOPTEVFOR scheduled an operational assessment for OASIS to occur in April 2010 before the LRIP decision. Subsequently, the PM and COMOPTEVFOR canceled the operational assessment and did not reschedule it because of delays in completing predecessor testing, including air worthiness and contractor testing with the MH-60S. The objectives of these tests were to prove integration of the OASIS with the MH-60S and system readiness for Government testing. The delays in completing predecessor testing were driven by system design challenges, including modification to add the body-mounted electrode and address tow cable problems. Additionally, while the draft OASIS TEMP did include an operational assessment, the assessment involved operating OASIS from an alternate platform, the MH-53 helicopter. Mine Warfare staff stated that testing the OASIS with the MH-53 helicopter was canceled because the MH-53 is not representative of the MH-60S. The test lead for OASIS at COMOPTEVFOR agreed, stating that using the MH-53 would have given a false assessment of OASIS capabilities. The false assessment would occur because the MH-53 helicopter has a higher towing capacity than the MH-60S helicopter and would unfairly skew the test results. DoD Instruction 5000.02 and COMOPTEVFOR Instruction 3980.1 require acquisition managers to conduct an operational assessment before the LRIP decision. COMOPTEVFOR Instruction 3980.1 states that the focus of the operational assessment is to assess the capability of the system under test to meet performance goals in operational effectiveness and suitability.

> *. . . the PM and COMOPTEVFOR canceled the operational assessment and did not reschedule it . . .*

In response to our audit on August 19, 2011, the PM agreed to update the draft OASIS TEMP for Milestone C to modify the operational assessment to use the MH-60S helicopter, rather than the MH-53 helicopter, and to coordinate with COMOPTEVFOR in planning the assessment to support the LRIP decision review. Additionally, on November 8, 2011, program officials attended an operational assessment scope and planning meeting with COMOPTEVFOR. Program officials agreed to conduct a 1-month, operational assessment, to begin October 2012 in support of the LRIP decision.

Production Readiness Reviews Needed

Before our review, the PM and the contractor had not scheduled iterative production readiness reviews in support of the LRIP decision review. The statement of work in the OASIS contract (N00024-02-C-6316) included a single production readiness review and the contract did not clearly state when the review would be conducted. On February 15, 2012, in response to a discussion draft of our report, the PM stated that the production readiness review was planned for August 2012, which is before the LRIP decision review in the second quarter of FY 2013 and therefore is "in accordance with current guidance."

The Program Manager's plan for conducting a single production readiness review before the LRIP decision review was only partially in accordance with guidance in the Defense Acquisition Guidebook. Specifically, the Defense Acquisition Guidebook states that program managers should conduct production readiness reviews of the prime contractor and major subcontractors in an iterative fashion, concurrently with other technical reviews, during the EMD phase. The Guidebook also states that, as the design progresses through the System Capability and

Manufacturing Process Demonstration portion of EMD, program managers should conduct periodic production readiness reviews to identify and mitigate risks. Program managers should conduct the final production readiness review on the system at the completion of the EMD phase and the beginning of LRIP.

During our audit, the PM stated that producibility was also considered as part of the system design review, including the system-critical design review in 2003 and that producibility trade-offs were made within the design process. However, the OASIS system design had changed significantly. Specifically, the OASIS experienced various design changes since the 2003 critical-design review, most significantly the PM's approval in January 2008 to add the body-mounted electrode. The body-mounted electrode was needed to eliminate corrosion to the tow cable, to alleviate tow cable twisting, and to allow the OASIS to use the same tow cable as the airborne mine countermeasure systems. The PM and the contractor conducted an updated critical design review in 2009 that included some consideration of manufacturing, but production readiness reviews go beyond the scope of the critical design review and focus on assessing the manufacturing and quality risks as programs proceed to LRIP and full-rate production. Specifically, as defined in the Defense Acquisition Guidebook, the production readiness review provides value by answering critical manufacturing questions:

. . . when the system design is not ready for production, programs will incur unacceptable risks of breaching cost, system performance, or schedule thresholds.

- Are the production facilities ready and are the required workers trained?
- Is the detailed design complete and stable enough to enter LRIP?
- Is the supply chain established and stable with materials available to meet planned production?
- Have manufacturing processes been demonstrated in a pilot-line environment?

Overall, the PM and the contractor did not adequately emphasize the producibility of the OASIS design during the EMD phase of the acquisition process. As a result, on July 14, 2011, the contractor stated that the current Inverter Power Source design for the OASIS was not "conducive to production." The Defense Acquisition Guidebook states that, when the system design is not ready for production, programs will incur unacceptable risks of breaching cost, system performance, or schedule thresholds. Performing iterative production readiness reviews would have provided the PM with earlier awareness of producibility problems that could impact the ability to meet the 2005 program exit criteria for the LRIP decision review that requires OASIS to "Demonstrate total program production goals can be achieved within cost projections of the Acquisition Program Baseline."

During the audit, the PM stated that in FY 2010, the contractor installed new leadership and since then, the program office has observed improvement in the contractor's oversight of producibility problems. However, the PM also stated that she recognized that producibility must be a priority as the OASIS program progresses and she has requested producibility funding in the FY 2013 budget. While the contractor actions and PM observations are encouraging, the Assistant Secretary of the Navy for Research, Development, and Acquisition should delay the

LRIP decision review as necessary for the PM to demonstrate that total program production goals can be achieved within the cost projects of the Acquisition Program Baseline.

Planned Testing Not Synchronized or Fully Defined

The PM did not synchronize and fully define test planning for the OASIS. Specifically, the PM did not yet update the draft OASIS TEMP to:

- synchronize the planned schedule for developmental testing of OASIS, integrated with the MH-60S helicopter, with the developmental test schedule in the TEMP for the Multi-Mission Helicopter, February 1, 2011, (the MH-60S TEMP); and
- discuss a reliability growth plan.

Developmental Testing Schedules in the TEMPs for OASIS and the MH-60S Helicopter Do Not Synchronize

The draft OASIS TEMP scheduled the developmental testing phase to begin after the LRIP decision review. However, it is essential that the PM complete the developmental testing phase before the LRIP decision because this testing will include towing OASIS over an instrumented test field containing inert mines and documenting how the magnetic and acoustic fields that OASIS generates compare to those that system models have predicted. Navy testers analyze the test results to determine how far away the OASIS can influence a mine to explode and whether the probability of explosion meets the system performance requirements defined in the draft CPD. The MH-60S TEMP correctly schedules OASIS developmental testing for FY 2012, before the LRIP decision review. Further, in Annex D, "AMCM Test Program," the MH-60S TEMP states that the OASIS TEMP should complement the TEMPS for the AMCM systems (including OASIS). DoD Instruction 5000.2 defines the TEMP as a document that program managers use to plan testing to demonstrate system performance that must include a test schedule and the test resource requirements necessary to achieve the planned testing.

Navy testers analyze the test results to determine how far away the OASIS can influence a mine to explode and whether the probability of explosion meets the system performance requirements defined in the draft CPD.

The PM did not update the draft OASIS TEMP to synchronize scheduled developmental testing with test planning in the MH-60S TEMP because N8 did not finalize OASIS requirements (discussed in Finding A). Specifically, the test lead for the PM stated that all OASIS TEMP revisions were on hold until N8 finalized the CPD, including revised shock requirements. In response to the audit, on August 19, 2011, the PM stated that the schedule in the draft OASIS TEMP was "incorrect" and agreed to update the document to include a developmental test phase before the LRIP decision. The PM's TEMP update should include shock testing or analysis and should synchronize the planned schedule for developmental testing of the OASIS integrated with the MH-60S helicopter, with the developmental test schedule in the "Test and Evaluation Master Plan for the Multi-Mission Helicopter," February 1, 2011.

Draft OASIS TEMP Did Not Include a Reliability Growth Plan

During the audit, we noted that the draft OASIS TEMP did not include planning for reliability growth. As previously defined, reliability growth planning provides a feasible growth path from a current estimate of reliability to a value of reliability that is sufficiently high to demonstrate that the system will meet system requirements during Initial Operational Test and Evaluation. Additionally, preliminary information from the PM indicated that the mean time between failures of a key OASIS subsystem, the Inverter Power Source, may be as low as 10 hours, but the draft CPD has a threshold requirement of 40 hours mean time between operational mission failures for OASIS. The draft CPD defines mean time between operational mission failure as any failure that prevents the OASIS from completing any portion of its mission profile, from conducting preflight checks to transitioning back to base and completing post mission analysis.

DoD Instruction 5000.02 describes the reliability growth plan as an integral part of the design and development phase. Further, the Defense Acquisition Guidebook Annex, "Test and Evaluation Master Plan," states that, because reliability is a key factor in system development, the TEMP should identify the amount of system operating time to be accrued during planned tests. Additionally, the Guidebook states that the TEMP should reference a reliability growth planning document. The test lead for Mine Warfare stated that the PM did not address the system reliability growth plan in the draft TEMP because N8 had not finalized the shock requirement or approved the draft CPD.

In response to our audit, on August 19, 2011, the PM stated that the OASIS was still early in its testing phase but that reliability data collected to date indicated that a system reliability problem existed. For example, the mean time between failures for the Inverter Power Source of as low as 10 hours was significantly below the threshold system requirement of 40 hours in the draft CPD. The PM also stated that program office staff and the contractor would continue to collect reliability data and would revise the TEMP to include a reliability growth plan. Furthermore, the OASIS test lead agreed that the draft OASIS TEMP needed to have a section on reliability growth to support the LRIP decision review. Additionally, on December 12, 2011, the Assistant PM provided a summary of planned reliability growth activity for OASIS that could be used to update the draft OASIS TEMP, after N8 approved the draft CPD. The revised summary references a reliability growth plan and states that program office staff will use data from MH-60S flight testing to calculate a reliability growth curve. The Assistant PM for OASIS stated that the draft TEMP was still under revision.

Navy Could Commit to Acquiring Low-Rate Initial Production OASIS Units of Unknown Operational Performance and Producibility

The Navy could commit to acquiring four LRIP OASIS units, at an estimated cost of $15 million, of unknown operational performance because of insufficient test planning and producibility. These LRIP units could require costly retrofits and may not satisfy test requirements in support of the full-rate production decision, scheduled at the end of FY 2013. In addition, the Navy plans to acquire 38 more units at a cost of $140.6 million. Specifically, if the PM does not complete

> *. . . the Navy plans to acquire 38 more units at a cost of $140.6 million.*

shock testing and obtain an operational assessment from COMOPTEVFOR, the milestone decision authority cannot assess the shock resistance capabilities of OASIS against required shock capabilities and will not have an independent assessment of risk factors to gauge whether OASIS will be operationally effective and suitable. If production readiness reviews and contractor production planning are not performed to determine whether the OASIS design is ready for production, the OASIS will incur unacceptable risks that may breach program schedule and cost thresholds.

Recommendations

B.1. We recommend that Assistant Secretary of the Navy for Research, Development, and Acquisition:

a. Revise the exit criteria his predecessor defined in the memorandum, "Revision to the Organic Airborne and Surface Influence Sweep (OASIS) Acquisition Decision Memorandum Dated 15 Apr 2002," April 26, 2005, to require the program to meet the updated shock value threshold the Deputy Chief of Naval Operations for Integration of Capabilities and Resources provides in response to Recommendation A.1.

b. Delay the low-rate initial production decision review, as necessary, to enable the Program Manager, Mine Warfare, to meet the revised exit criteria (resulting from Recommendation B.1.a) for surviving shock from nearby detonations and to meet the exit criteria in the memorandum "Revision to the Organic Airborne and Surface Influence Sweep (OASIS)," April 26, 2005, to demonstrate that total program production goals can be achieved within the cost projections of the Acquisition Program Baseline.

B.2. We recommend that the Program Manager, Mine Warfare:

a. Coordinate with the Commander, Operational Test and Evaluation Force, to schedule an operational assessment for the Organic Airborne and Surface Influence Sweep, integrated with the MH-60S helicopter, before the low-rate initial production decision review.

b. Update the draft, "Test and Evaluation Master Plan for the Organic Airborne and Surface Influence Sweep," January 2009, to:

1). Include shock testing or analysis;

2). Synchronize the planned schedule for developmental testing of the Organic Airborne and Surface Influence Sweep integrated with the MH-60S helicopter, with the developmental test schedule in the "Test and Evaluation Master Plan for the Multi-Mission Helicopter," February 1, 2011; and

3). Include a reliability growth plan to support the low-rate initial production decision review.

Management Comments Required

The Navy did not comment on a draft of this report. We request that the Navy provide comments on the final report.

Appendix A. Scope and Methodology

We conducted this performance audit from March 2011 through March 2012 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. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

We interviewed staff from: Program Executive Office (Littoral Combat Ships), and Mine Warfare Program Office, Washington Navy Yard; and the Program Executive Office for Air-Antisubmarine Warfare, Assault, and Special Mission Programs and the Multi-Mission Helicopter Program Office, Patuxent River, Maryland. We also interviewed staff from the offices of DoD Director, Operational Test and Evaluation, Alexandria, Virginia; the Deputy Chief of Naval Operations, Pentagon; the Commander, Operational Test and Evaluation Force, Alexandria, Virginia; the Commander, Naval Surface Warfare Center, Panama City, Florida; and the Director, Defense Contract Management Agency, Orlando, Florida. Further, we toured the ITT corporation facility in Panama City, Florida, which was responsible for designing and building the OASIS and observed three engineering developmental models of OASIS.

We collected, reviewed, and analyzed documents dated from January 2001 through January 2012. We reviewed the "Operational Requirements Document for Organic Airborne and Surface Influence Sweep," January 12, 2001; the draft "Capability Production Document for Organic Airborne and Surface Influence Sweep," December 15, 2008; the draft "Test and Evaluation Master Plan for the Organic Airborne and Surface Influence Sweep," January 2009; and the "Multi-Mission Combat Support Helicopter (MH-60S) Test and Evaluation Master Plan," February 2011.

To determine whether the Navy was effectively establishing requirements and planning testing to support procuring the OASIS after the LRIP decision review, we reviewed program planning and reporting documentation against the policies and guidance in the following DoD and Navy issuances:

- Chairman of the Joint Chiefs of Staff Instruction 3170.01H, "Joint Capabilities Integration and Development System," January 10, 2012;
- Chairman of the Joint Chiefs of Staff "Manual for the Operation of the Joint Capabilities Integration and Development System," January 19, 2012;
- DoD Instruction 5000.02, "Operation of the Defense Acquisition System," December 2008;
- Defense Acquisition Guidebook;
- COMOPTEVFOR Instruction 3980.1, "Operational Test Director's Manual, April 23, 2008.

Use of Computer Processed Data

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

Use of Technical Assistance

An electrical engineer and a computer and electronics engineer from the Technical Assessment Directorate, DoD Office of Inspector General, assisted with the audit. The engineers assisted the team in evaluating and reviewing OASIS systems engineering, test and evaluation, and other acquisition planning related documentation.

Prior Coverage

During the last 5 years, the DoD Inspector General (IG) has issued one report discussing OASIS. Unrestricted DoD IG reports can be accessed at http://www.dodig.mil/audit/reports.

Report No. DoDIG-2012-081, "Navy Organic Airborne and Surface Influence Sweep Program Needs Defense Contract Management Agency Support," April 27, 2012

Appendix B. OASIS Components and Related Mine Countermeasure Systems

When fielded, the OASIS will generate and impart underwater magnetic and acoustic signature fields to provide a high-speed influence minesweeping capability. Influence minesweeping is the ability of the OASIS to mimic a ship's magnetic or acoustic signature, which then causes mines to explode. OASIS uses its influence ability to neutralize sea mines in areas where mine hunting is not possible due to mine burial or high bottom clutter. OASIS is just one of the four AMCM systems that the Navy plans to develop and install on the MH-60S helicopter.

OASIS Description

The OASIS, integrated with the MH-60S helicopter, can be subdivided into three major components: the aircraft system, the AMCM mission kit, and the OASIS Tow Body and Power Distribution Unit.

Aircraft System

The aircraft system component includes all of the aircraft systems used to support OASIS during AMCM missions. Specifically, this system component includes the MH-60S helicopter, modified for towing, and an embedded global positioning system and/or inertial navigation system, radar altimeter, electrical power, and hydraulic pressure. Figure B-1 shows the MH-60S helicopter.

Figure B-1. MH-60S Helicopter

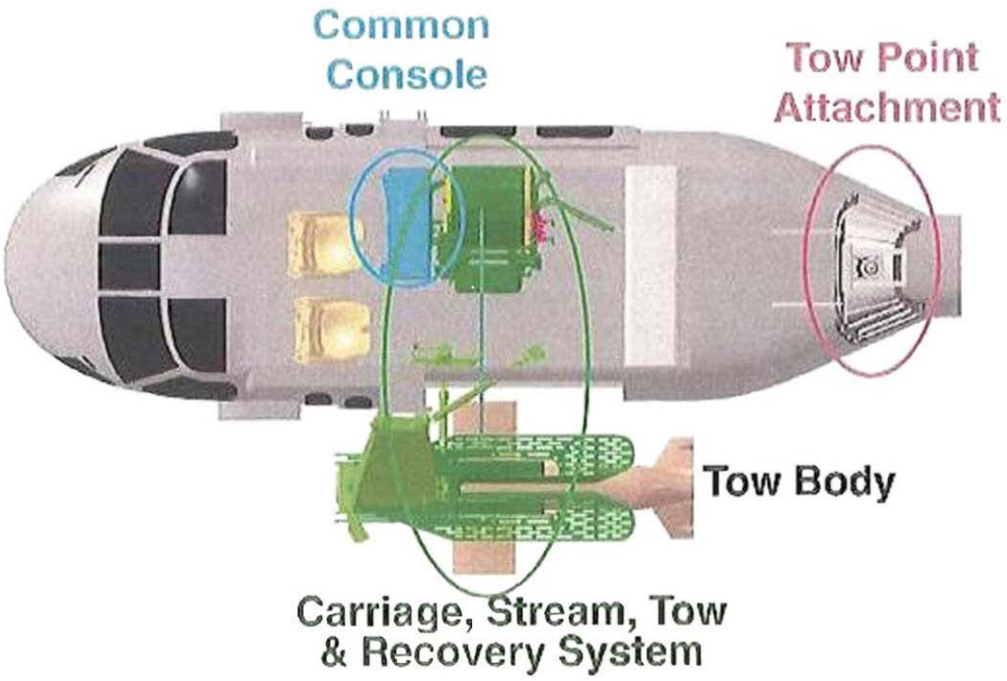
Source: Multi-Mission Helicopter Program Office (PMA 299)

AMCM Mission Kit

The Navy will use AMCM mission kit components to integrate OASIS with the MH-60S helicopter. The mission kit consists of the carriage, stream, tow, and recovery system (a pylon extending from the port cargo door of the helicopter, a winch, and a tow cable) and the common console. The common console resides in the MH-60S helicopter and provides all control and monitoring for the OASIS and the carriage, stream, tow, and recovery system.

Figure B-2 shows how the AMCM mission kit, including the carriage, stream, tow, and recovery system and the common console installs into the MH-60S helicopter. Figure B-2 also shows the tow point attachment for the tow cable.

Figure B-2. AMCM Mission Kit Installed Into the MH-60S Helicopter



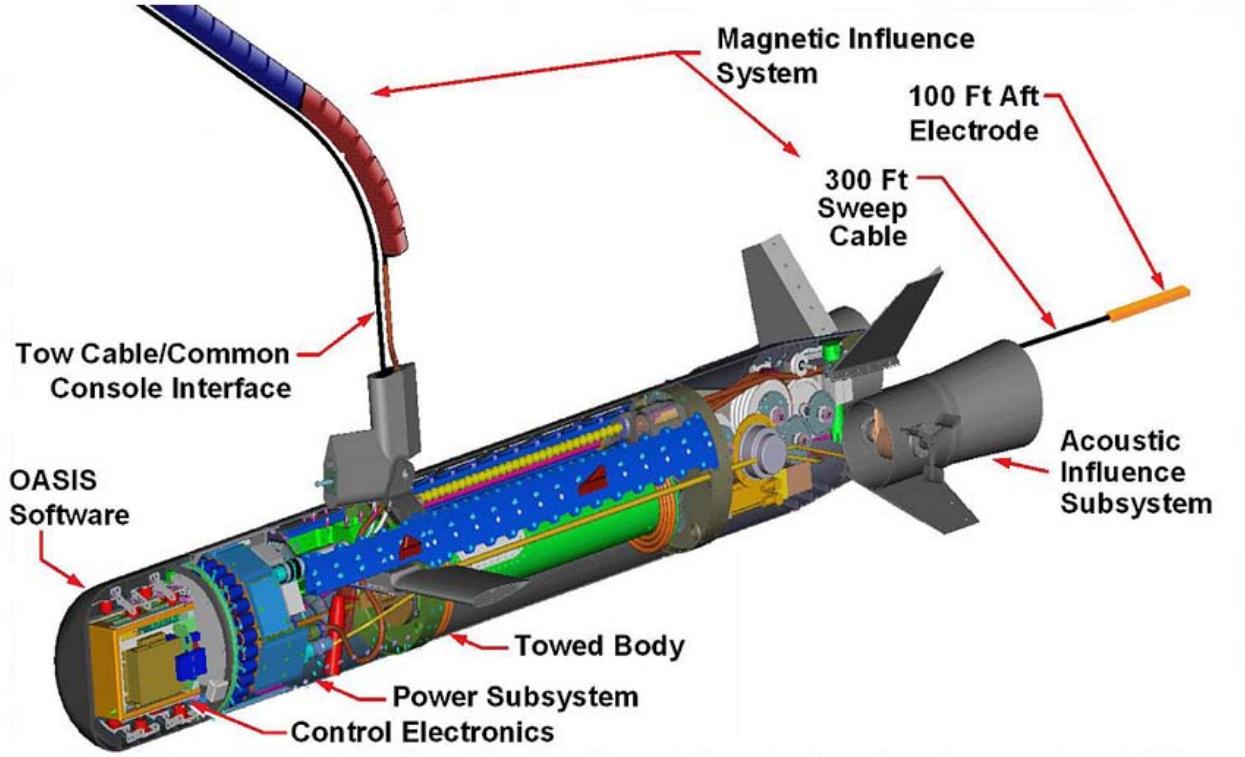
Source: Multi-Mission Helicopter Program Office (PMA 299)

OASIS Tow Body and Power Distribution Unit

The OASIS tow body component includes the following subsystems: acoustic influence, magnetic influence, control and monitoring, and power. The acoustic influence subsystem includes a rotating impeller that creates expanding bubbles that subsequently collapse, creating acoustic output to simulate a ship. The magnetic subsystem includes a body-mounted electrode, a power inverter, and a 405-foot sweep or electrode cable, which using electricity from the power system, work together to create a magnetic influence field. The control and monitoring subsystem contains all components to control the tow body and to communicate with the common console in the MH-60S helicopter. All of these subsystems and their components reside in the OASIS tow body, with the exception of the power distribution unit, a component of

the power subsystem in the MH-60S helicopter. The power distribution unit feeds electric power, from the helicopter to the OASIS tow body, through the tow cable. Figure B-3 shows the subsystems within the OASIS tow body.

Figure B-3. OASIS Tow Body Subsystems



Source: Naval Surface Warfare Center-Panama City, Florida

Related Mine Countermeasures Systems

The Navy plans to develop and install three other related organic AMCM systems separately on the MH-60S helicopter. These systems include the:

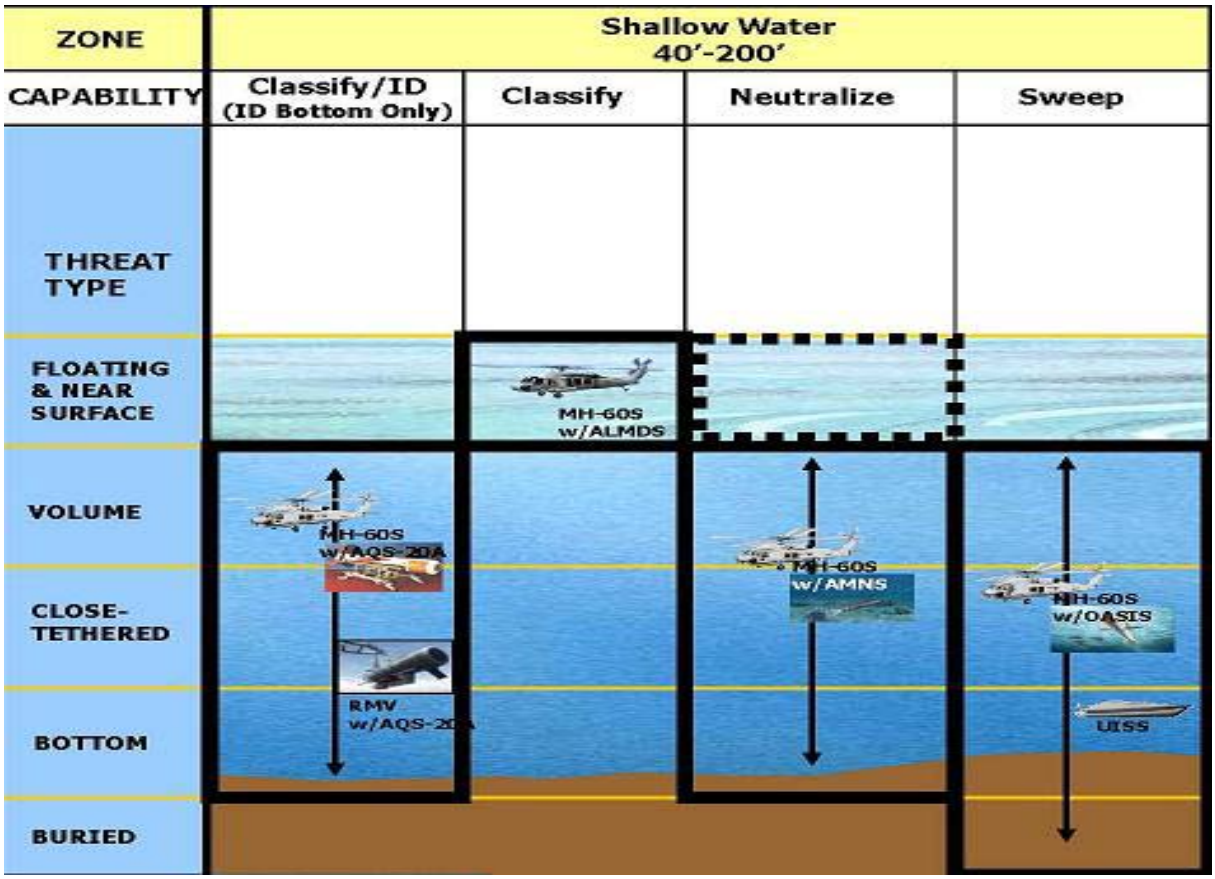
- AQS-20A Mine-Hunting Sonar, a towed, underwater mine-detection sonar that employs an electro-optic identification sensor to locate and identify bottom, close-tethered, and moored sea mines (the Navy also plans to tow the Mine-Hunting Sonar with the Remote Multi-Mission Vehicle, which is an unmanned snorkeling submersible vehicle);
- Airborne Laser Mine Detection System, a high-area coverage, electro-optic AMCM laser system that locates and identifies floating and near-surface moored sea mines; and
- Airborne Mine Neutralization System, an expendable, remotely operated device that will reacquire previously identified bottom mines and neutralize them using the Archerfish Common Mine Neutralizer.

DoD Inspector General issued Report D-2007-0084, "Acquisition of the Navy Rapid Airborne Mine Clearance System," April 11, 2007, on a fourth AMCM system, the Rapid Airborne Mine Clearance System, which was to be an MH-60S-deployed system capable of reacquiring and neutralizing near surface and floating mines using projectile fired from a Mark 44 Bushmaster II gun. In the report, we recommended that the system not enter the LRIP phase of the acquisition process until it had demonstrated that it could operate and function with the MH-60S helicopter. According to the N8 Branch Head of Mine Warfare Division, in 2010 the Navy eliminated funding because the Rapid Airborne Mine Clearance System did not demonstrate the ability to neutralize mines when installed in the MH-60S helicopter.

In addition to the AMCM systems, the Navy was also developing the prototype Unmanned Influence Sweep System, which involves an unmanned surface vehicle towing a surface minesweep. The Navy expects to have a Milestone B Program Initiation decision at the end of FY 2012 for the Unmanned Influence Sweep System.

Figure B-4 shows the capabilities (classify/identify, neutralize, or sweep) of OASIS and related mine countermeasures systems against various mine threats. These capabilities can be divided into two categories: mine hunting and minesweeping. In clearing a mined area, the Navy's countermine force will first complete mine hunting, which includes detecting and classifying mine-like contacts, identifying each contact as a mine or a nonmine/mine-like bottom object, and then neutralizing the mines. After completing mine hunting, the countermine force will perform minesweeping to remove any mines that were not identified and neutralized during mine hunting.

Figure B-4. Capabilities of OASIS and Related MCM Systems



Source: Naval Surface Warfare Center-Panama City Division

Acronyms:

ID - Identification
ALMDS - Airborne Laser Mine Detection System
AMNS - Airborne Mine Neutralization System
AQS-20A - Designator for the Mine-Hunting Sonar
RMV - Remote Multi-Mission Vehicle
UISS - Unmanned Influence Sweep System

Glossary

Acquisition Category

Acquisition Categories include categories I, II, and III. Acquisition Category I programs have the highest dollar value and have the Defense acquisition executive as the milestone decision authority. Acquisition Category II and III programs have relatively lower dollar values and the component (Army, Navy, Air Force) acquisition executive, or designee, serve as the milestone decision authority.

Acquisition Phase

Acquisition phase refers to all the tasks and activities needed to bring a program to the next major acquisition milestone. Acquisition phases provide a logical means of progressively translating broadly stated capabilities into well-defined, system-specific requirements and ultimately into operationally effective, suitable, and survivable systems.

Developmental Testing and Evaluation

Developmental testing and evaluation is any testing used to assist in the development and maturation of products, product elements, or manufacturing or support processes. It also includes any engineering-type testing used to verify the status of technical progress, verify that design risks are minimized, substantiate achievement of contract technical performance, and certify readiness for initial operational testing. Development tests generally require instrumentation and measurements and are accomplished by engineers, technicians, or soldier operator-maintainer test personnel in a controlled environment to enable failure analysis.

Engineering and Manufacturing Development (EMD) Phase

EMD is the third acquisition phase of the program life cycle, as defined and established by DoD Instruction 5000.02. This phase consists of two efforts, integrated system design and system capability and manufacturing process demonstration, and begins after acquisition Milestone B. A program planning to proceed into system capability and manufacturing process demonstration at the conclusion of integrated system design will first undergo a post-critical design review assessment to confirm design maturity and the initial product baseline.

Initial Operational Test and Evaluation

Initial Operational Test and Evaluation is testing conducted on production, or production representative articles, to determine whether systems are operationally effective and suitable to support a full-rate production decision.

Joint Capabilities Integration and Development System (JCIDS)

JCIDS implements the DoD requirements process. Specifically, JCIDS supports the Chairman of the Joint Chiefs of Staff and the Joint Requirements Oversight Council in identifying, assessing, and prioritizing joint military capability needs, as required by law. The capabilities are identified by analyzing what is required across all joint capability areas to accomplish the mission.

Key Performance Parameters

Key performance parameters are those attributes or characteristics of a system considered critical or essential to the development of an effective military capability and that make a significant contribution to the characteristics of the future joint force. A key performance parameter normally has a threshold representing the minimum acceptable value achievable to low-to-moderate risk, and an objective, representing the desired operational goal but at higher risk in cost, schedule, and performance.

Low-Rate Initial Production (LRIP)

LRIP is the first effort of the Production and Deployment acquisition phase. This effort is intended to result in completion of manufacturing development in order to verify adequate and efficient manufacturing capability and to produce the minimum quantity necessary to provide production-representative articles for initial operational test and evaluation. LRIP establishes an initial production base for the system and permits an orderly increase in the production rate for the system, sufficient to lead to full-rate production upon successful completion of operational (and live-fire, where applicable) testing. At Milestone B, the milestone decision authority determines the LRIP quantity for major defense acquisition programs and major systems.

Operational Effectiveness

Operational effectiveness is the measure of the overall ability of a system to accomplish a mission when used by representative personnel in the environment planned or expected for operational employment of the system considering organization, doctrine, tactics, supportability, survivability, vulnerability, and threat.

Operational Suitability

Operational suitability is the degree to which a system can be placed and sustained satisfactorily in field use with consideration being given to availability, compatibility, transportability, interoperability, reliability, wartime usage rates, maintainability, safety, human factors, habitability, manpower, logistics supportability, natural environmental effects and impacts, documentation, and training requirements.

Operational Test and Evaluation

Operational test and evaluation refers to the field test, under realistic conditions, of any item (or key component) of weapons, equipment, or munitions for the purpose of determining the effectiveness and suitability of the weapons, equipment, or munitions for use in combat by typical military users; and the evaluation of the results of such tests.

Production and Deployment Phase

The Production and Deployment phase is the fourth phase of the life cycle (after EMD) as defined and established by DoD Instruction 5000.02. This phase consists of two efforts: low-rate initial production and full-rate production and deployment, separated by the full-rate production decision review. The Production and Deployment phase begins after a successful Milestone C review. The purpose of this phase is to achieve an operational capability that satisfies the mission need.

Program Executive Officer (PEO)

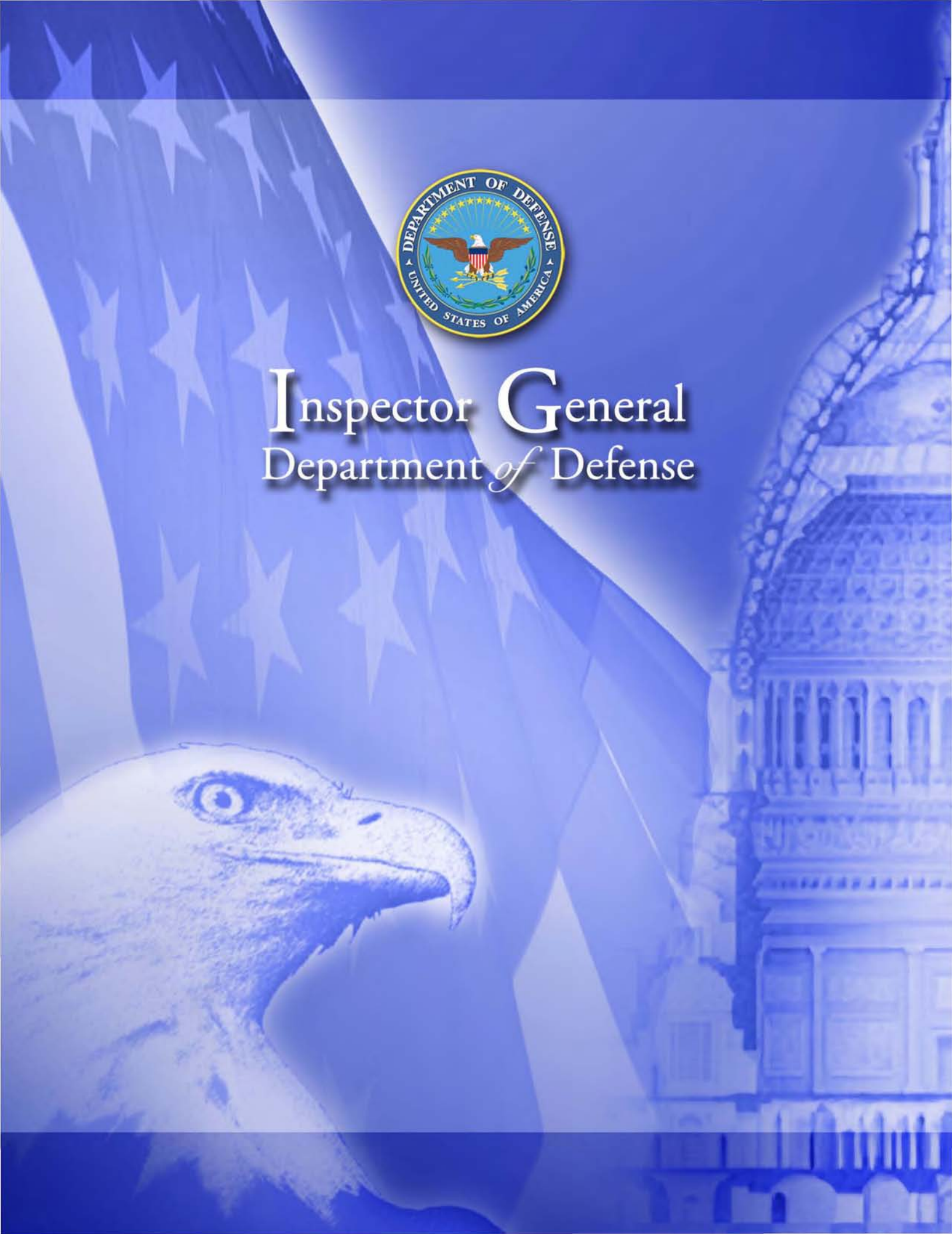
The program executive officer is a military or civilian official who has responsibility for directing multiple program managers for assigned acquisition programs. A PEO reports to, and receives guidance and direction from, the DoD component acquisition executive.

Program Manager

The program manager is a designated individual with responsibility for and authority to accomplish program objectives for development, production, and sustainment to meet the user's operational needs. The program manager shall be accountable for credible cost, schedule, and performance reporting to the milestone decision authority.

Test and Evaluation Master Plan (TEMP)

The TEMP documents the overall structure and objectives of the Test and Evaluation (T&E) program. It provides a framework within which to generate detailed T&E plans and documents schedule and resource implications associated with the T&E program. The TEMP identifies the necessary Developmental Test and Evaluation (DT&E), Operational Test and Evaluation (OT&E), and Live Fire Test and Evaluation (LFT&E) activities. It relates program schedule, test management strategy and structure, and required resources to: Critical Operational Issues (COIs), Critical Technical Parameters (CTPs), objectives and thresholds documented in the Capability Development Document (CDD), evaluation criteria, and milestone decision points.


Inspector General
Department of Defense