Audit Report

OFFICE OF THE INSPECTOR GENERAL

ADVANCED CONCEPT TECHNOLOGY DEMONSTRATION

Report No. 97-120

April 7, 1997

Department of Defense

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Acronyms

ACTD	Advanced Concept Technology Demonstration
C^4I	Command, Control, Communications, Computers, and Intelligence
DUSD(AT)	Deputy Under Secretary of Defense (Advanced Technology)
UAV	Unmanned Aerial Vehicle

INSPECTOR GENERAL
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April 7, 1997

MEMORANDUM FOR DEPUTY UNDER SECRETARY OF DEFENSE
(ADVANCED TECHNOLOGY)

SUBJECT: Audit Report on Advanced Concept Technology Demonstration
(Report No. 97-120)

We are providing this final audit report for information and use. We considered management comments on the draft of this report in preparing the final report.

Comments on the draft of this report conformed to the requirements of DoD Directive 7650.3 and left no unresolved issues. Therefore, no additional comments are required.

We appreciate the courtesies extended to the audit staff. Questions on the audit should be directed to Mr. Raymond A. Spencer, Audit Program Director, at (703) 604-9071 (DSN 664-9071) or Mr. Thomas S. Bartoszek, Audit Project Manager, at (703) 604-9014 (DSN 664-9014). See Appendix G for the report distribution. The audit team members are listed inside the back cover.

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Office of the Inspector General, DoD

Report No. 97-120 **April 7, 1997**
(Project No. 6AB-0018)

Advanced Concept Technology Demonstration

Executive Summary

Introduction. DoD began the Advanced Concept Technology Demonstration program in 1994 to provide enhanced capabilities to the Military Departments through the integration of mature and cost-effective technologies. Three themes form the focus of the Advanced Concept Technology Demonstration program: user involvement from the inception of the program, mature technology focused on warfighting needs, and a plan to execute a focused demonstration program that will provide the user a sound basis for investment decisions before commitment to a formal acquisition program. The projects are not Defense acquisition programs as defined in DoD Directive 5000.1, "Defense Acquisition," and, therefore, do not follow the same procedures and not subject to the same oversight as Defense acquisition programs.

The Deputy Under Secretary of Defense (Advanced Technology) approved 22 projects, estimated to cost about $4 billion, for FYs 1995 and 1996. The Deputy Under Secretary provides oversight, support, and evaluation of the approved projects. As the program and its processes have evolved, the Deputy Under Secretary identified and corrected problems with the process through the integrated product team process and has clarified the procedures.

Audit Objectives. The overall audit objective was to evaluate the Advanced Concept Technology Demonstration program. In this respect, we reviewed criteria used to select current and pending Advanced Concept Technology Demonstration efforts, the process for determining the program's effectiveness, and the transition of the program into the Defense acquisition cycle. We also evaluated the adequacy of the DoD Components' management controls as they apply to the audit objectives.

Audit Results. Based on our interpretation of the selection criteria, five projects, valued at $2.3 billion, of nine projects that we selected for review were questionable choices as advanced concept technology demonstration projects. As a result, the Advanced Concept Technology Demonstration process lacked broad support within the Military Departments, and the Military Departments were unclear on what type of projects would make viable projects. The Deputy Under Secretary of Defense (Advanced Technology) has issued guidance for transitioning advanced concept technology demonstration programs into the acquisition process, clarified some of the criteria, and put the criteria and guidance in the Defense Acquisition Deskbook so that all parties to the advanced concept technology demonstration have access to the criteria. However, two critical criteria for selecting advanced concept technology demonstration programs, mature technology and critical military need, are still undefined.

Recommendations in this report, if implemented, will improve the effectiveness of the selection process for the Advanced Concept Technology Demonstration program and enhance support for it. See Part I for a detailed discussion of the audit results. See Appendix A for the management control program discussion.

Summary of Recommendations. We recommend that the Deputy Under Secretary of Defense (Advanced Technology) develop clear and assessable selection criteria to include the definitions of mature technology and critical military need, include those definitions in the Defense Acquisition Deskbook, and reevaluate the FY 1997 candidates when the criteria are developed.

Management Comments. The Under Secretary of Defense for Acquisition and Technology did not agree with the conclusion that some projects were questionable choices under the criteria. However, he stated that the fact that the issue was raised indicated a need to clarify the criteria. Therefore, he concurred with our recommendations. Although not required to comment on the draft audit report, the Vice Chairman of the Joint Chiefs of Staff also stated that he endorses the recommendations. The comments are in Part III of this report. Our response to the Under Secretary's comments is in Appendix F. We will be pleased to participate in any group established to implement our recommendations.

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Part I - Audit Results

Audit Background

The Deputy Under Secretary of Defense (Advanced Technology) (DUSD[AT]) initiated the Advanced Concept Technology Demonstration (ACTD) program in early 1994 to enhance military capability within a short timeframe to solve important military problems that the user identified. The ACTDs require user involvement from inception to evaluate military utility, develop operational concepts, and retain low-cost residual operational capabilities.

As the program and its processes have evolved, DUSD(AT) has identified and corrected problems with the process through the integrated product team process and has clarified the procedures. The DUSD(AT) also defines guidelines, provides oversight support through an oversight committee, provides evaluations of the projects, and approves projects for the program.

The DUSD(AT) approved 22 ACTDs, valued at about $4 billion, for FYs 1995 and 1996 (Appendix B).

Audit Objectives

We evaluated Office of the Secretary of Defense and DoD Component policies and procedures for the ACTD program to ensure that appropriate candidates were selected for the program, that the programs were managed effectively, and that their transition into the Defense acquisition cycle was adequate. We also evaluated the management controls as they applied to the audit objectives. The audit scope and methodology, prior audits and other reviews, review of the management control program, and organizations and individuals visited or contacted are in Appendix A.

Also included in Appendix A is a discussion of the areas not requiring further review because of effective policies or effective management. Those areas are the effectiveness of the ACTDs and the transition of ACTDs into the Defense acquisition cycle.

The Advanced Concept Technology Demonstration Selection Process

Based on our interpretation of the selection criteria, five projects, valued at $2.3 billion, of nine projects that we selected for review and that the DUSD(AT) approved, were questionable ACTDs. The projects were questionable because the DUSD(AT) had not clearly defined the selection criteria and, therefore, inconsistently applied the criteria. Four projects do not have mature technology, and eight projects do not meet a critical military need. As a result, the ACTD process lacks broad support within the Military Departments, and the Military Departments were unclear on what type of projects would make viable ACTDs. Of the 22 projects selected for FYs 1995 and 1996, the Military Departments proposed only 7 of the projects for the ACTD program. In addition, Congress expressed concern about the use of the ACTDs.

ACTD Policy

DoD Regulation. DoD Regulation 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information Systems (MAIS) Acquisition Programs," March 15, 1996, part 2.7, "Advanced Concept Technology Demonstration," states that ACTDs are a means to demonstrate the use of mature technology to address urgent military needs (During the audit, DUSD[AT] changed the terminology from "urgent" to "critical."). While stating that the ACTDs are not an acquisition program themselves, the regulation states that additional buys beyond any residual capability of the project would become an acquisition program.

Office of the Secretary of Defense Guidance. The "ACTD Initiation and Approval Process," July 1995, published by DUSD(AT), states that the ACTDs initiation and approval process stresses flexibility, senior management involvement, and judgment instead of detailed criteria for selecting ACTDs. The ACTD process begins with a user and developer teaming to propose projects to DUSD(AT). If DUSD(AT) accepts the proposed project as an ACTD candidate, then both the Joint Staff and DUSD(AT) Breakfast Club (the Breakfast Club) assess it separately. The Breakfast Club is an advisory group consisting of executives from DUSD(AT); the Director, Defense Research and Engineering; the Joint Staff; and the DoD Components' Science and Technology and Operations groups. After reviewing the assessments of the Joint Staff and Breakfast Club, DUSD(AT) makes the selection. The ACTDs initiation and approval process might typically occur as described in Appendix C.

The "Guidelines for the ACTD Management Plan," January 1995, published by DUSD(AT), states that the management plan is the principal management tool for the ACTDs. As such, the management plan is signed by all participants, including the developer and user, and requires the identification of funding to

complete ACTDs and the funding for supporting program efforts that are essential to the success of the ACTDs. The funding must be available to ensure the completion of the ACTDs. In addition, the management plan requires a schedule, which is typically 3 years, to show the critical events of the ACTDs.

The ACTDs "Guidelines for ACTD Implementation Directive," November 28, 1995, is useful to clarify roles and responsibilities of the various parties executing the ACTDs and to provide unambiguous top-level guidance. The directive is an agreement to define the operational capability to be demonstrated, the general approach, the agencies responsible for planning and conducting the demonstration, and the approximate funding and schedule. The parties executing the ACTD should sign the directive at the time that the ACTDs candidate is briefed to the Breakfast Club and, if approved as an ACTD, the directive would represent formal initiation of the ACTDs.

Selection Criteria. The DUSD(AT) officials stated that they use the following selection criteria to evaluate candidate projects for the ACTDs program and that the criteria would be included in the Defense Acquisition Deskbook.[1]

o Technology should be sufficiently mature;

o The proposed program should provide significantly increased military capability;

o The proposed program should be likely to be affordable (ensuring that affordability is a part of the ACTDs);

o The timeframe from approval until completion of the ACTD demonstration should typically be 2 to 4 years;

o The user should be intimately involved (but not committed to procurement);

o The developer should be ready to address the program with a plan that covers all essential aspects;

o All parties should identify, understand, and accept risks;

o The respective Service or DoD agency should budget funding to complete the demonstration program, subject to review of progress;

o Cost-effective demonstrations should be focused on principal issues; and

o Funding should be programmed to support 2 years in the field.

[1]The Defense Acquisition Deskbook is an electronic reference system that provides the DoD acquisition community with discretionary guidance for implementing mandatory DoD acquisition direction.

Although not specifically included as a selection criterion, DoD Regulation 5000.2-R states that ACTDs should meet urgent military needs. Consequently, we included that criterion in our evaluation.

Approved Projects

Of the 22 approved projects, valued at about $4 billion, we selected 9, valued at about $2.7 billion, to include in the review (Appendix D). Table 1 shows our assessment on whether the nine projects met the selection criteria. We evaluated the projects against only the selection criteria that we deemed most essential for the successful completion of the ACTDs. Because DUSD(AT) did not clearly define the selection criteria, we applied our interpretation of the selection criteria to the ACTDs programs that we reviewed.

Table 1. Use of ACTDs Selection Criteria

Project Name	Mature Technology	Urgent Military Need	User Intimately Involved	Timeframe (2 to 4 Years)	Adequate Funding Budgeted	Funding (millions)
High Altitude Endurance-Unmanned Aerial Vehicle (UAV)	N	N	N	N	Y	$ 966*
Joint Countermine	N	N	Y	Y	Y	583*
Kinetic Energy Boost Phase Intercept	N	N	Y	N	Y	40*
Low Life-Cycle Cost Helicopter	Y	N	Y	Y	Y	21*
Rapid Force Projection Initiative	N	N	Y	Y	Y	647*
Counter Proliferation	Y	N	Y	Y	Y	123
Cruise Missile Defense	Y	N	Y	Y	Y	80
Medium Altitude Endurance UAV	Y	Y	N	Y	Y	147
Precision/Rapid Counter Multiple Rocket Launch	Y	N	Y	Y	Y	91
Total						**$2,698**

*Questionable projects, which total $2.3 billion.

Application of Criteria. The DUSD(AT) did not consistently apply the selection criteria when approving the FYs 1995 and 1996 projects for the ACTDs program. As a result, DUSD(AT) approved at least five questionable ACTDs projects, totaling $2.3 billion.

For the nine ACTDs programs that we examined:

o Four of the nine ACTDs programs did not use mature technology. Those were the High Altitude Endurance-UAV, the Joint Countermine, the Kinetic Energy Boost Phase Intercept, and the Rapid Force Projection Initiative.

We did not consider the technology to be mature if the project used models and simulations to represent technology not yet developed or software programs that support ACTDs such as command, control, communications, computers, and intelligence (C^4I), for which software development was concurrent with the development of programs that support the ACTDs.

o Three of the four ACTDs relied significantly on software or C^4I development and integration that were not clearly based on mature technology. The ACTDs were the Rapid Force Projection Initiative, the Joint Countermine, and the High Altitude Endurance-UAV. For example, the Rapid Force Projection Initiative ACTDs program office is developing concurrently the Rapid Force Projection Initiative software linkages and C^4I components to link non-line-of-sight sensors and shooters. The software and C^4I development is significant and involves 12 subsystems that have to be integrated.

o All four ACTDs relied significantly on modeling and simulations because supporting programs were not mature. For example, the Joint Countermine program office developed the Joint Countermine Operational Simulation subsystem for evaluating emerging Countermine systems, doctrine, and tactics during the ACTDs.

o Eight of the nine ACTDs did not have a declared or documented urgent military need. Those were the High Altitude Endurance-UAV, the Joint Countermine, the Kinetic Energy Boost Phase Intercept, the Low Life-Cycle Cost Helicopter, the Rapid Force Projection Initiative, the Counter Proliferation, the Cruise Missile Defense, and the Precision/Rapid Counter Multiple Rocket Launch. We based our determination on whether the Under Secretary of Defense for Acquisition and Technology documented the urgent need. We were only provided documented evidence for the Medium Altitude Endurance-UAV, for which the Under Secretary of Defense for Acquisition and Technology identified an urgent military need and directed the Service to proceed with its development. We recognize that a military need may be declared by certain DoD officials, such as the Chiefs of Staff of the Military Departments, the Chairman of the Joint Chiefs of Staff, or the Commanders-in-Chief of the Unified Commands. However, DUSD(AT) did not define what constitutes an urgent military need or who may declare the urgent need for the ACTDs candidates.

o Two of the nine ACTDs did not have a user representative intimately involved in the project. Those were the High Altitude Endurance-UAV and the Medium Altitude Endurance-UAV. Because DUSD(AT) has not defined what constitutes user involvement, we based our determination on whether the user had signed the management plan, the implementation directive, or a memorandum of agreement (that is, whether the user had a written commitment to the program). We recognize that the user may be involved in the ACTDs although the user may not be officially signed onto the ACTDs management plan or other agreement showing commitment to the program. For example, the U.S. Atlantic Command was the designated user representative for the Medium Altitude Endurance-UAV but had not officially signed on to the project when DUSD(AT) approved it.

o Two of the nine ACTDs could not be completed within the preferred 2- to 4-year timeframe: the High Altitude Endurance-UAV and the Kinetic Energy Boost Phase Intercept. We based our determination on whether the ACTDs' time to complete as shown in the management plan was within that timeframe. For example, the schedule for the Kinetic Energy Boost Phase Intercept project was almost 6 years, which did not include the users' 2-year evaluation. A goal of the ACTD program is to get a critical technology into the hands of the user much quicker than a streamline acquisition process could accomplish.

Questionable Projects. We questioned five of the nine projects as acceptable ACTDs projects and two of the projects as marginally acceptable based on our definition of the criterion. In addition, the Joint Staff questioned several of the projects.

Audit Questioned Projects. Of the nine projects that we examined, five ACTDs projects, valued at $2.3 billion, were questionable for the ACTDs program. We considered four projects questionable because two critical criteria were not met: mature technology and urgent military need. The four projects that did not meet those criteria are: the High Altitude Endurance-UAV, the Joint Countermine, the Kinetic Energy Boost Phase Intercept, and the Rapid Force Projection Initiative. We also questioned the Low Life-Cycle Cost Helicopter project because it was not advancing technology to meet a military need; rather, the project was to demonstrate the viability of commercial helicopters to meet the Navy requirements, which is an acquisition strategy. In addition, the Warfighting Capability Assessment team rated the Helicopter overall as low potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need. We identified two projects that we considered marginal because they did not meet the urgent military need criterion: the Counter Proliferation and the Precision/Rapid Counter Multiple Rocket Launch ACTDs. Appendix E describes how the questionable and marginal projects did not meet the criteria.

We recognize that flexibility is essential in assessing how a project meets a specific criterion and that any one project may not meet all criteria. However, we believe that if the project did not meet any of the critical criteria, its selection as an ACTD was highly questionable. Others that met only one or two of those criteria may be marginal candidates, and the approving body should clearly state the reasons that it approved the projects even though they did not meet the critical criteria.

Joint Staff Comments. Joint Staff officials presented their ratings of the FYs 1995, 1996, and 1997 ACTDs candidates in different ways to the Office of the Under Secretary of Defense (Acquisition and Technology) because the evaluation process was evolving. During FY 1995, Joint Staff officials discussed their results with DUSD(AT), and in FY 1996, the Joint Staff sent a memo to the Under Secretary of Defense for Acquisition and Technology identifying that all Joint Requirements Oversight Council principals were supportive of the proposed candidates. In FY 1997, the Joint Staff officials sent a memo to the Under Secretary ranking the candidates in order of priority to the Joint Staff's needs.

The Joint Staff officials evaluated the 10 FY 1995 ACTD projects, concluding that 3 of the 10 candidates had low potential as ACTD projects. They based their assessment on their evaluation criteria (Appendix C), which differ from the ACTDs selection criteria primarily in that the Joint Staff focus is on the responsiveness to the need while the ACTDs definition focus is on urgent military need. The projects are the Synthetic Theater of War, the Advanced Joint Planning, and the Rapid Force Projection Initiative. Additionally, a Joint Staff official stated that the Rapid Force Projection Initiative was "colored by uncertainty with the technology," specifically the Enhanced Fiber Optic Guided Missile subsystem. Although Joint Staff officials concluded that those projects had low potential to meet their evaluation criteria and need, DUSD(AT) approved all three as FY 1995 ACTDs.

Joint Staff officials evaluated the 12 FY 1996 ACTD projects, concluding that the Miniature Air-Launched Decoy candidate lacked technical maturity. They also concluded that the Counter Proliferation and the Air Base and Port Biological Detection candidates needed further development to clarify utility to the warfighter. Additionally, they concluded that the Low Life-Cycle Cost Helicopter and the Land (Combat) Vehicle Survivability candidates were the least well defined. Although Joint Staff officials concluded that the projects' technologies were not mature, lacked clear military utilities, or were not well defined, DUSD(AT) approved all six as FY 1996 ACTDs.

Dissemination of Selection Criteria. The DUSD(AT) presented the selection criteria to DoD Components and Office of the Secretary of Defense staff through briefings and in an undated pamphlet, "Advanced Concept Technology Demonstration, Today's Technology for the Warfighter." However, many within the DoD Components felt that the criteria and guidance for selecting programs were unclear. As a result, of the 22 projects selected for FYs 1995 and 1996, only four were proposed by the Army and three by the Navy. The Air Force did not participate in the FY 1995 and FY 1996 candidate proposal process because of a lack of guidance.

As a result of our discussion with DUSD(AT) officials, they agreed to add the selection criteria to the Defense Acquisition Deskbook (the Deskbook). The September 1996 update to the Deskbook contains the criteria. We believe that adding the criteria will make more people aware of the ACTD program and will provide proponents of potential ACTD projects the guidance needed to propose candidate programs.

Defined Criteria and Requirements

Two of the significant criteria for selecting an ACTD project are the maturity of the technology and the urgency of the military need. Those criteria are found in the purpose of ACTD as expressed in DoD Regulation 5000.2-R, to demonstrate "the use of *mature technology* to address *urgent military needs* [emphasis added]." Although DUSD(AT) has addressed key issues to improve the process, such as putting selection criteria and guidance on the ACTD

process in the Deskbook, he has not adequately defined mature technology and urgent military need. Various DoD officials, to include a member of the Breakfast Club, stated that they need definitive criteria, with some minimum standards, to define what ACTDs are and to ensure that DUSD(AT) approves only projects that are appropriate for the ACTD program.

Mature Technology. DoD officials stated that technology supporting ACTDs should be mature or proven, and if not, the technology should not be included in the ACTD program. Of the nine projects we reviewed, four did not have mature technology when we applied our interpretation of mature technology, as described in Appendix E.

Differing Definitions. DoD officials defined mature technology in widely contrasting ways. For example, some officials defined mature technology as:

o technology for which a prototype already exists,

o technology that had a risk level that is acceptable to the program manager, or

o technology that is proven.

Officials from the Office of the Director, Operational Test and Evaluation, stated that programs should not be included in the ACTD program if they use models and simulations to represent technology not yet developed. Also, officials stated that DoD should not use immature software programs that support ACTDs, such as C^4I. Because of the contrasting definitions, we requested DUSD(AT) to provide us the definition of mature technology. He responded that:

> The primary reasons for stressing the use of mature technology are to focus the ACTD on the assessment of the military utility rather than on issues of the technical maturity, and to allow programs to move quickly into system integration and demonstration without extensive development effort. The DUSD(AT) Breakfast Club examines each proposed ACTD to assess the maturity of the technologies involved. The DUSD(AT) Breakfast Club membership includes the senior technologists from the three Services and from OSD [Office of the Secretary of Defense]. The review by the DUSD(AT) Breakfast Club is a much more effective way of assessing the maturity of the underlying technology in a proposed ACTD than by the application of a set of rules or measures. In summary, there is no set definition for mature technology.

Inconsistent Terminology. In addition to not defining mature technology, the guidance was inconsistent when it referred to the maturity of the technology. The DUSD(AT) guidance, "Guidelines for ACTD Management Plan," January 1995, states that ACTDs included "maturing" technology, whereas the guidance, "ACTD Initiation and Approval Process," July 1995, states that ACTDs included "mature" technology.

During our audit, DUSD(AT) agreed to our recommendation for consistent use of terms in the guidance. The DUSD(AT) revised the interim guidance to reflect the consistent use of the term "mature technology." The Deskbook integrated product team approved the revised guidance on August 30, 1996, for inclusion in the Deskbook. Office of the Secretary of Defense officials stated that they plan to include the change in the Deskbook.

Need for Clearer Definition. While we recognize that DUSD(AT) needs flexibility in assessing the maturity of the technology, DoD needs good guidelines on what constitutes mature technology for an ACTD candidate. Without a clear definition of mature technology, DoD Components are left to openly interpret the meaning of mature technology. Additionally, without a clear and assessable definition of mature technology, the Joint Staff officials, the Breakfast Club, and DUSD(AT) cannot effectively and consistently assess whether a proposed project for the ACTD program is technically mature and appropriate. The Deskbook should address the definition of mature technology in its guidance on ACTDs. Such a definition might be technology that is already fielded and needs no additional development except when integrating other fielded systems. We see those criteria in ACTDs like the Medium Altitude Endurance-UAV or the Cruise Missile Defense, for which the ACTD used technology that was already fully developed (Appendix D). While specifically defining mature technology may be difficult, DoD needs some definition or description. Often examples of the programs that meet the criteria and the programs that do not meet the criteria will clarify the criteria definition.

Urgent Military Need. DoD officials have not defined urgent military need or declared that eight of the nine approved ACTDs met an urgent military need as described in Appendix E.

Definition. The DoD Regulation 5000.2-R states that ACTDs are to meet an "urgent" military need; however, it does not define an urgent military need. The published guidance of DUSD(AT) also does not define urgent military need and does not identify who may declare that ACTDs meet an urgent military need. Further, the Joint Staff evaluation criteria do not define or describe the urgency of the need for ACTD programs. The Joint Staff's criteria for evaluating proposed projects are in Appendix C. The Joint Staff's criteria are different from DUSD(AT) selection criteria in that the criteria focus on the military need and usefulness. The Joint Staff officials prioritized the projects with respect to actual need. However, the Breakfast Club prioritized the projects with respect to available funding. Therefore, the issue of whether ACTDs approved by DUSD(AT) address critical military needs is unclear.

Only one of the nine approved ACTDs that we evaluated was based on an urgent military need. In his July 12, 1993, memorandum, the Under Secretary of Defense (Acquisition)[2] identified an "urgent need" for the capability of an endurance UAV and cited the characteristics of the Medium Altitude Endurance-UAV ACTD. The DUSD(AT) and other DoD officials provided no justifications of "urgent need" for any other approved ACTD. The

[2]Renamed Under Secretary of Defense for Acquisition and Technology in November 1993.

Joint Staff officials identified four of the nine as having high potential in meeting the Joint Staff's need. The Joint Staff officials stated that they were generally supportive of the FY 1996 candidates. However, input to the Joint Staff ranged from supportive, to needs more work, to disagree for the two FY 1996 ACTDs that we selected for review. Table 2 shows the Joint Staff's prioritization of the nine projects that we selected for review.

Table 2. Joint Staff Prioritization

Project Name	High	Medium	Low
High Altitude Endurance-UAV	X		
Joint Countermine	X		
Kinetic Energy Boost Phase Intercept		X	
Low Life-Cycle Cost Helicopter			X
Rapid Force Projection Initiative			X
Counter Proliferation		X	
Cruise Missile Defense	X		
Medium Altitude Endurance-UAV	X		
Precision/Rapid Counter Multiple Rocket Launch		X	

Consistency. DUSD(AT) guidance was inconsistent when it referred to ACTDs meeting military needs. For example, "ACTD Initiation and Approval Process" states that ACTDs solve "important military problems," whereas "Guidelines for ACTD Implementation Directive," November 1995, states that ACTDs meet "urgent military operational needs." Although inconsistent in terminology, both documents were consistent in stating that ACTDs should improve a military capability. During our audit, DUSD(AT) agreed to our recommendation for consistent use of terms in its guidance. DUSD(AT) officials revised the interim guidance and changed the terminology from "urgent" to "critical." The Deskbook integrated product team approved the change on August 30, 1996. Office of the Secretary of Defense officials plan to incorporate the change in the Deskbook. While those actions correct the inconsistent use of the term, the definition of critical military need is still unclear.

We agree that ACTDs should meet critical military needs and improve military capabilities. However, without a clear, Defense-wide definition of a critical military need, the definitions will vary greatly among DoD Components. Additionally, the Joint Staff, the Breakfast Club, and DUSD(AT) cannot effectively and consistently assess whether an ACTD candidate meets a critical military need and is appropriate for the ACTD program without a definition. All criteria must be clear and assessable, whether stated qualitatively or quantitatively. Reasonable criteria are those that informed persons could use to reach substantially similar conclusions. An example of a potential clear definition of critical military need is a need that the Joint Staff identifies as high potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need. Further, a qualitative or quantitative criterion should have a clear definition, free of unclear or imprecise terminology such as "adequate,

sufficient, or acceptable." The DUSD(AT) should clearly define those criteria, provide the definitions to include examples in the Deskbook, and identify which DoD officials may declare that an ACTD meets a critical military need.

Support for ACTD

As stated earlier, because of confusion about the program and the lack of clarity in the Office of the Secretary of Defense guidelines and selection criteria, the Army and the Navy were the only Services that proposed ACTD candidates. Some DoD officials did not view technology used in some ACTDs as mature. Others stated that ACTD programs should not include software and C^4I systems development and integration, and modeling and simulations used to represent technology, because those elements do not represent mature technology. The ambiguity contributed to the lack of broad support within DoD.

In addition, Congress is concerned about the program. In the National Defense Authorization Act for Fiscal Year 1997, July 30, 1996, the conferees stated that "it appears that the Department is using the ACTD program to circumvent acquisition requirements, rather than to demonstrate new technologies on a limited basis." The conferees specifically cited the Joint Tactical UAV project, an FY 1997 ACTD candidate. Additionally, the Senate Committee on Appropriations stated that the complex development required for some ACTDs may not be appropriate for the streamlined acquisition procedures used for ACTDs. The Joint Countermine is an example of a very complex development. The complexity is driven by the need to integrate 14 Army, Navy, and Marine Corps technical demonstration projects and field military equipment. The projects include advanced technology demonstration and concept demonstrations, which are programs still in development. Additionally, a significant portion of the project is the development of software and C^4I to integrate those subprojects.

Management Actions

Implementation of the ACTD process has been evolving since its inception in 1994. The Military Departments nominated 7 of the FYs 1995 and 1996 approved ACTDs and nominated 5 of the 25 final candidates for FY 1997. In addition, Office of the Secretary of Defense officials have made changes to much of their guidance and required the Breakfast Club to document its deliberation of candidate ACTD projects.

Criteria Defined. Office of the Secretary of Defense officials recognized that the ACTD program is new to the Department and that program changes will occur because of lessons learned. During the audit, officials recognized that some criteria for the selection of projects for the ACTD program were not clearly or consistently stated among the guidance documents. Officials took

corrective action and plan to include the changes in the Deskbook. However, as discussed earlier, mature technology and critical military need still need defining. Also, Office of the Secretary of Defense officials recognized that the policies and procedures for transitioning into the Defense acquisition cycle were not adequate, and they published interim guidance. We commend Office of the Secretary of Defense officials for recognizing the need for change and for taking steps necessary to improve the ACTD program.

Documented Evaluations. The Joint Staff and the Breakfast Club did not document deliberations in evaluating the candidates and in showing how they reached the conclusions and recommendations to DUSD(AT) based on the selection criteria. Also, no documentation existed that showed how DUSD(AT) evaluated the candidates with respect to the selection criteria. Other than the initial briefing to the Breakfast Club, the proponents provided no additional information or briefings unless requested. In addition, none of the participants retained meeting minutes for the FYs 1995 and 1996 candidate projects.

During our meeting in December 1995, we expressed our concerns to DUSD(AT) about the lack of documentation showing the consideration given to the selection criteria for the approved candidates. In January 1996, DUSD(AT) directed the Breakfast Club members to document their assessments of the proposed ACTDs for FY 1997, and they did.

Other Matters of Interest

Guidance. The Office of the Secretary of Defense defined ACTDs in DoD Regulation 5000.2-R, and stated that ACTDs are not acquisition programs. However, DoD Regulation 5000.2-R only governs major Defense acquisition and major automated information system acquisition programs and not other Defense acquisition programs such as ACTDs. Because DoD Directive 5000.1, "Defense Acquisition," applies to all DoD acquisition programs, Office of the Secretary of Defense officials should include information on ACTDs in that directive rather than in the regulation. During our meeting in August 1996, DUSD(AT) agreed.

ACTD Management Plans. The DUSD(AT) did not meet its goal to have management plans for the projects approved in a timely manner. Although the management plans are not part of the selection criteria, ACTD program managers require them to effectively manage their respective project. The DUSD(AT) guidance, "ACTD Initiation and Approval Process," July 1995, states that all parties should fully endorse the management plan within 60 days after executive level approval of the ACTD. Only one of the nine projects meets that goal. For five of nine projects that we examined, the approval process averaged 366 days. Three of the five projects were the same projects that we questioned. Those projects were the High Altitude Endurance-UAV, the Joint Countermine, and the Rapid Force Projection Initiative. Three projects concluded before they had an approved management plan. Because DoD and Component officials did not approve the plans expeditiously, program

managers were forced to clarify responsibilities and objectives as needed through memorandums of agreement, independent advisory groups and committees, and the integrated product team process. Because management took actions to resolve timeliness issues, this report makes no recommendations.

Continual Funding. Five of the nine projects that we examined did not have funding budgeted to complete the planned demonstration, to include the users' 2-year evaluation. Those projects were the High Altitude Endurance-UAV, the Joint Countermine, the Kinetic Energy Boost Phase Intercept, the Rapid Force Projection Initiative, and the Precision/Rapid Counter Multiple Rocket Launch. The funding problems occurred after DUSD(AT) selected the project for the ACTD program. The ACTD and its supporting programs had to compete with other needs of the Services. We based our determination on whether the ACTD and its supporting programs were funded at the time we conducted our audit. We believe that if the ACTD projects truly had a critical military need and the Services fully supported the ACTD program by nominating candidates, then the Services' priority for the projects would have been higher and funding more likely. For example, the program office did not fully fund key elements of the Precision/Rapid Counter Multiple Rocket Launch project, such as the Reconnaissance Infrared Surveillance Target Acquisition System, totaling about $9 million.

We recognize that all programs must compete for dollar resources. However, programs that are to meet a critical military need within a 2- to 4-year timeframe must maintain their initial funding profile if they are to succeed. When DUSD(AT) clarifies the selection criteria, he should consider only those projects that meet a critical military need and other defined criteria for the ACTD program and accordingly will fund those projects because of their critical need to the warfighter.

Conclusion

The processes for selecting and approving projects for the ACTD program are maturing, and DUSD(AT) is resolving issues and problems as they arise. However, the processes for selecting and approving projects could be more effective with guidance that clearly defines the program's selection and approval criteria for mature technology and critical military need. Clarifying the criteria will result in:

- the selection process being more explicit and understood;

- consistent application of those criteria to ensure that DUSD(AT) approves only projects that are appropriate for the ACTD program;

o solidifying support within Congress, DoD, and the Services for the ACTD program as the ACTD candidates, approved programs, and dollars allocated and spent continue to grow in the unique application of technology; and

o decreased potential of program failure.

Management Comments and Audit Response to the Finding

The Under Secretary of Defense for Acquisition and Technology provided extensive comments on the report's content. The Under Secretary disagreed with our interpretation of the criteria, specifically those key criteria of military need and mature technology. However, the Under Secretary stated that the criteria should be clarified to allow better understanding by those not directly involved in the selection process.

We developed our definition because the criteria were not clearly understood, and there were different interpretations of the criteria. We believe that the criteria should be also clarified for those involved in the selection process as well as for other interested parties. As personnel involved in the selection process change, the clarification of the guidance will ensure consistency in the process and in the application of the criteria. We made appropriate changes to the finding based on the comments and responded to the Under Secretary's comments in Appendix F. The full text of his comments are in Part III of this report.

Recommendations, Management Comments and Audit Response

We recommend that the Deputy Under Secretary of Defense (Advanced Technology):

1. Establish a working group consisting of members from the user, developer, tester, and Office of the Secretary of Defense communities to develop clear and assessable selection criteria, including the definitions of mature technology and critical military need, and include the revised selection criteria in the Defense Acquisition Deskbook.

2. Reevaluate the FY 1997 candidates once the selection criteria are developed, to ensure that they meet the assessable selection criteria defined by the working group.

The Under Secretary of Defense for Acquisition and Technology Comments. The Under Secretary of Defense for Acquisition and Technology concurred, stating that the intent of the selection criteria needs clarification and that the Department will reexamine the ACTDs selected for FY 1997 to ensure that the candidates are consistent with the intent of the selection criteria. We will be pleased to participate in a working group, as he suggested, to clarify the criteria.

The Vice Chairman of the Joint Chief of Staff Comments. Although not required to comment, the Vice Chairman of the Joint Chiefs of Staff provided comments on the finding and recommendations. The Vice Chairman stated that while he found fault with some initial assumptions and some specific observations, he endorses the recommendations. For the full text of the Vice Chairman's comments, see Part III.

Part II - Additional Information

Appendix A. Scope and Methodology

Scope

We limited our scope to the 22 approved ACTD projects for FYs 1995 and 1996 as shown in Appendix B. We judgmentally selected nine projects, valued at $2.7 billion, for evaluation. The nine projects are listed and described in Appendix D. The sample projects were selected to get projects representing:

- o various stages of development,
- o single systems,
- o systems-of-systems,
- o concepts of operations,
- o management of single components, and
- o management of multiple components.

Methodology

We conducted this economy and efficiency audit from October 1995 through October 1996 in accordance with auditing standards issued by the Comptroller General of the United States, as implemented by the Inspector General, DoD, and included such tests of management controls as deemed necessary.

We reviewed data from December 1993 through August 1996. We evaluated the policies and procedures of DUSD(AT) and the DoD Components for selecting, developing, and executing ACTD projects. We compared and analyzed the process for selection of the ACTDs, the process for determining effectiveness of the effort, and the transition of ACTDs into the Defense acquisition cycle. The audit did not rely on computer-processed data. We interviewed Office of the Secretary of Defense and DoD Component officials.

No prior audits covered the ACTD program.

Management Control Program

DoD Directive 5010.38, "Internal Management Control Program," April 14, 1987,* requires DoD organizations to implement a comprehensive system of management controls that provides reasonable assurance that programs are operating as intended and to evaluate the adequacy of the controls.

Scope of Review of Management Control Program. We evaluated the adequacy of the DUSD(AT) and the DoD Components' management controls over the selection, management, and transition into the acquisition cycle of ACTD programs. In assessing those controls, we evaluated plans and procedures, written policies, and management-initiated reviews.

Adequacy of Management Controls. The policies and procedures governing the effectiveness of the process and the transition of programs into the acquisition cycle were generally adequate. However, we identified a material management control weakness as defined by DoD Directive 5010.38. The DUSD(AT) needs to establish management controls to define and consistently apply criteria for evaluating and selecting projects for the ACTD program. See Part I for details on the material weakness. The recommendations, if implemented, will improve the effectiveness and efficiency of the ACTD program. Specifically, the lack of clearly defined criteria led to the inconsistent application of the criteria to select and approve ACTD candidates. A copy of the report will be provided to the senior official responsible for management controls in the Office of the DUSD(AT) and the Under Secretary of Defense (Comptroller).

Adequacy of Management's Self-Evaluation. The Office of the Deputy Under Secretary of Defense (Advanced Technology) and the DoD Components did not establish ACTD projects as assessable units. Accordingly, they did not identify or report the material management control weakness identified by the audit.

Area Not Requiring Further Review

Effectiveness of the ACTD Projects. We met with users, ACTD project managers, and senior DoD officials to evaluate whether the process for determining the effectiveness of the projects was adequate. We also reviewed the projects' management plans, the results of in-process reviews, and other program documentation. The process that the Office of the Secretary of

*DoD Directive 5010.38 has been revised as "Management Control (MC) Program," August 26, 1996. The audit was performed under the April 1987 version of the directive.

Defense officials used for determining the effectiveness of the ACTDs was working. Both the oversight committees and the integrated product teams addressed and resolved issues when identified.

Transition to Acquisition. Office of the Secretary of Defense officials recognized that the guidance for assessing whether the project met military needs and planning for transition into the acquisition cycle were not sufficient.

Assessing Military Utility. The DUSD(AT) issued interim guidance in January 1995 that required meaningful, quantitative measures of success to evaluate whether the project would meet military needs. Those measures of success included measures of effectiveness and measures of performance. Although the early guidance did not detail measuring success, the DoD Components and Office of the Secretary of Defense officials assessed the project's success through an iterative process, which saved time and money. For example, after the Precision/Rapid Counter Multiple Rocket Launch approval by the DUSD(AT) as an ACTD, the project office saved $16 million by canceling the Modified Dual-Purpose Improved Conventional Munition, a program that supported the ACTD, because the program did not meet one of the Precision/Rapid Counter Multiple Rocket Launch requirements.

Acquisition Planning. On July 21, 1995, the Under Secretary of Defense for Acquisition and Technology directed that transition planning should start for the ACTDs initiated in FY 1995 and that integrated product teams should accomplish the planning effort. Additionally, the DUSD(AT) developed templates for project managers to use to smoothly transition their efforts into the acquisition process. The templates address both assessing military utility and transitioning to the acquisition cycle. Office of the Secretary of Defense officials plan to include the draft of their interim guidance, "Transition of Advanced Concept Technology Demonstration (ACTD) to the Formal Acquisition Process," June 19, 1996, in the Deskbook.

Organizations and Individuals Visited or Contacted

We visited or contacted individuals and organizations within DoD; the General Accounting Office; and the Applied Physics Laboratory, Johns Hopkins University. Further details are available on request.

Appendix B. Funding for Approved Advanced Concept Technology Demonstrations FYs 1995 Through 2001

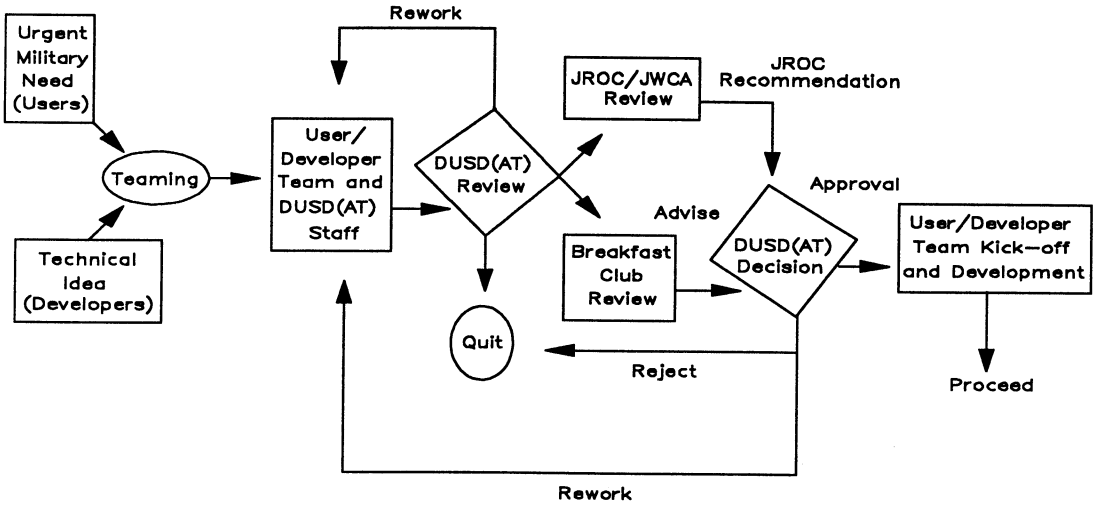
Approved ACTDs for FY 1995

	Amount (millions)
High Altitude Endurance-UAV	$ 966
Rapid Force Projection Initiative	647
Joint Countermine	583
Synthetic Theater of War	439
Advanced Joint Planning	222
Medium Altitude Endurance Unmanned Aerial Vehicle	147
Precision/Rapid Counter Multiple Rapid Launch	91
Cruise Missile Defense	80
Precision Signal Intelligence Targeting	44
Kinetic Energy Boost Phase Intercept	40
Total for FY 1995 Projects	**$3,259**

Approved ACTDs for FY 1996

	Amount (millions)
Tactical Unmanned Aerial Vehicle	$145
Combat Identification	126
Counter Proliferation	123
Battlefield Awareness Data Dissemination	85
Semi Automated Image Processing	63
Navigation Warfare	57
Miniature Air-Launched Decoy	32
Combat Vehicle Survivability	22
Low Life-Cycle Cost Helicopter	21
Air Base and Port Biological Detection	19
Joint Logistics	13
Joint Readiness Extension to the Advanced Joint Planning	6
Total for FY 1996 Projects	**$712**

Appendix C. Advanced Concept Technology Demonstration Selection Process



JROC Joint Requirements Oversight Council
JWCA Joint Warfighting Capability Assessment

User and Developer Team. A crucial ground rule for any project proposed for the ACTD program is the need for a close partnership between a sponsoring user organization and a DoD Component acquisition organization. The proposal must identify and develop that relationship before the DUSD(AT) gives any serious consideration to the project. The DUSD(AT) staff is to assist the team of user and developer by clarifying the selection criteria and team responsibilities and is to assist in developing and refining the proposal.

Initial Briefing to DUSD(AT). Once the team defines its proposal, the team presents it to the DUSD(AT). The DUSD(AT) reviews the proposal for military need, potential capability, and affordability. The DUSD(AT) then either accepts the proposal for further discussion as a formal ACTD candidate, requests revision of the proposal, or determines that the proposal is outside the scope of the ACTD program.

Review and Prioritization. If DUSD(AT) accepts the proposal as an ACTD candidate, then both the Joint Staff and the Breakfast Club independently assess the candidate. Both the Joint Staff and the Breakfast Club provide their assessments to the DUSD(AT) for his final selection.

Joint Staff Review and Prioritization. Following the initial DUSD(AT) review, the DUSD(AT) forwards information on the ACTD candidates to the Joint Staff's Joint Requirements Oversight Council (the Council). The Council then disseminates the list of ACTD candidates to the Joint Staff's Joint Warfighting Capability Assessment teams. Each Joint Warfighting Capability Assessment team evaluates a specific joint warfighting area.

The team assesses and prioritizes the ACTD candidates with respect to the Joint Warfighting Capability Assessment need. Joint Staff officials developed six evaluation criteria for the Joint Warfighting Capability Assessment team to use to assess the ACTD candidates. The evaluation criteria are as follows:

o Joint Warfighting Capability Assessment team linkage to the proposed ACTD;

o Responsiveness to need;

o Strength of user sponsorship;

o Potential to lead to permanent solution;

o Value of residual capability; and

o Degree of doctrine or concept of operations, technology, and force structure integration (or planning for same).

The Joint Warfighting Capability Assessment team forwards its assessments and prioritized list to the Council. Besides the Joint Warfighting Capability Assessment evaluation, the Council obtains comments about the candidate ACTDs from the Unified Commanders in chief. The Council then prioritizes the candidate ACTDs based on the Joint Warfighting Capability Assessment and Unified Commander's input. The Council then forwards its prioritized list to the DUSD(AT).

Breakfast Club Review. Concurrent with the Joint Warfighting Capability Assessment team review, the developer and user brief the Breakfast Club on the technical and schedule aspects of the candidates. Additionally, the Breakfast Club reviews the candidates with respect to available funding. The Breakfast Club provides its recommendations to the DUSD(AT).

DUSD(AT) Approval of ACTDs. Upon receipt of the assessments and recommendations of the Joint Staff and Breakfast Club, the DUSD(AT) makes the ACTD selection for the ACTD program.

Appendix D. Description of the Advanced Concept Technology Demonstrations Reviewed

Counter Proliferation. The system, $123 million funded, combines sensors, weapon systems, and collateral damage prediction and bomb damage assessment tools to provide an improved capability to detect and destroy hardened production and storage facilities for weapons of mass destruction. The Defense Special Weapons Agency and the European Command manage the project jointly.

Cruise Missile Defense. The system, $80 million funded, combines an airborne sensor suite and a surface-based air defense system to provide the capability to detect and destroy cruise missiles at ranges beyond the radar line-of-sight of surface-based (sea and land) air defense units. The Army and Navy manage the project jointly.

High Altitude Endurance-UAV. The system, $966 million funded, combines sensors and data processors on a UAV to operate in all weather, day and night, at high altitudes and to provide wide area, near real-time imagery. The project consists of two air vehicles: the Global Hawk, a conventional UAV, and the Darkstar, a low observable UAV. The Global Hawk will operate in low-to-moderate air defense threats. The Darkstar will operate in high air defense threats. The Defense Advanced Research Projects Agency manages the project with assistance from the Army, the Navy, and the Air Force.

Joint Countermine. The system, $583 million funded, combines sensors and weapon systems designed to detect and neutralize sea and land mines and to provide the capability to conduct seamless amphibious and ground forces mine countermeasure operations. The Army and Navy comanage the project.

Kinetic Energy Boost Phase Intercept. The system, $40 million funded, combines sensors, airborne interceptor missiles, and battle management command and control systems. The system will acquire and intercept theater ballistic missiles in their boost phase and early mid-course of flight. The draft management plan states that the ACTD will include two phases. Phase I will use models and simulation to verify that airborne interceptor can perform effectively with existing forces. Phase II will demonstrate the actual intercept of a target with a missile. The Air Force manages the project.

Low Life-Cycle Cost Helicopter. The project, $21 million funded, is to evaluate whether leasing commercial helicopters will reduce shipboard vertical-lift operating costs. The Navy manages the project.

Medium Altitude Endurance-UAV. The system, $147 million funded, known as the Predator, combines sensors and data processors. The surveillance system will operate in most weather at medium altitudes and will provide sustained, near real time intelligence information on fixed and mobile targets. The Unmanned Aerial Vehicles Joint Project Office under the Program Executive

Office for cruise missiles and unmanned aerial vehicles serves as the demonstration manager, and the U.S. Atlantic Command serves as the operations manager.

Precision/Rapid Counter Multiple Rocket Launch. The system, $91 million funded, combines sensors, weapon control systems, and data processing and display to provide an adverse weather, day and night, end-to-end, sensor-to-shooter, precision deep-strike capability. The Army manages the project.

Rapid Force Projection Initiative. The system, $647 million funded, combines sensors and weapon systems designed to detect and destroy targets beyond traditional direct fire ranges. The system provides increased lethality and survivability for early entry forces. The Army manages the project.

Appendix E. Questionable and Marginal Advanced Concept Technology Demonstrations Reviewed

Questionable Projects

The High Altitude Endurance-UAV, Joint Countermine, Kinetic Energy Boost Phase Intercept, Low Life-Cycle Cost Helicopter, and Rapid Force Projection Initiative projects were not appropriate for the ACTD program and are questionable.

High Altitude Endurance-UAV. We did not consider the High Altitude Endurance-UAV appropriate for the ACTD program because the UAV was not technically mature and did not meet a critical military need when we applied our interpretation of those selection criteria to the ACTD. In addition, the user was not intimately involved, and the UAV was not scheduled for completion within the timeframe of 2 to 4 years.

Mature Technology. The DUSD(AT) considered the High Altitude Endurance-UAV project technically mature for the ACTD program. However, one of the two air vehicles that comprise the High Altitude Endurance-UAV, the Darkstar, was not technically mature. Before approval of the High Altitude Endurance-UAV as an ACTD, the Defense Advanced Research Projects Agency, the executive agent for the project, concluded that the Darkstar's overall technical risk was "medium to high." The "Cost Analysis Improvement Group Cost Assessment," May 13, 1994, states that the Darkstar project had a substantial risk of cost growth, particularly for software development. The price negotiation memorandum for the Darkstar, June 24, 1994, concluded that development of its software was "high risk."

During the High Altitude Endurance-UAV approval process, the program office did not present analytical studies to demonstrate the technical maturity of the Darkstar. The contractor had not yet developed the Darkstar's avionics software, which includes the system's flight control software. Resulting software development problems delayed the Darkstar's first flight for 6 months.

The Darkstar crashed upon takeoff during its second test flight on April 22, 1996. In its press release, July 8, 1996, the Defense Advanced Research Projects Agency stated that its safety investigation concluded that the Darkstar crashed as a result of the system's flight control software and deficiencies in the system's modeling and simulation. Subsequently, the Defense Airborne Reconnaissance Office requested $29 million to replace the Darkstar that crashed, to configure a second air vehicle for flight, to accelerate fabrication of

a third air vehicle, to implement changes in program process and procedures, and to support hardware changes likely to result from accident investigation findings.

Critical Military Need. Although the Joint Staff rated the High Altitude Endurance-UAV overall as high potential to meet the Joint Warfighting Capability Assessment team's evaluation criteria and need, it did not address critical military need, and we could not find evidence that the Under Secretary of Defense for Acquisition and Technology stated that the project met a critical military need.

User Intimately Involved. We based our determination on whether the user had signed the implementation directive before the approval of the ACTD or the Management Plan during the ACTD. The High Altitude Endurance-UAV user did not sign the management plan. Also, the High Altitude Endurance-UAV did not have an implementation directive, but used instead a memorandum of agreement, which the user did not sign.

Timeframe (2 to 4 Years). We determined whether the ACTD went beyond the 4 years from the time that the DUSD(AT) approved the ACTD until the completion of the demonstration. The DUSD(AT) approved the program in August 1994, and the program continues through the fourth quarter of 1999, as shown in the management plan spanning 5.5 years.

Joint Countermine. We did not consider the Joint Countermine appropriate for the ACTD program because it was not technically mature and did not meet a critical military need when we applied our interpretation of those selection criteria to the ACTD.

Mature Technology. The Navy demonstration manager for the Joint Countermine established an independent ACTD Review Committee (the Committee) in May 1995 to assess the project. The Committee concluded that the hardware for the Advanced Lightweight Influence Sweep System and the Magic Lantern (Adaption) Advanced Technology Demonstration subsystems supporting the Joint Countermine were not sufficiently mature for inclusion in the ACTD. The Committee recommended deleting those projects. The Committee also concluded that the C^4I and Joint Countermine Operational Simulation efforts were too ambitious, and the Committee recommended rigorously downscaling those efforts to meet only the basic objectives of the ACTD. Additionally, the Committee concluded that more than 50 percent of the $86 million budgeted was intended for the C^4I and the Joint Countermine Operational Simulation efforts and that the funding was for the development of two new acquisition programs.

Critical Military Need. Although the Joint Staff rated the Joint Countermine overall as high potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need, it did not address critical military need. In addition, we found no documentation in which the Under Secretary of Defense for Acquisition and Technology declared that the project met a critical military need.

Kinetic Energy Boost Phase Intercept. We did not consider the Kinetic Energy Boost Phase Intercept technically mature or meeting a critical military need when we applied our interpretation of those selection criteria to the ACTD. In addition, it was not to be completed within the timeframe of 2 to 4 years.

Mature Technology. The DUSD(AT) approved the project as an FY 1995 ACTD. Simulation and analysis was to provide technical support to the missile and sensor development. In addition, a miniaturized version of the Joint Tactical Information Distribution System must be developed from existing technologies for command, control, and communication. The ACTD planned to develop those support systems during the ACTD project.

Critical Military Need. The Joint Staff rated the Kinetic Energy Boost Phase Intercept ACTD overall as medium potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need. We could not find evidence that the Under Secretary of Defense for Acquisition and Technology or any other authority within the Department stated that the project met a critical military need.

Timeframe (2 to 4 Years). We determined whether the ACTD went beyond the 4 years from the time that the DUSD(AT) approved the ACTD until the completion of the both Phase I and II demonstration. The DUSD(AT) approved the program in August 1994. The draft management plan shows the program demonstration beginning in early 2000, which spans almost 6 years.

Low Life-Cycle Cost Helicopter. The Low Life-Cycle Cost Helicopter (the Helicopter) was not appropriate for the ACTD program because the project did not meet a critical military need when we applied our interpretation of that selection criterion to the ACTD, and the Joint Staff rated the Helicopter as low potential.

We did not identify documentation in which the Under Secretary of Defense for Acquisition and Technology stated that the project met a critical military need. The only need identified was the need to determine the cost-effectiveness of leasing commercial helicopters to replace military helicopters. Also, the Joint Staff rated the Helicopter overall as low potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need. The Helicopter project resulted from a contractor's proposal to provide commercial helicopters to meet the vertical lift requirement of the Navy because of the aging fleet of Navy helicopters.

A DUSD(AT) official stated that DUSD(AT) supplied funding to the project to overcome resistance by officials within the Navy. The DUSD(AT) approved the project in July 1995 and provided $1 million of DoD funding to the Navy to demonstrate the concept of a lease charter approach in place of procurement. However, that approach did not meet the criteria for DoD funding, which is to fill funding gaps when integrating several technology programs, to supply multiple copies of the ACTD hardware, or to support the 2-year residual period. The Navy did not prepare a management plan. In addition, the Navy

July 1995 analysis of the cost-effectiveness of leasing commercial helicopters instead of procuring new helicopters concluded that leasing was more cost-effective.

Because the Navy demonstration program office did not initially evaluate the project's stated objectives to determine the cost-effectiveness of leasing, the Navy planned a $20 million, 6-month, non-ACTD follow-on demonstration to evaluate those same objectives.

Rapid Force Projection Initiative. We did not consider the Rapid Force Projection Initiative technically mature or meeting a critical military need when we applied our interpretation of those selection criteria to the ACTD.

Mature Technology. The Rapid Force Projection Initiative planned to use simulations and analyses to support the determination of value added of proposed technologies for the ACTD because the supporting systems were immature. In addition, the communication architecture used in the ACTD was based on the evolving battle command system that the Army was developing.

Critical Military Need. The Joint Staff rated the Rapid Force Projection Initiative ACTD overall as low potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need. We could not find evidence in which the Under Secretary of Defense for Acquisition and Technology or any other authority stated that the project met a critical military need.

Marginal Projects

In addition to the questionable projects, several of the programs that we reviewed did not meet the critical military need selection criterion. We considered them marginal candidates because no authority within the Department identified them as meeting a critical military need. The programs were the Counter Proliferation, the Cruise Missile Defense, and the Precision/Rapid Counter Multiple Rocket Launch.

Critical Military Need. We could not find evidence that the Under Secretary of Defense for Acquisition and Technology or any other authority stated that the projects met a critical military need. However, the Joint Staff reviewed and rated each of those ACTDs as described below.

Counter Proliferation. The Joint Staff reviewed Counter Proliferation as part of its review of the FY 1996 ACTD candidates. In a memorandum to the Under Secretary of Defense for Acquisition and Technology, May 15, 1995, the Joint Staff stated that it was generally supportive of the proposed candidates. However, each Service representative provided input to the overall decision. Some said that they supported the ACTD; others said that the projects were promising but needed clarification; and still others said that the projects were not relevant to that Service's responsibilities in joint warfare.

Cruise Missile Defense, Precision/Rapid Counter Multiple Rocket Launch. The Joint Staff reviewed the ACTDs as part of the FY 1995 candidates. It rated the Cruise Missile Defense as high potential and the Precision/Rapid Counter Multiple Rocket Launch as medium potential to meet the Joint Warfighting Capability Assessment team evaluation criteria and need.

Appendix F. Audit Response to Specific Management Comments

The Under Secretary of Defense for Acquisition and Technology provided specific comments to the executive summary, Part I - Audit Results, and Part II - Additional Information. He addressed the selection criteria of critical military need, mature technology, user involvement, and the 2- to 4-year timeframe. Below we discuss management comments and provide our audit response.

Comments on Critical Military Need. The Under Secretary stated that our report incorrectly implies that a formal determination by the Under Secretary of Defense for Acquisition and Technology is the appropriate basis for establishing military need. He stated that the process of identifying a critical military need is articulated in the 1995 ACTD management plan in which the warfighting community identifies the need, which is then confirmed by the Joint Requirements Oversight Council. The process is consistent with the DoD Directive 5000.1, "Defense Acquisition," which governs acquisition programs. The Under Secretary further stated that the report's interpretation is inconsistent with the actual process already in place to determine military need. He stated, however, that he had not been totally consistent in the documentation of the process for establishing military need and that the working group will address the criteria.

Audit Response. We agree with the Under Secretary's outline of the process identified in the 1995 ACTD management plan. Appendix C of the report outlines the process described by the Under Secretary. The process included the user's identification of military need and the Joint Staff's review and prioritization. We have not questioned the need for the projects. We have questioned whether the projects selected are the most critical. The Joint Staff prioritizes the ACTDs; however, the criteria for the prioritization as described in Appendix C does not include "critical military need," used by the Breakfast Club to recommend candidates to DUSD(AT) for selection. For example, the Joint Staff rated two of the nine projects we reviewed as low, yet DUSD(AT) approved the projects for the ACTD program. Those projects were the Rapid Force Projection Initiative and the Low Life-Cycle Cost Helicopter. DUSD(AT) has not indicated the organization that may declare that a proposed project meets a critical military need. Because the Under Secretary made a declaration of military need for the Medium Altitude Endurance-UAV, we used his determination as a basis for our assessment. That program was the only ACTD for which a DoD official made a formal declaration of military need. The working group should address who may declare a critical military need when convened.

Comments on Mature Technology. The Under Secretary stated that the draft report misstates the technology standard as mature technology when in fact the precise definition is "technology should be sufficiently mature." He stated that the most senior technologists in the Department of Defense reviewed the approved ACTDs and judged them employing sufficiently mature technology for the program. The Under Secretary indicated that the objective of the

program is to select technologies that will be available when needed and not to restrict the choice to those technologies that are fully demonstrated. He stated that the level of technology must be sufficient so that the residual capability that remains with the user at the conclusion of the ACTD is useful in an operation environment.

The Under Secretary also stated that the audit report cites models and simulations as an indication of the use of immature technologies in an ACTD. He stated that on the contrary, models and simulations are vital to ACTDs because the program manager uses models and simulations to plan experiments, to develop concepts of operations, and to supplement knowledge gained from testing.

Further, the Under Secretary stated that the report does not distinguish between risks resulting from integration and risks resulting from immature technology. Most ACTDs involve integration of elements that require development of new software, which is not a technology maturity issue but rather a risk issue. The Under Secretary cited as an example the crash of the Darkstar. He stated that the Darkstar crashed because of deficiencies in modeling and simulation and not flight control software. The Under Secretary stated that those issues were integration issues and not issues of maturity.

Audit Response. We identified inconsistent published guidance concerning the maturity of technology. "The Guidance for ACTD Management Plan," January 1995, uses the term "maturing technology." The "ACTD Initiation and Approval Process," July 1995, and the DoD Directive 5000.2-R, "Mandatory Procedures for Major Defense Acquisition Programs (MDAPs) and Major Automated Information System (MAIS) Acquisition," use the term "mature technology." The Under Secretary is now saying that the criteria is "sufficiently mature technology." The Under Secretary must clarify what the criteria is and must explain its meaning, whether "mature technology," "maturing technology," or "sufficiently mature technology," to assist the Services or other interested parties in assessing and proposing candidate projects for the ACTD program.

We agree that the use of models and simulations are vital to an ACTD or other programs because the program manager may use them to plan experiments, to develop concepts of operations, or to supplement knowledge gained from testing. However, the examples cited in the report show that program office officials used models and simulations to represent technology not yet developed or to represent software programs that support ACTDs for which software development was concurrent with the development of the program that supports the ACTD. If the technology is not yet developed, the outcome of the modeling and simulation is highly questionable. For example, the contractor was developing, concurrent with the hardware models and simulations used to represent prototype, High Altitude Endurance-UAV hardware. Additionally, developers of the prototype High Altitude Endurance-UAV hardware relied significantly on the immature models and simulations. As stated in the draft audit report, the Cost Analysis Improvement Group's assessment of the Darkstar identified substantial risk of cost growth for software development, not integration as claimed by the Under Secretary. Also, the report states that the

safety investigation results concluded that the High Altitude Endurance-UAV crashed as a result of the system's flight control software and deficiencies in the system's modeling and simulation. A memorandum from the Deputy Program Director, July 10, 1996, confirmed that the flight control software was the cause of the Darkstar crash. The issue was a maturity issue foremost and secondly an integration issue. The issues are not mutually exclusive but interrelated. DoD officials must carefully evaluate both issues in the selection of an ACTD candidate. However, the first step in the process is having a clear understanding of what is acceptable, mature or maturing technology. This understanding maybe in the form of examples. Those definitions will help decision makers in the identification of potential candidates for the ACTD program and in the approval of projects for the program.

Comments on User Involvement. The Under Secretary stated that the report incorrectly bases its interpretation on whether the user was involved in the ACTD process based on the user signing the management plan, the implementation directive, or the memorandum of agreement. He stated that the user was committed to support the Medium Altitude Endurance-UAV and the High Altitude Endurance-UAV. The user made those commitments during discussions with the DUSD(AT). He stated that the level of user involvement during the ACTD indicates the strength of the commitment.

Audit Response. We were unable to determine the commitment that the users provided to the programs if they did not formally sign up through the program documentation requirements. We commend the DUSD(AT) in his attempts to have the user signed on early in the life of the ACTD programs. However, for the High Altitude Endurance-UAV, the user still did not sign the High Altitude Endurance-UAV Management Plan as of August 1996, 2 years after the ACTD was initially approved. As stated in the audit report, officials did not approve the Management Plan because of the definition of the user's role as the user representative and refinement of transition planning issues. Thus, even though the user may have been informally committed to the High Altitude Endurance-UAV ACTD, the user was not clearly in agreement on all program issues and most definitely was not formally committed to the program.

While the user may have been involved during the duration of the ACTD, the purpose of having the users sign the management plan, implementation directive, or the memorandum of agreement is to ensure continual support throughout the duration of the program. Without that commitment, the users are giving little more than lip service to the commitment, and it falls far short of the intent of the ACTD, which is to have the user intimately involved from the beginning of the ACTD until completion.

Comments on the 2- to 4-Year Timeframe. The Under Secretary stated that we had changed the timeframe from "typically be 2 to 4 years," to a more stringent timeframe of "2 to 4 years." He indicated that the timeframe is listed as a selection criterion to distinguish the ACTD process from the timeframe of 12 years or more, which is typically required of a formal acquisition program. He stated that the timeframe was intended to be a coarse measure and not a fine measure, as the report interpreted.

Audit Response. We used a finite measure to determine whether the programs were to be completed within a short time, as spelled out in the ACTD master plan. If the need is identified by the user and accepted as a critical military need, then the duration of the program should be within a reasonable timeframe to meet the need. Otherwise, the urgency and the subsequent selection of the project for the ACTD program is questionable. The High Altitude Endurance-UAV spans more than 5.5 years, and the Kinetic Energy Boost Phase Intercept program spans more than 6 years. While the duration of the programs does not significantly exceed the selection criteria goals, they are indicators of the systemic problem that the overall ACTD programs face. The problems concern the vagueness of the selection criteria, which is the overall theme of the audit report. The ambiguity in definition and terms will only lead critics of the program to conclude that the ACTD program is circumventing the acquisition process and not accelerating the acquisition process through the use of mature technology to meet the critical military needs of the warfighting community.

Comments on the Low Life-Cycle Cost Helicopter. The Under Secretary stated that nothing in the ACTD solution criteria precludes projects that evaluate commercial solutions to military needs. The Under Secretary stated that the ACTD program provides an excellent vehicle for assessing military utility of such solutions.

Audit Response. The Low Life-Cycle Cost Helicopter project is to determine whether commercial helicopters can be used instead of procuring new military helicopters to lower operating cost. While we believe that such projects have merit, we do not believe that they meet the intent of the ACTD program, which is to quickly bring advanced technology to the warfighter to meet a critical military need. The use of the ACTD program for projects such as the Low Life-Cycle Cost Helicopter could jeopardize the ACTD program by causing concern that the ACTD program will be used to circumvent other means to test such concepts.

Appendix G. Report Distribution

Office of the Secretary of Defense

Under Secretary of Defense for Acquisition and Technology
- Deputy Under Secretary of Defense (Acquisition Reform)
- Deputy Under Secretary of Defense (Advanced Technology)
- Deputy Under Secretary of Defense (Logistics)
- Director, Acquisition Program Integration
- Director, Defense Procurement
- Director, Test, Systems Engineering and Evaluation
- Director, Defense Logistics Studies Information Exchange

Under Secretary of Defense (Comptroller)
- Deputy Chief Financial Officer
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Assistant Secretary of Defense (Public Affairs)
Director, Operational Test and Evaluation

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Director, Joint Chief of Staff

Department of the Army

Assistant Secretary of the Army (Research, Development and Acquisition)
Auditor General, Department of the Army

Department of the Navy

Assistant Secretary of the Navy (Financial Management and Comptroller)
Assistant Secretary of the Navy (Research, Development and Acquisition)
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Assistant Secretary of the Air Force (Acquisition)
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Office of Management and Budget
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Chairman and ranking minority member of each of the following congressional committees and subcommittees:

Senate Committee on Appropriations
Senate Subcommittee on Defense, Committee on Appropriations
Senate Committee on Armed Services
Senate Committee on Governmental Affairs
House Committee on Appropriations
House Subcommittee on National Security, Committee on Appropriations
House Committee on Government Reform and Oversight
House Subcommittee on Government Management Information and Technology, Committee on Government Reform and Oversight
House Subcommittee on National Security, International Affairs, and Criminal Justice, Committee on Government Reform and Oversight
House Committee on National Security

Part III - Management Comments

Under Secretary of Defense for Acquisition and Technology Comments

THE UNDER SECRETARY OF DEFENSE
3010 DEFENSE PENTAGON
WASHINGTON, D.C. 20301-3010

ACQUISITION AND TECHNOLOGY

FEB 18 1997

MEMORANDUM FOR INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

Subject: Audit Report on Advanced Concept Technology Demonstrations (ACTDs) (Project No. 6AB-0018), memo dated December 9, 1996

Thank you for the opportunity to review the findings summarized in your draft report. I appreciate your efforts to evaluate the effectiveness of the ACTD program, however, I have serious concerns with your methodology and the conclusions you have reached; thus, I do not believe that the draft report should stand without substantial revision.

The two most serious concerns with the draft audit report have to do with your assessment of the ACTD selection criteria. First, your report implies that a formal USD(A&T) determination is the appropriate basis for establishing military need. This is not correct. Second, the draft report misstates our technology standard as "mature technology" when in fact the precise criterion is "technology should be sufficiently mature." Several errors flow from this misstatement. These two issues are described below and a more complete discussion of the concerns is contained in the attachment.

Military needs for ACTDs are first articulated by the warfighter community and then confirmed by the Joint Requirements Oversight Council (JROC). This process is described in the 1995 ACTD Master Plan. It is patterned after the process used to establish needs in the formal acquisition process and is consistent with DODD 5000.1. All ACTDs approved to date have followed this process, including a review by the Vice Chairman of the Joint Chiefs of Staff (VCJCS) or the full Joint Requirements Oversight Council (JROC), who have confirmed that these are appropriate projects for ACTDs. The auditors' interpretation of the process for establishing military needs is inconsistent with the published process and with Department policy regarding responsibility for needs prioritization. It should not be used as the basis for an assessment of the ACTD selection process.

The second concern is your statement that four of the ACTDs did not use mature technology. All of these ACTDs were reviewed by the user and by the Deputy Under Secretary of Defense (Advanced Technology) (DUSD(AT)) Breakfast Club,

which is comprised of the most senior technologists in the Department of Defense. These ACTDs were judged to employ sufficiently mature technologies, which is the precise selection criterion, not "mature technologies" as used in the IG's evaluation process. While this may appear to be a subtle distinction, it led to improper measures and interpretations being applied during the audit process. For example, models and simulations (M&S) were cited as an indicator of the use of immature technologies in an ACTD. To the contrary, M&S are a vital element of ACTDs. They are used to plan experiments, develop CONOPS and to supplement knowledge gained from field testing of the core elements of the ACTD. They are not used in lieu of field testing of core elements. While conceptual systems are sometimes represented in the M&S, they are there to assess growth beyond the core capability of the ACTD. This should not have been interpreted as an indication that the core systems are not sufficiently mature. Furthermore, the report does not distinguish between risks due to integration of complex systems and risks due to immature technology. It is important to make this distinction since integration risks are addressed under a separate selection criterion. The technology maturity in the nine ACTDs that are addressed in your report is consistent with the intent of the ACTD selection criteria.

It is clear that the ACTD selection criteria has not been interpreted correctly by the audit team and others may encounter similar problems. I therefore agree with your recommendation to assemble a working group to clarify the intent of the criteria. We will invite a representative of your organization to participate in that effort. We will also re-examine the ACTDs selected in FY97 to ensure they are consistent with the intent of the selection criteria. I would urge that the assessment found in Part I, Audit Results, pages 3 through 5, and Appendix E be removed from the final report. The focus of the report should be on the need for clarification of selection criteria. I would be glad to provide any assistance needed in that regard.

Paul Kaminski

Paul G. Kaminski

Attachment

Comments on the DoD Inspector General Draft Audit Report
on
Advanced Concept Technology Demonstrations

Executive Summary

1. Page i, paragraph 4, regarding audit results.

Comment: The statement that five of the ACTDs were questionable is based on incorrect interpretations of the ACTD selection criteria regarding military need and technology maturity. The IG's assessment of military need was based on whether or not a critical need had been documented by the Under Secretary of Defense for Acquisition and Technology (USD[A&T]). This is not an appropriate basis for judging military need, nor is it consistent with the selection process as described by the Deputy Under Secretary of Defense (Advanced Technology) (DUSD[AT]) in the 1995 ACTD Master Plan. The plan indicates that the need for an ACTD is first articulated by the warfighter community and then confirmed by the Joint Requirements Oversight Council (JROC). This approach is patterned after the process used to establish needs in the formal acquisition process. DODD 5000.1 assigns the Joint Requirements Oversight Council (JROC) responsibility for the prioritization of military needs. All ACTDs approved to date have followed the process described in the ACTD Master Plan and have been confirmed by the chairman of the JROC to be appropriate projects for ACTDs.

The criterion which concerns technology maturity states that "technology should be sufficiently mature." The report revised this criterion to be "mature technology" which in not consistent with the intent. The objective is to select technologies that will be available when needed, not to restrict the choice to those technologies that have already been fully demonstrated.

All nine of the ACTDs addressed in the report were reviewed under the established process and judged by competent authority to address a critical military need and to employ sufficiently mature technology. This paragraph should be revised to indicate that the selection criteria and process were observed in the selection of these ACTDs. The issue here should be the need to clarify the criteria to allow it to be better understood by those who are not directly involved in the selection process.

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Part I - Audit Results

1. Page 3, first paragraph, which discusses the ACTD selection process.

Comment: As indicated in the previous section, the statement that five of the ACTDs are questionable is based on incorrect interpretations of the selection criteria. This also applies to the statement that the selection criteria has been "inconsistently applied." When the selection process was audited to see if the criteria had been applied properly, the criteria was modified in a significant way. The criterion "sufficiently mature technology" was changed to "mature technology" and the criterion "timeframe --- should typically be 2-4 years" was changed to a more rigid "2-4 year timeframe." Furthermore, very specific tests for compliance (e.g., use of models & simulation C4I development as indicators of immaturity, USD(A&T) documentation to assess military need, signature on plans or agreements to assess user involvement) were then applied. Any apparent inconsistencies are the result of these narrow interpretations and tests for compliance. The wording we have chosen for the ACTD selection criteria reflects our intent to consider a wide range of ACTD candidates and to choose those that have the highest potential payoff. The criteria have been applied in accordance with this intent and in a consistent manner. The report should be revised to reflect this.

The statement that only one of the 22 projects selected as ACTDs in FY95 and FY96 was proposed by a Military Department is incorrect. The report should be revised to indicate that seven of those projects were proposed by either the Army, the Navy or both. The projects proposed by the Army were Precision Rapid Counter Multiple Rocket Launcher, Rapid Force Projection Initiative, and Joint Logistics and Joint Countermine. The Navy proposed Precision SIGINT Targeting System, Low Life Cycle Cost Helicopter, Cruise Missile Defense (Phase I), and Joint Countermine. Given the emphasis on joint capabilities and the strong role in the ACTD process of the Joint Staff, the Unified CINCs, DARPA, and Joint Project Offices, six proposals originating with the Military Departments is considered a reasonable balance. Revised

2. Page 6, concerning technology maturity. Page 5

Comment: The statement that four of the ACTDs did not use mature technology highlights the use in the report of "mature" instead of "sufficiently mature" to describe acceptable technology. The criterion was selected to recognize that there are two sides to the maturity coin. On one side of the coin, we do not want to restrict the choice to those technologies that have already been fully

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demonstrated. We need to be able to select evolving technologies, as long as they will be available when needed. This is a significant point and can allow use of technologies that are as much as 2-3 years newer than otherwise possible. A good example of this is the computer industry which is introducing new generations of equipment every eighteen months. In such cases, it is wise to allow technology development work to be performed within or concurrent with an ACTD if there is reasonable confidence in the time required to complete development. The criterion "sufficiently mature technology" also allows the use of less mature technologies when they operate in parallel, such that overall risk is acceptable.

On the other side of the coin, the level of technology must be sufficient so that the residual capability that is left with the user at the conclusion of the ACTD is useful in an operational environment. This means that not only must the performance meet the needs, but the configuration must also be suitable for use by the troops.

The draft audit report tests for "mature technology" and does not consider an ACTD to use mature technology if:

a) the project used models and simulation to represent technology not yet developed; or

b) software programs such as C4I, were developed concurrently with other programs that support the ACTD

Both the interpretations and the way in which they were applied have led to erroneous conclusions as described below:

Modeling and Simulation(M&S)

Four ACTDs were cited as relying on modeling and simulation because supporting programs were not mature. It is important to point out that M&S is a valuable tool for use in development, integration, planning, CONOPs development, and assessment of utility. M&S is particularly important for ACTDs which involve systems-of-systems. These types of ACTDs generally involve large military exercises. To plan these exercises requires reasonably good insight into the performance and CONOPs of the forces involved and into the associated interactions. For systems-of-systems, it is impractical to do that solely through mission rehearsal using live forces. M&S provides an effective, low cost alternative. In addition, the assessment of military utility for an ACTD must often consider the implications of the proposed capability on the extended battlefield - not just between a few opposing elements. M&S is the proper way to make this assessment. For these and other reasons, use of

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M&S throughout the development process is strongly encouraged by DoD 5000.2R (Section 3.44).

In a number of ACTDs, M&S has also been used to examine conceptual systems that are not a part of the ACTD capability. These conceptual systems frequently are not mature, the components will not be physically present during the ACTD, and these capabilities will not be left with the user as residuals. For these reasons they are not part of the core capability and they are examined on a non-interference basis to provide insight into issues related to future evolution of the ACTD core capabilities. This is an efficient and inexpensive way to get added value from the ACTD. The important point is that core capabilities always exist as real hardware and software; M&S is not being used in lieu of actual testing of those capabilities. The report should be revised to remove statements that M&S is being used because technology is not mature.

Software Development

Three ACTDs were cited as relying significantly on software or C4I development and integration that was not based on mature technology. However, most of the ACTDs involve the integration of elements or capabilities that require development of new software. Software development per se is not a technology maturity issue. The software development process is well established and predictable if the underlying processes and behaviors are well defined. Even where there are a significant number of C4I links involved, it is incorrect to conclude that the number in itself implies immature technology. A case in point is the Precision Rapid Counter Multiple Rocket Launcher (PRC-MRL) ACTD. This ACTD involved linkage of not single service, but multi-service sensors and shooters. Even so, the PRC-MRL ACTD was recently completed and has been judged to have been highly successful. The final demonstration occurred with a major exercise in Korea and included fully exercising the system linkage. The report should be revised to remove this basis for assessing technology maturity.

The draft audit report appears to consider risk due to immature technology and risk due to integration activities to be synonymous and they are not. A program which uses nothing but mature technologies can still incur significant technical risk due to the complexity of the integration effort required, or perhaps due to the use of mature commercial technologies in a military environment. For example, building a complex computer network entirely from mature, commercially available components does not ensure that the network integration will proceed smoothly or that it will operate flawlessly. There are system design, integration, and operations risks that must be considered. There are two

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separate selection criteria that relate to risk in an ACTD. The first is the criterion that addresses technology maturity. The second is the criterion that relates to identifying, understanding and accepting other risks that are inherent in ACTDs, such as integration and programmatic risks. The risks due to the complexity of integrating sensors and shooters should be addressed in the criterion for overall risk rather than as a technology maturity issue.

3. Page 6, concerning critical military need.

Comment: The report states that it was necessary to make an interpretation of this requirement because "the Deputy Under Secretary of Defense (Advanced Technology) (DUSD[AT]) did not define what constitutes an urgent military need or who may declare the urgent need for ACTD candidates." The report interpreted this to mean that a written determination of critical need must have been issued by the Under Secretary of Defense for Acquisition and Technology (USD[A&T]) in order to satisfy this criterion. As stated earlier, this interpretation is inconsistent with the process for assessing military need that was published by the DUSD(AT) in the Advanced Technology Concept Demonstration Master Plan dated April 1995. It is also inconsistent with DoD 5000.1 which assigns the JROC the responsibility for establishing priorities for military needs. The determination of military needs for ACTDs is made by the JROC. Furthermore, in the final balancing of ACTD candidates, military needs, and available resources, the DUSD (AT) consulted with USD (A&T) and the Vice Chairman of the Joint Chiefs of Staff (VCJCS) to obtain their concurrence before final approval of both the FY95 and FY96 ACTDs. The audit report should be revised to reflect the established process for assessing military need and to reflect that military need for each of the FY95 and FY96 ACTDs was confirmed as described in the published selection process.

Page 6

4. Page 7, concerning user involvement.

Comment: The draft of the audit report indicates that two of the nine ACTDs examined did not satisfy this criterion. The conclusion was based on an interpretation by the auditors that intimate user involvement should be determined by whether the user had signed the Management Plan, Implementation Directive, or a Memorandum of Agreement. However, these documents are normally approved after the ACTD has been approved and are not available at the time the ACTD selection decisions are made. At the time of selection, CINC USACOM was committed to the support of both the Medium Altitude Endurance (MAE) Unmanned Aerial Vehicle (UAV) and the High Altitude Endurance (HAE) UAV ACTDs. Those commitments were made during discussions between CINC USACOM and the DUSD(AT). Prior to the approval of each of these

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ACTDs, USACOM identified an Operations Manager to be responsible for all user support. The strength of commitment is clearly demonstrated by the significant level of user involvement during the ACTD. For example, for the MAE UAV ACTD, the total involvement in this ACTD by USACOM and their combatant commands, FORSCOM, CINCLANFLT, and ACC was in excess of 200 man-years. This includes US Army soldiers from the Military Intelligence Battalion (Low Intensity) who were assigned TDY to work on the program. The statement in the audit report that the user was not intimately involved in this ACTD is clearly in error. Since all of these ACTDs began more than a year ago, there is an excellent opportunity to evaluate the strength of user commitment based on actual involvement, which is the central issue with this criterion. The report should be revised to remove the statement that the user has not been intimately involved in both of these ACTDs.

5. Page 7, concerning timeframe for ACTDs.

Comment: The report indicates that two of the nine ACTDs examined failed to meet the 2-4 year timeframe. However, the criterion states "typically 2-4 years" not "2-4 years" as the report indicates. The timeframe is listed as a selection criterion to distinguish the ACTD process from the timeframe of 12 years or more typically required under the formal acquisition process. This is intended to be a course measure, not a fine measure as the auditors have interpreted. The range was used to indicate variation from ACTD to ACTD and the word "typically" was used to indicate that these limits were to be applied to the group of ACTDs and were not firm limits for an individual ACTD. Of the two ACTDs in question, one was planned to be completed in less than 2 years and one in greater than 4 years. The timeframes were considered to be consistent with the scopes of the ACTDs and were acceptable. Furthermore, if an ACTD can be conducted in less than 2 years, that should not be considered to be a negative factor. The report should be revised to indicate that the ACTDs approved in both FY95 and FY96 were typically 2-4 years in duration.

6. Page 7, last paragraph, concerning questioned projects.

Comment: The Low Life-Cycle Cost Helicopter ACTD was questioned because it "was not advancing technology to meet an military need, rather this project was to demonstrate an acquisition strategy: the viability of commercial helicopters to meet Navy requirements." The issue here is whether it is appropriate to use ACTDs to evaluate commercial solutions to military needs that have traditionally required a unique military solution. Are they effective and suitable for use in a military environment? There is nothing in the ACTD solution criteria to preclude these types of projects. In

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fact, ACTDs provide an excellent vehicle for assessing the military utility of such solutions.

Page 7

7. Page 8, concerning Joint Staff comments.

Comment: In the review of proposed candidates, the final determination of military need, and the judgment of whether that need is sufficient to justify an ACTD, rests with the VCJCS, who chairs the JROC. The VCJCS must integrate the views within the JROC. As is frequently the case for projects that have a joint flavor, the level of support across the Military Departments is not uniform because the contribution the capability makes to all Departments is not equal. In a similar way, the contribution to all mission areas is not likely to be the same and the individual JWCAs are unlikely to reach identical views. The responsibility for providing a fully integrated picture rests with the VCJCS. He has indicated that each of the ACTDs selected to date was appropriate in that regard.

Page 8

8. Page 9, first paragraph, concerning dissemination of selection criteria.

Revised

Comment: This paragraph should be revised to indicate that six of the FY95 and FY96 projects were proposed by either the Army or the Navy. The projects proposed by the Army were Precision Rapid Counter Multiple Rocket Launcher, Rapid Force Projection Initiative, and Joint Logistics. The Navy proposed Precision SIGINT Targeting System, Low Life Cycle Cost Helicopter, and Cruise Missile Defense (Phase I).

Page 8

9. Page 9, third paragraph, concerning defined criteria and requirements.

Comment: DoD Regulation 5000.2-R applies to major acquisition programs and does not apply to ACTDs. The paragraph in that regulation relating to ACTDs is a concise description of the ACTD process and was included in the regulation for information purposes. The purpose was to provide an example of a nonstandard path by which a program might enter the formal acquisition process. The wording was not intended to serve as the basis for selection criteria for the ACTD process. However, to avoid future misunderstandings, the wording is being revised in Change 2 to the document to indicate that "ACTDs are a means of demonstrating the use of emerging or mature technology to address critical military needs."

Page 26

10. Page 9, concerning mature technology and the DarkStar ACTD.

Comment: The cause of the DarkStar mishap on the second flight was not tied to issues of technology maturity but

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rather issues relating to the integration of the technologies in the DarkStar system. The systems flight control software supported DarkStar through the first fully autonomous flight of the UAV. The improved software and other changes incorporated in the second air vehicle will correct the wheelbarrowing seen on the second flight and expand the flight envelope. Modeling and simulation fidelity has been increased and the lessons learned have been applied to reduce flight test risk. The risks associated with development of the DarkStar were identified and accepted at the time the ACTD was approved.

11. Page 10, concerning inconsistent terminology. Page 9

Comment: The comment regarding the need to be consistent in the terminology used in various documents concerning ACTDs is valid and standard terminology will be adopted and appropriate changes will be made in the next update to the Acquisition Deskbook and the ACTD Master Plan.

12. Page 10, concerning the need for clearer definition of mature technology.

Comment: The comment concerning the need to clarify the definition of mature technology is also valid and a working group, comprised of representatives from OSD, the Joint Staff, developers, users, and the test community will be formed to clarify the definition. A representative of the IG's office will also be invited to participate.

13. Page 11, concerning military need. Page 10

Comment: As indicated in paragraph 11 above, military needs are established by the process described in the ACTD Master Plan. The Chairman of the JROC indicated that all of the FY95 and FY96 ACTDs were considered to be appropriate ACTDs. The basis used in the report to assess military need is incorrect. The report should be revised to reflect that military need for all of the ACTDs was established in accordance with the defined process. We agree that we have not been totally consistent in the documentation of the process for establishing military need and we will address that subject in the working group discussed in the preceding comment.

14. Page 13, concerning support for ACTDs. Page 12

Comment: The statement that the Army was the only service that proposed ACTD candidates is incorrect and should be removed. The statement concerning the complexity of the Joint Countermine ACTD is correct. However, there is a critical military need for this capability and the technologies involved have been evaluated on three separate Revised

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occasions and have been judged to be sufficiently mature to support the ACTD objectives. The ACTD process is an excellent mechanism for the integration of this type of joint capability. Since we intend the process to be capable of conducting demonstrations of this complexity, the task is to make that clear in our selection criteria.

Page 15

15. Page 16, regarding recommendations.

Comment: We concur that the selection criteria can be clarified and as indicated in paragraph 11 above, we will establish a team for that purpose and we will publish the resulting selection criteria in the Defense Acquisition Deskbook. We will also ensure that the approved FY97 ACTDs meet the resulting criteria.

Part II - Additional Information

Page 24

1. Page 26, concerning the Medium Altitude Endurance-UAV.

Revised

Comment: The Unmanned Aerial Vehicles (UAV) Joint Project Office under the PEO for Cruise Missiles and UAV served as the demonstration manager. The U.S. Atlantic Command served as the operational manager.

Pages 26-27

2. Page 27-28, concerning the High Altitude Endurance Unmanned Aerial Vehicle (HAE UAV).

Comment:

Technology Maturity

The technologies used in this ACTD were mature technologies at the time of ACTD initiation. The fabrication technology had been demonstrated, the avionics are not state of the art systems, the software development task is not large by DoD standards (less than 250,000 lines of code), and the propulsion system is off the shelf. It was the integration which was deemed medium to high risk within the time and dollars estimated by the contractor in June of 1994. The contractors developing the software have a solid track record in this area and are rated as high as SEI level 3. The flight controls software was not developed before the ACTD but that was judged to be acceptable.

The cause of the accident on the second test flight was related to air vehicle wheelbarrowing which subsequently led to an interaction of the vehicle inertia and the landing gear dynamics that was exacerbated by the main landing gear touching the ground. The flight control software did not play a role in the accident. The program intends to prevent the occurrence of wheelbarrowing using the controls on air

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vehicle #2. Deficiencies in the modeling and simulation were identified and have been corrected. These are not technology maturity issues, but rather issues relating to the complex system integration task on this ACTD. The risks were identified and accepted at the time the ACTD was approved.

Critical Military Need

The HAE system will provide the warfighter with synoptic, real time, high resolution surveillance of the battlefield. This is a current deficiency which was identified as early as the mid-80's in the RSTA Mission Need Statement and was revalidated by JCS after Desert Storm. The military importance of this capability to the warfighter was confirmed by the VCJCS prior to approval of this ACTD. The basis used by the IG to assess this criterion was not valid and the report should be revised to reflect the correct process.

User Intimately Involved

The U.S. Atlantic Command (USACOM) was fully committed to this project prior to its approval as an ACTD. At the start of the ACTD, USACOM designated an Operations Manager to oversee all user support to the ACTD. USACOM had agreed to be responsible for the development of CONOPs, operational employment in military exercises, and the assessment of military utility. They will be represented in many of these areas by their Combatant Command, the USAF Air Combat Command. There have been User conferences conducted at approximately 9 month intervals, ground segment experiments with military service participation, user attendance at program reviews and excellent participation of the User on the HAE oversight committee. Full user involvement in this ACTD has never been issue and the report should be revised to reflect that fact.

Timeframe

The HAE UAV ACTD was scheduled to be five and a half years in length. While a little longer than typical, this was consistent with the objective of this ACTD and was considered to be appropriate. Also, it should be noted that the user field demos required a full two years of this period, significantly greater than for many ACTDs.

3. Page 28-29, concerning Joint Countermine.

Pages 27-28

Comment:

Technology Maturity

The issue of maturity of the components and C4I architecture used in this ACTD has been reviewed on three separate

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occasions. Prior to the approval of the ACTD, the technology was reviewed by the Breakfast Club and it was judged to be sufficiently mature. This ACTD is a case in which duplicate technologies are being assessed for some aspects, thus reducing the risk due to technology. Because of the complexity of this ACTD, the Deputy CINC USACOM conducted a separate review and he also concluded that the technology was sufficiently mature. In a 1995 review by the Defense Science Board, concerns were expressed that the technology was too mature and that more aggressive technologies should be included.

The IG audit team also raised a question about the models and simulation effort being used to represent elements that are not physically present due to lack of maturity. As explained earlier, this is not the reason for the use of models and simulation. All core elements of this ACTD will be present in one or more of the planned demonstrations. In the case of the Joint Countermine Operational Simulation, this capability is an element of the operational system. It is vital to the real time situational assessment and to the execution of the mission. It bears no relationship to the maturity of technology being used in the ACTD.

Critical Military Need

Again, the criterion used by the IG to judge military need was not valid. The military importance of this capability to the warfighter was identified by the Army, the Navy, and the Marine Corps. The critical need is also identified in the USACOM Integrated Priority List and it was confirmed by the VCJCS prior to approval of this ACTD.

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4. Page 29, concerning Kinetic Energy Boost Phase Intercept.

Comment:

Technology Maturity

The KE BPI (Phase I) ACTD was a 12 month effort to develop the CONOPs and assess the affordability (cost effectiveness) of the proposed concept. The technology of the KE BPI (Phase I) ACTD was not an issue because this effort was accomplished by performing modifications of existing man-in-the-loop and digital simulations. The concept was determined to be technically achievable, but operationally unaffordable. The KE BPI (Phase II) ACTD was not approved. The report should be revised to reflect that the approved KE BPI ACTD was for Phase I only.

Critical Military Need

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The need for a capability to engage tactical ballistic missiles during boost phase was confirmed in writing by the Director, Operational Plans and Interoperability (J-7), Joint Staff prior to the approval of this ACTD.

Timeframe

The initial concept for this ACTD required a total of four years (FY95-98). Loss of funding stretched the program into FY99. However, the approved ACTD was for Phase I only, which required slightly less than one year, not almost six years as indicated in the draft audit report. While this was less than the typical timeframe, it was consistent with the objective of this ACTD and was therefore appropriate. Revised

5. Page 29-30, concerning Low Life-Cycle Cost Helicopter. Pages 28-29

Comment:

Critical Military Need

The serious need for this capability was originally identified by two CINCs. The CNO confirmed the need in two memoranda to the DUSD(AT). The Vice Chairman also strongly supported the need during a meeting with the DUSD(AT).

Advancing Technology

The audit report questioned this ACTD because it was not "advancing technology to meet a military need," but rather was to demonstrate an acquisition strategy, the viability of commercial helicopters to meet the Navy requirements. This comment does not relate to any of the selection criteria. There is a critical need and it is being addressed with technology that is sufficiently mature. In ACTDs and throughout defense acquisition, there is strong emphasis on the consideration of commercial items prior to the commencement of development effort. The issue is the military utility (e.g. effectiveness and suitability) of the commercial item. An ACTD is well suited to making that determination of military utility. The intent of the ACTD process is well served when a commercial item is evaluated in a military application and proven to have high utility. The report should be revised to remove this ACTD from the questionable category.

6. Page 30, concerning the Rapid Force Projection Initiative. Page 29

Comment:

Technology Maturity

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The models and simulation used in this ACTD are vital to the objectives of the ACTD. They are being used to plan the exercises, develop CONOPs, assess utility, and explore paths for evolution of the ACTD capability. They are not being used to compensate for core capabilities that are immature.

Computers - All computer hardware/software that hosts the Command and Control (C2) are either Army Common Hardware/Software (CHS) or Commercial-Off-The-Shelf (COTS).

C2 - The C2 systems and the local area network that will link these systems are either already fielded or will be fielded to experimental units before the RFPI ACTD field experiments. The Appliqué C2 capabilities that will be used for RFPI consist of; (a) Task Force XXI capabilities that will be demonstrated in that Advanced Warfighting Experiment more than a year before the RFPI experiments; and (b) enhancements to the software that are required to address RFPI unique C2 requirements. The enhancements require software development, but that development will follow current Army architecture and software standards and will require no software technology development.

Communications - The backbone of the digital communications system will be the Very High Speed Integrated Circuit (VHSIC) Enhanced Position Location Reporting System (EPLRS) which is an upgrade to the currently fielded EPLRS. The VHSIC EPLRS is scheduled to be fielded by the Army starting in mid FY97. A "tactical internet" architecture is to be used to link the VHSIC EPLRS units. This architecture is based on proven commercial LAN algorithms and routing schemes. It will be used in the TFXXI AWE prior to the RFPI experiments. Furthermore, a backup communications architecture is also being developed in case the tactical internet architecture is not satisfactory. The backup architecture is standard communications architecture and is based on the inherent capabilities of the VHSIC EPLRS.

While the C4I capability required for RFPI is complex and requires some development activity, the effort within this ACTD is integration effort, not technology development. The technologies being used will be proven prior to their use in RFPI. The risks for this ACTD have been defined and risk management measures are in place. Furthermore, the risk levels are considered to be reasonable and have been accepted. The report should be revised to remove this basis for assessing technology maturity.

Critical Military Need

The critical need to enhance the survivability and lethality of our light early entry forces when faced with an armor

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threat was identified by the Army in 1994 and the need was then confirmed by the VCJCS prior to approval of this ACTD.

7. Page 31, concerning Counter Proliferation. Page 29

Comment:

Critical Military Need

The priority need for the capability to hold at risk facilities designed to process and store weapons of mass destruction has been identified in the Deputy Secretary of Defense Report to Congress on Counter Proliferation. It has also been stated by CINCEUR, the user for this ACTD, and confirmed by the VCJCS.

8. Page 31, concerning Cruise Missile Defense (Phase I). Page 30

Comment:

Critical Military Need

The Navy initially highlighted the critical need to extend the capability of ships to defend against low flying cruise missiles and this need was supported by CINCPAC. This need was confirmed by the VCJCS prior to the approval of this ACTD.

9. Page 31, concerning the Precision/Rapid Counter Multiple Rocket Launcher. Page 30

Comment:

Critical Military Need

The critical need for a capability to counter the North Korean 240 mm multiple rocket launcher threat was initially identified by CINC USFK in discussions with the Deputy Assistant Secretary of the Army for Research & Technology. This need was confirmed by the VCJCS prior to the approval of the ACTD.

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Joint Chief of Staff Comments

THE VICE CHAIRMAN OF THE JOINT CHIEFS OF STAFF
WASHINGTON, D.C. 20318-0001

CM-1595-97
28 February 1997

MEMORANDUM FOR THE INSPECTOR GENERAL, DEPARTMENT OF DEFENSE

Subject: Audit Report On Advanced Concept Technology Demonstrations (Project 6AB-0015)

1. Thank you for the opportunity to review the findings of the draft report. Advanced Concept Technology Demonstrations (ACTDs) are a key element in the DOD Science and Technology (S&T) and acquisition processes and any attempts to improve their ability to fulfill warfighter's requirements are encouraged. Although the report asserts ambiguity in definitions for "mature technology" and "critical military need," the Joint Staff, JROC, and OSD Advanced Technology staffs have worked in concert to understand the technical risks and warfighting value of each program. The JROC now prioritizes all ACTD candidate programs. While we find fault with some initial assumptions and some specific observations of the investigation (i.e., the JROC did in fact assess and validate the military need of the ongoing ACTDs with the JWCA process), most of the final recommendations pass the "reasonable man" test and are endorsed. The ACTD process is still young and improvements to the ACTD Master Plan are to be expected and encouraged as it evolves into a more efficient process.

2. Regarding the report's major recommendations, a summary of Joint Staff positions is enclosed. The Joint Staff supports the IG recommendation to establish an ACTD Working Group or Integrated Concept Team which will identify process improvements to speed advanced technology to the warfighter.

JOSEPH W. RALSTON
General, USAF

Enclosure

Joint Staff Comments: DoD IG Audit on ACTDs

02/03/97 6:45 AM

ISSUE: IG OBSERVATION & SUGGESTION	JOINT STAFF RECOMMENDATION	RATIONALE
QUESTIONABLE ACTDS & SELECTION CRITERIA: 5 of 9-projects examined ($2.3B) were found to be questionable, that is, not meeting either of the 2 critical criteria relating to mature technology or critical need.	Implement Working Group (WG) to address selection criteria & other issues listed below.	• Consensus in selection criteria will provide common ground for JWCA Teams, CINCs, JRB & JROC to evaluate merits of competing ACTD candidates.
DEFINING 'MATURE TECHNOLOGY': IG discusses possible definitions (i.e., technology for which a prototype already exists; technology that had a high risk acceptable to PM; Technology that is proven; programs using models & simulations to represent technology not yet developed should not be ACTDs). IG recommends: *technology that is fielded & needs no additional development except integrating other fielded systems.*	Definition change is **not** necessary.	• OSD & Joint Staff needs the freedom to experiment with new cutting-edge concepts.
DEFINING 'CRITICAL MILITARY NEED': OSD recently changed 'urgent' to 'critical' as the standard descriptive term in the Deskbook. IG stresses need for consistency & proposes definition: *a need that the Joint Staff identifies as high potential to meet the JWCA Team evaluation criteria and need.*	WG re-examine definition & recommend changes as necessary.	• Will encourage evaluators to apply quantitative MOEs to requirements supporting ACTDs. • Will eliminate perception of questionable prioritization of past ACTDs.
REEVALUATE FY97 ACTD: Establish a WG to develop selection criteria & definitions for 'mature technology' & 'critical military needs'. Reevaluate FY97 ACTD candidates using new criteria.	Implement WG to provide recommendations/ feedback	• Avoid potential for criticism - the right thing to do.

Audit Team Members

This report was produced by the Acquisition Management Directorate, Office of the Assistant Inspector General for Auditing, DoD.

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