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MEMORANDUM FOR COMPONENT ACQUISITION EXECUTIVES

Subject: Transition Guidance for Advanced Concept Technology
Demonstrators (ACTDs) to the Formal Acquisition Process

The attached paper provides an excellent template for the transition of ACTDs to the acquisition process. The document is intended to serve as a guide for those cases when ACTDs make this transition, and is not intended to be mandatory. Please disseminate within your Component. I will also have it made available in the Acquisition Deskbook.

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Attachment

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Transition of Advanced Concept Technology Demonstrators (**ACTDs**) to the Formal Acquisition Process

-Executive Summary-

This paper presents guidance in transitioning Advanced Concept Technology Demonstrators (**ACTDs**) to the formal acquisition system, which is governed by DoD 5000.2R. The audience for this paper is primarily the **ACTD** Manager.

The primary goal of an Advanced Concept Technology Demonstration (**ACTD**) is to assess the **military utility** of a significant new capability and to conduct that assessment at a scale size adequate to clearly establish operational utility and system integrity. The formal acquisition process is the primary mechanism for the procurement of new or upgraded military capabilities. On the other hand, the **ACTD** process is a pre-acquisition activity that provides the user an opportunity to assess a new capability and determine its military utility before deciding to acquire additional units.

There is an interface between these two activities that has to be addressed by the **ACTD** Manager. The **ACTD** process is a pre-acquisition activity with a significant level of management oversight, but each program is highly tailored and there is generally much less formal structure than with the acquisition process. The acquisition process involves programs with higher funding levels and is therefore governed by laws and regulations which have to be addressed by major defense acquisition programs. For those **ACTDs** that demonstrate strong military utility, the intent is to transition into the formal acquisition process to acquire the system in sufficient quantity to meet the operational requirement. However, without careful preparation, the transition may result in the loss of some of the benefits of the **ACTD**. For example, without suitable preparation in areas such as contracting, costly delays—including a break in a production line—could occur. Upfront planning is a necessity to ensure the successful transition of an **ACTD** to the acquisition process.

Strategies and approaches are described to facilitate transitioning from an **ACTD** to the acquisition process as defined by DoD 5000.2R. The suggested approaches are based on lessons learned. The focus of the suggestions are **ACTDs** that are planned-if successful-to enter the acquisition process at the start of LRIP.

The primary challenges that are faced in preparing for the transition of a **ACTD** into LRIP are: a) Contracting *strategy*—motivating the contractor(s) to provide a best-value (from an overall life cycle cost-effectiveness perspective) solution and

transitioning into LRIP without loss of momentum; b) **Interoperability—ensuring** that the ACTD can interface with other systems on the battlefield; c) Supportability—ensuring that the fielded systems can be cost-effectively supported; d) **Test and Evaluation—early** and continuous participation of the operational testing **community** and evaluators throughout the ACTD process from definition of data needs and associated military exercises to completion of the Operational Assessment to support the production/transition decision; e) Affordability—assessing life cycle affordability and application of a Cost as an Independent Variable (CAIV) strategy to continuously look for ways to reduce cost; f) **Funding—choosing** the proper strategy for obtaining the resources necessary for acquisition; g) **Requirements—evolving** from a mission need and associated performance goals at the start of the ACTD to a formal ORD and/or a system performance specification at the conclusion of the ACTD which captures the technology maturity and the knowledge and understanding gained by the warfighter while using the capability in realistic military exercises; and h) Acquisition Program Documentation—defining and planning for the documentation required prior to the acquisition decision that occurs at the end of the ACTD.

Potential difficulties of the transition of an ACTD into the acquisition process are discussed in each of the above areas. Suggestions which can help the ACTD Demonstration Manager to minimize negative consequences are provided. The underlying theme is that continuity of the ACTD to the formal acquisition program is accomplished by up-front planning. This planning should not, however, dilute the focus of the ACTD. It is believed that a little planning upfront can result in significant cost and schedule savings later.

Transition of Advanced Concept Technology Demonstrators (**ACTDs**) to the Formal Acquisition Process

INTRODUCTION

The purpose of this paper is to provide a template for managers of **ACTDs** to use to transition their efforts to the acquisition process. Recognizing the large differences between different types of **ACTDs**—and, similarly, between acquisition programs—this paper is suggestive rather than prescriptive.

DoD 5000.2R defines the mandatory acquisition process requirements for major defense acquisition programs. The milestone decision authority for any acquisition program has a great deal of flexibility to adapt the process to fit the needs of the individual program. The Acquisition **Deskbook** will include assistance and suggestions to acquisition program managers in the development of their programs. The **Deskbook** will also provide guidance for the **ACTD Manager**.¹

Three generic classes (defined on page 5) of **ACTDs** are currently being pursued. This paper deals only with the one of the three classes which seems the most likely to result in a single weapon system that may be needed in significant quantities. Subsequent revisions to this paper will also discuss the other two classes.

Background

The primary goal of an Advanced Concept Technology Demonstration (**ACTD**) is to assess the **military utility** of a significant new capability and to conduct that assessment at a scale size adequate to determine operational utility and system integrity. **ACTDs** are jointly sponsored and implemented by the operational user and materiel development communities, with oversight guidance from the Deputy Under Secretary of Defense for Advanced **Technology**—**DUSD(AT)** .

The formal acquisition process is the primary mechanism for the procurement of new or upgraded military capabilities. On the other hand, the **ACTD** process is a pre-acquisition activity that provides the user an opportunity to assess a new capability and determine its military utility before deciding to acquire additional units. The **ACTD** process also can provide the user

¹ 'Guidelines for **ACTD** Management Plan," Acquisition **Deskbook**.

with residual operational capability at the conclusion of the ACTD.

Another key attribute of an ACTD is the opportunity it provides to develop an in-depth understanding of a new capability before developing the formal operational requirements. The prototype will be used in representative military exercises and its effectiveness, operability, and suitability assessed before the requirements are formalized. Furthermore, since the ACTD involves the developer, the user, and the operational test community working in concert, there is a good understanding not only of the critical operational requirements, but also of the cost, schedule, and risk sensitivities to variations in the operational requirements. This environment produces an informed buyer.

ACTDs address critical military needs. The selection process involves significant interaction with the Joint Requirements Oversight Council, Unified Commanders, and Military Departments to ensure each ACTD is focused on relevant needs. The DUSD(AT) staff then, with the Military Departments and industry, determines if there are any technologies which address those needs. Whether an ACTD is joint or service unique in nature, the DUSD(AT) relies heavily on the advice and judgment of the JROC in selecting new ACTDs.

ACTDs emphasize the integration of mature or emerging technology(s) into fieldable prototypes, and are typically completed in 3 years or less. This can provide the user an opportunity to develop, refine, and assess operational concepts and requirements for the new capability, and to do so under operational environments. Recommendation for an ACTD entry into the acquisition cycle will depend on several factors. For example, transition will depend on the military utility as determined by the operational user, the existence of a validated requirement (if the quantity is sufficient to necessitate a validated requirement), the maturity of the technology, and the ease of integration of the ACTD into a field useable product.

Not all ACTDs will be selected for transition to the formal acquisition process. The user can conclude--for example--that acquisition is not justified. The options in this case are to use the residual capability as is, to continue development, or simply to terminate. However, if the acquisition of more systems is warranted, the nature of the items required becomes an important consideration.

Transition to the formal Defense acquisition process will be necessary when development or production is required. The acquisition category will depend on the number and cost of

systems required. The question at that time is at what point does the ACTD enter the acquisition process. If significant further development is needed, the system might enter into the development portion of the "Engineering and Manufacturing Development (EMD)" phase. If the capability of the ACTD is adequate and needed quickly, entering into the "Low-Rate Initial Production (LRIP)" portion of EMD is an option. The following figure outlines possible paths which the ACTD might follow as it transitions to an acquisition program.

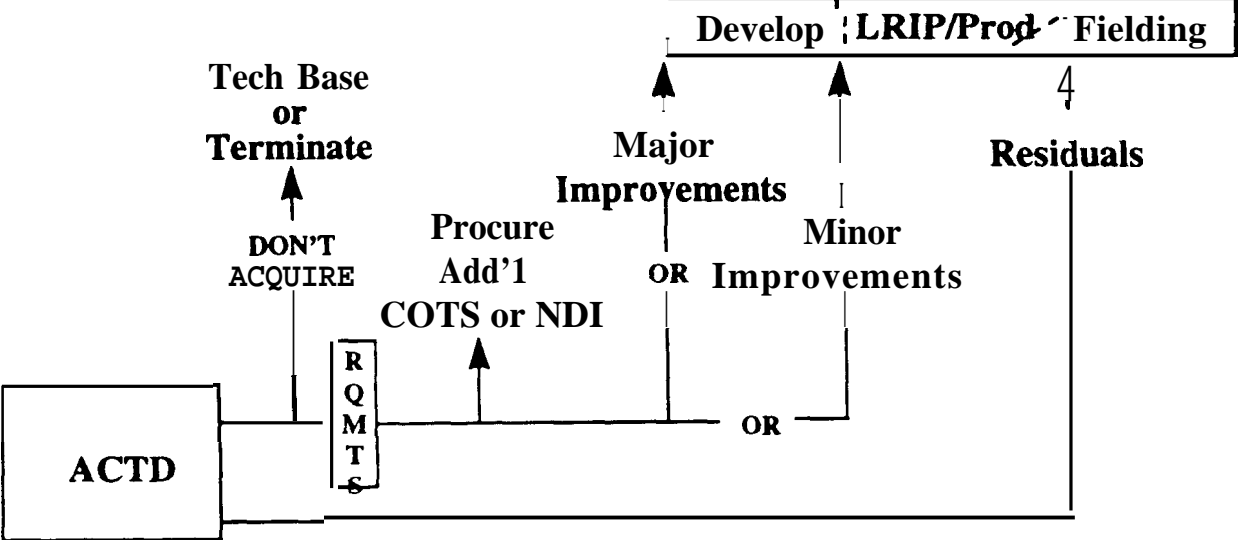


Figure 1. Alternatives Following Completion of ACTD

ACTD Management

The principal management tool for the ACTD is the ACTD Management Plan, the guidelines for which will be provided in the Acquisition Deskbook. The ACTD Management Plan provides for each ACTD a top-level description of the demonstration with sufficient detail that the vital objectives, approach, critical events, participants, schedule, funding, and transition objectives are understood and (by endorsement) agreed by all relevant parties. A tenet of the ACTD philosophy is to maintain a flexible approach to the advanced development process and to avoid unnecessary rigidity and formality in documentation and process in order to

accelerate user evaluation of the potential capability. The Management Plan will generally be drafted jointly by the primary acquisition and user organizations for the **ACTD**, with assistance from other participants. The Management Plan is evolutionary and is expected to reflect any significant changes, such as in objectives, approach, or critical events.

Responsibilities

Executing Agent - The lead development organization for an **ACTD**, typically a service development or acquisition organization or a DoD agency such as DARPA or DSWA. The executing agent is identified in the Management Plan for each **ACTD** and is responsible for planning, coordination, and direction of all development community activities related to the project.

User Sponsor - The lead operational organization for an **ACTD**, typically a **CINC** or an operational element of a Service. The user sponsor plans, coordinates, and directs user activities, as well as allocates user resources, that support an **ACTD**. A user sponsor should be designated early and should be identified in the Management Plan for each **ACTD**. Representative user sponsor responsibilities include operational mission and exercise planning and after-action reporting, including an assessment of the military utility which is to be provided to the **JROC**. The User Sponsor provides the Lead Service (where the user sponsor is not the Lead Service) and **ACTD** Demonstration Manager (from the **ACTD** development organization) recommendations on operational aspects of **ACTD** transition and execution.

Lead Service - A lead Service will be designated for each **ACTD**. The lead Service(s) will be responsible for transition planning in the areas of organizing, training, and equipping. The lead Military Departments, in coordination with all affected Military Departments and Agencies, will prepare recommendations to **DUSD(AT)** regarding the disposition of an **ACTD** (options include termination, additional technical or operational concept development, or a proposed acquisition strategy for a potential program) . If an acquisition strategy is proposed, the lead Service will coordinate the development of the appropriate requirements documentation and identify an organization to execute the proposed follow-on effort if it is approved. When the **ACTD** Demonstration Manager is not within the Lead Service-e.g. , when **DARPA** is the **ACTD** Demonstration Manager-the **ACTD** Demonstration Manager supports the Lead Service in transition planning as needed.

Demonstration Manager (DM) - The individual who is designated by the Executing Agent to be responsible for planning, coordination and direction of all development community

activities related to the project. The DM also prepares and delivers periodic reports to the Oversight Group and other reviewing authorities. When the ACTD DM is not within the Lead Service (e.g., when DARPA is the ACTD DM), the ACTD Demonstration Manager supports the Lead Service in transition planning as needed.

Operations Manager (OM)—the individual designated by the User Sponsor to be responsible for all planning, coordination, and direction of user activities related to the ACTD; such as mission planning and exercise, after-action reporting and the assessment of military utility. The OM may also serve as the Deputy Demonstration Manager.

Classes of ACTDs

Figure 2 shows three generic classes of ACTDs that present significantly different transition challenges. The Class I ACTDs are typically information systems with special purpose software operating on commercial workstations. They frequently are required in small quantities and that requirement can be satisfied without further development or production using the residual ACTD systems or a few additional systems.

ACTD CLASS	POST-ACTD PHASE		
	EMD	PROD	FIELDING
I SOFTWARE/ WKSTATION/ COMMO			R+
II WEAPON, SENSOR, or C4ISR SYSTEM	✓	or ✓	R
III SYSTEM SYSTEMS OF	✓	&/or ✓	R

✓ - Likely Transition R - ACTD Residuals

Figure 2. Classes of ACTDs

Class II ACTDs are **weapon or sensor systems** similar in concept to systems that are acquired through the formal acquisition process. In many cases a Class II ACTD will be planned to transition into LRIP following the ACTD, but there may be cases where it is appropriate to plan for additional development following the ACTD. For example, if the cost of **weaponization** is high in comparison to all other costs of the ACTD, the best strategy may be to assess military utility before incurring the full cost of **weaponization**. In this case the intended point of entry into the acquisition process could be the development portion of EMD.

Class III ACTDs are best described as **'systems of systems.'** An individual element within the overall architecture of a Class III ACTD may be a fielded system, a system already in acquisition, or a system emerging from the technology base. The overall ACTD may involve multiple Program Executive Officers, and perhaps multiple Military Departments. The challenge may therefore be to integrate and coordinate the individual transitions to achieve the capability represented in the ACTD.

Although existing ACTDs fit into each of the three classes described above, the only ones which have progressed to the point that a significant amount of transition planning effort has been performed are in Class II. Since the experience base is limited, the guidelines in this paper are focused on Class II ACTDs. After the methodology for transition of the other classes has been developed and tested, these guidelines will be expanded to address all three classes.

TRANSITION STRATEGY

An ACTD becomes a candidate for acquisition after the military utility of the capability is demonstrated. It is important that the transition into acquisition occur smoothly and without undue loss of momentum. To enable this, the transition objective must be identified at the time the ACTD is approved, and the transition strategy must be developed during the detailed planning for the ACTD, reflected in the ACTD Management Plan, and followed in major procurement actions for the ACTD.

The basic strategy for transition planning is fairly straight forward:

- a) At the beginning of the ACTD, estimate whether the nature of the objective system and the quantities will require entry into the formal acquisition process (versus alternate approaches such as small purchases of commercial products). If entry in the formal process is necessary, define the intended entry point (e.g. LRIP) in

- the process, assuming a successful demonstration and a positive determination by the user of high military utility. Define strategies for the areas of contracting, supportability, interoperability, affordability, and requirements definition that are consistent with the intended entry point.
- b) Define implementation timelines for each of the strategies. For example, those elements of the strategy that will have a direct impact on the design of the system must be addressed either in the initial design or in a subsequent design upgrade (e.g. P³I) that is consistent with the overall acquisition strategy.
 - c) For those elements that can be deferred (e.g. which do not affect the design of the system), the timeframe for the deferred activity should be consistent with the anticipated acquisition decision and the follow-on acquisition process. In this step, it is important to achieve the proper balance between maintaining a streamlined ACTD leading up to the determination of military utility and being prepared to support the acquisition decision. The objective is not to encumber the ACTD to the point that it cannot be executed in 2 to 4 years, but rather to define what must be done, what can be deferred, and when the deferred activity will be completed.
 - d) This transition planning effort is straightforward but not a minor effort; there is usually time between the selection of a candidate ACTD and the availability of the funding necessary to begin to execute the program. This time can be used to accomplish the transition planning. Both the acquisition transition and the operational transition must be addressed. In some areas such as maintenance, there will be interaction between the two. The lead Service must take the lead in planning for the operational transition. Here, too, a note of caution is appropriate. The goal in planning the operational transition should not be to completely 'normalize' the operational aspects of the system. ACTDs are intentionally introducing significant changes to the traditional acquisition process, and they, in some cases, should exert similar influences in the operational community. Considering non-traditional approaches is appropriate. For example, using contractor logistic support on a long term basis, or at least an interim basis following initial fielding, may help significantly to reduce the burden on the ACTD and expedite the schedule for achieving operational capability.

The transition goal and the associated strategy for an ACTD should be specified in the ACTD Management Plan and reflected in

the program content. It is critical to identify during the planning stage whether the ACTD would, if successful, transition to development or to LRIP. Much more advance planning is required for the latter case. The transition strategy provides a readiness posture that go beyond the ACTD. The decision to proceed will be based on the assessment of military utility and relative priorities within the DoD.

Oversight of Transition Preparations

If a program enters the formal acquisition process as a major defense acquisition (ACAT 1) program, DoD 5000 specifies that an Overarching Integrated Product Team structure will be in place. For less than major programs, some form of the integrated product team should also be used, as specified by the milestone decision authority. The point at which this happens will vary, but a general rule-of-thumb is that this transition occurs when a Program Manager is appointed. prior to that, the ACTD DM will act in accordance with their approved Management Plan.

When the transition strategy indicates that a significant level of transition preparation effort is required, a Transition IPT (TIPT) is normally established soon after approval is given to initiate the ACTD. The TIPT is co-chaired by a representative from ODUSD/AT and the ACTD DM. (Lead Service representation is required, especially if the ACTD is going to transition to a Service-managed program.) The TIPT includes representation from all of the stakeholders in the ACTD to include the User Sponsor, the Lead Service, the developer(s), the supportability community, the Joint Staff, ODOT&E and the operational test agencies, as well as the OSD and service staff elements that will be involved in the formal milestone review that occurs at the end of the ACTD.

The purpose of the TIPT is to ensure that the necessary preparations are made during the formulation and execution of an ACTD to allow effective transition into the next phase with a quality product and without a loss of momentum. A TIPT is typically supported by a number of working level IPTs to focus on preparations in the areas of acquisition, test and evaluation, supportability, and requirements. Cross functional representation is strongly encouraged to keep the preparations coordinated across the board. Normally the ACTD DM chairs all of the working level IPTs except the requirements IPT, which is chaired by the representative from the lead service, which will be writing the ORD. Both the structure and the membership of the working level IPTs should be tailored for each ACTD. It is important that working level IPTs address the preparations needed to accomplish the operational transition as well as the acquisition transition.

As the ACTD nears completion, meaning that useful assessments have been made, and preparations for transition are coming to a conclusion, the focus in the acquisition process shifts to the preparations for the formal milestone (or program review) that will determine the future of the program. At this juncture, the TIPT hands off oversight responsibility to an Overarching IPT (OIPT) to prepare for the formal review in accordance with the procedures defined in DOD 5000.2R for Major Programs. Note that the program should be fully funded at this point since the OIPT and DAB do not normally review activities that have not been funded by a component.

It is also advisable to conduct a major review with the Lead Service organization that will be accepting both the residual assets from the ACTD and the objective system. This review should occur at least six months prior to the end of the ACTD and should address the status of preparations for operational support (i.e., manning, logistics, training, operational concepts)"

Figure 3 gives the overall framework for transition planning. The strong role that transition planning plays during the ACTD formulation-phase, the key issues addressed by the TIPT, and the reviews of both the acquisition and operational transition plans near the end of the ACTD are depicted.

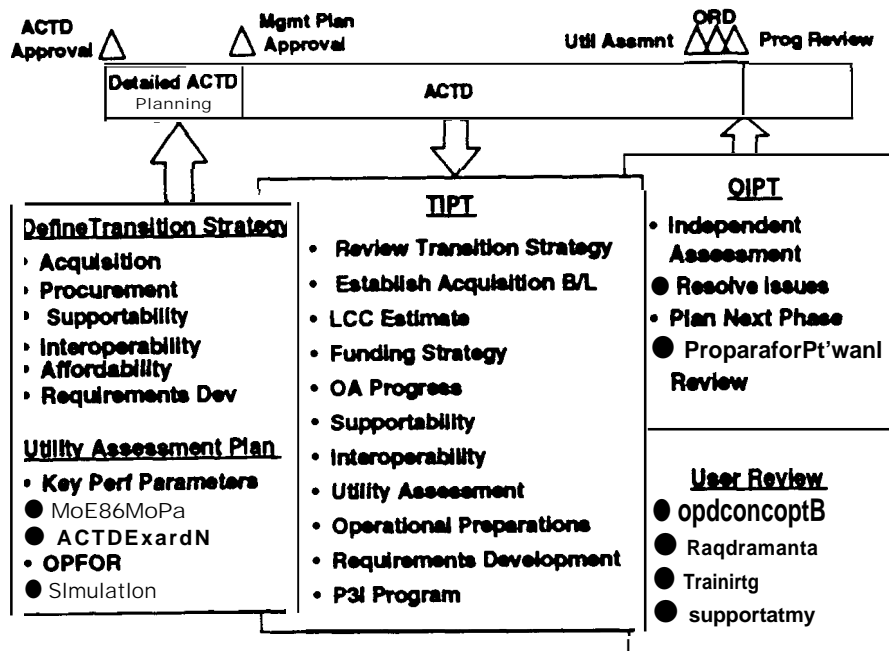


Figure 3. Transition Preparations

Tailoring the Transition

One size does not fit all! The objective is to meet the user's need with minimum delay and cost. However, the formal acquisition process has evolved under the twin pressures of experience and the force of legislation. Entry into the acquisition process will require prudent planning on the part of the ACTD DM. Identified below are some areas that will require attention before and during the transition.

TRANSITION CONSIDERATIONS

The strategies and approaches described below are based on lessons learned and are considered to be applicable to Class II ACTDs that are planned-if successful-to enter the acquisition process at the start of LRIP. The primary challenges that are faced in preparing for the transition of a Class II ACTD into LRIP are: a) Contracting strategy-motivating the contractor(s) to provide a best value (from an overall life cycle cost-effectiveness perspective) solution and transitioning into LRIP without loss of momentum; b) ~~Interoperability~~-ensuring that the ACTD can interface with other systems on the battlefield; c) ~~Supportability~~-ensuring that the fielded systems can be cost-effectively supported. d) Test and Evaluation-early and continuous participation of the operational testing community and evaluators throughout the ACTD process from definition of data needs and associated military exercises to completion of the Operational Assessment to support the production/transition decision; e) ~~Affordability~~-assessing life cycle affordability and application of a Cost as an Independent Variable (CAIV) strategy to continuously look for ways to reduce cost; f) ~~Funding~~-choosing the proper strategy for obtaining the resources necessary for acquisition; g) Requirements-evolving from a mission need and associated performance goals at the start of the ACTD to a formal ORD and/or a system performance specification at the conclusion of the ACTD which captures the technology maturity and the knowledge and understanding gained by the warfighter while using the capability in realistic military exercises; and h) ~~Acquisition Program Documentation~~-defining the documentation required prior to the acquisition decision that occurs at the end of the ACTD.

Contracting Strategy

The initial contracting strategy for an ACTD should be based on the circumstances associated with that particular ACTD and should consider not only the effort to be performed during the ACTD, but the post-ACTD objective as well. It should also provide some flexibility in case the ACTD results do not fully support the original objective. For example, if the post-ACTD objective is to enter directly into LRIP, the contracting

strategy should accommodate the plan to enter production (LRIP) with the ACTD design, but should also allow for the possibility of having to conduct further development effort after completion of the ACTD. At the end of an ACTD program, DoD must decide whether the capability demonstrated in the ACTD has sufficient utility to justify procurement of production versions, or whether further development, or termination is appropriate.

The contracting strategy for an ACTD should address how DoD would procure additional units of the design demonstrated during the ACTD phase if that is the decision at its conclusion. One approach would be to obtain priced options, including Federal Acquisition Regulation (FAR) or Defense FAR Supplement required terms and conditions, for production at the time competitive offers are solicited for an ACTD. An obvious advantage of priced options is that the prices could be competitively obtained versus negotiating prices with the ACTD contractor on a sole source basis, if a new competition is not sensible. Another advantage of obtaining option pricing is that exercising an option significantly reduces the procurement administrative lead-time and causes less disruption to program continuity. Conditions for exercising the option should be clearly identified in the ACTD Management Plan, and in the ACTD solicitation.

Obtaining priced options makes sense if the technology involved is fairly mature and the likelihood of design changes during the ACTD is considered to be low. These factors should also help determine the contract type of the priced options. For example, if an ACTD involves commercial systems already in production and does not anticipate any design changes, firm fixed price options make sense. For a technology that is fairly mature but not in production and still in need of some development, cost reimbursement options may be appropriate. The contract type of priced options must consider the maturity of the technology involved to avoid placing unreasonable risks on contractors.

This approach is currently being employed for the Tactical Unmanned Aerial Vehicle ACTD. The initial ACTD solicitation requested option prices for two production lots (including Low Rate Initial Production) . The options were evaluated and award was made for the ACTD phase. If DoD decides to procure systems identical to the ACTD system, it can do so by merely exercising the option in the ACTD contract.

As an alternative to option prices, DoD could solicit information on future production pricing (such as average unit production prices that are not binding on the contractor) . DoD would use this pricing information as part of an affordability analysis during ACTD source selections. This approach may be more appropriate than obtaining priced options if it is likely

that DoD will procure a configuration similar to that demonstrated during the ACTD but not an identical one. The ACTD solicitation should state that future production contracts are conditioned on the contractor *proposing* production prices that are equal or lower to the production prices initially provided in the ACTD competition. From the perspective of production prices benefiting from the initial ACTD competition, this approach is similar to obtaining option prices. Unlike option prices, this approach would still require obtaining proposals and negotiating prices. This should not be nearly as time consuming or burdensome as negotiating a typical sole source contract. Nevertheless, it will probably take more effort and time than merely exercising an option. This approach is being employed on the Miniature Air Launched Decoy ACTD.

It may be appropriate to enter a development program at the conclusion of the ACTD, either as a planned post-ACTD objective or because the ACTD results indicated that further development is required. A principal question is whether DoD should compete such a development program or negotiate a sole source contract with the ACTD contractor. It is impossible to answer this question in advance, but factors to consider include whether competition exists, the magnitude of the development effort, the number of systems that may ultimately be procured, the soundness of design of the ACTD system, whether DoD owns the design, data, and hardware from an ACTD, and cost. In any event, the Competition in Contracting Act requires justification for not conducting a competition.

If DoD determines that significant development effort is needed, or decides to make significant changes to the system demonstrated during the ACTD phase, or desires an entirely new system, a new competition should be conducted. Any pricing obtained as part of the ACTD contract would be invalid. Furthermore, there is no justification to award a sole source contract to the ACTD contractor in these circumstances.

The DoD should communicate the long term acquisition strategy to the ACTD offerors up front. The contracting strategy alternatives, subsequent to the ACTD contract, must be specified in the solicitation. The possibility of continuing with the ACTD contractor into production should be clearly communicated to potential offerors. Requesting option prices or production pricing information helps communicate this possibility. DoD should be as forthcoming as possible within the parameters of uncertainties that exist.

Interoperability

To ensure that the *major* products produced by ACTDs consider interoperability with all necessary elements during deployment, an interoperability plan should be developed at the onset of the ACTD. This plan should be developed for those interfaces that will be included in the ACTD configuration. It should define:

1. those systems with which the ACTD products are expected to **interoperate**;
2. the types of information to be transferred over the ACTD interfaces;
3. the testing approach for the interfaces (e.g., simulated or operational) ,
4. the organizational responsibilities for maintaining the interfaces (e.g., the ACTD or operational system) ,
5. the **degree** of compliance with applicable interoperability standards, such as the Joint Technical Architecture.

An ACTD may or may not address all interoperability requirements of the objective system. If there is required evolution beyond the ACTD configuration, that evolution should be defined, to include:

1. those systems with which the objective system is expected to **interoperate**,
2. the strategy for the evolution to the objective system **interoperability**,
3. the **planned** timeframe for incorporation should be shown in relationship to the overall acquisition strategy for those interfaces not included in the ACTD configuration.

The ACTD Management Plan should reflect the interoperability strategy and the interface management and evaluation responsibilities.

The execution of the interoperability plan is the responsibility of the ACTD DM. The DM should review the status of system interoperability with all interested parties periodically to discuss and review problems, and actions to ensure connectivity, compatibility, and synchronization of the effort. This should be part of the overall systems engineering effort performed during the ACTD.

Open Systems Architecture

An important part of reducing the Life Cycle Cost of a system which transitions from an ACTD is the implementation of Open Systems architecture. An ACTD normally builds a fieldable prototypes that are based on available components (e.g., engines, black boxes, etc.), allows the user to assess military utility, then leaves the residual capability with the user. However, after transition to production and/or fielding, more capable or more cost-effective components may become available. Employing an Open Systems architecture during the design of the ACTD will allow the use of a greater range of components, thus resulting in a better support infrastructure and the rapid insertion of technology for product upgrades.

Supportability

The Supportability effort required for an ACTD is dependent on many factors, but if the plan is to transition from the ACTD to LRIP, the full range of support areas (i.e., design interface, support equipment, training, initial spares, source of support, facilities, technical manuals, etc.) must be considered. The supportability of the residual capability that is to remain with the user at the conclusion of the ACTD also needs to be addressed.

During the initial planning for the ACTD, support from knowledgeable logistics *personnel* should be obtained to identify how, and to what extent, long-term support considerations should be addressed in the program. This should include to what extent the cost of establishing a support capability, and operating and support costs, can be included in a life cycle cost evaluation of competing proposals, to what extent support considerations need to be addressed in the development and evaluation of design and operating concept, the categories of support that must be addressed for the residuals and for the objective capability, and an initial supportability strategy for each of the categories. This supportability strategy should be reflected in the ACTD Management Plan and in the major procurement for the ACTD. For example, a strategy may include using contractor logistic support for the residuals to significantly reduce the level of effort that must be devoted to such areas as documentation and development of training programs. As a second example, those requirements that must be addressed early in the ACTD because they impact the design of the system (e.g. reliability, availability, built-in diagnostics, maintenance capability, operation in harsh environments) can be included within the basic contract and activities that can and should be deferred until there is adequate information available (e.g. tech manuals, training programs) can be put into an option, or a contract line

item, that will be initiated at a later date. It may be acceptable to delay the exercise of this option until **very** late in the **ACTD**, when the likelihood of proceeding into acquisition is better understood. It may be acceptable for the option to overlap the **LRIP** if there are other means for addressing support of the residuals.

It is particularly important to communicate the basic supportability requirements (e.g. C-130 transportable) and the supportability strategy to the bidders and to **let** them propose solutions. For systems that will undergo a single cycle of development to produce **fieldable** prototypes, and then enter **LRIP**, it is extremely important that the selected contractor demonstrate the level of understanding of supportability necessary to meet those demands. The RFP should require offerors to provide recommendations on the support concept as well as the source of support (contractor or organic) based upon their assessment of cost and mission requirements. This can be used as an input for a life cycle cost comparison of alternative design concepts. The objective of the **ACTD** effort should be to provide for a level of definition of support requirements adequate to allow procurement of the support elements concurrent with the end items, if and when the system is fielded. The offerors should be asked to provide support throughout the **ACTD** phase and to define an initial support plan for the residual capability and the objective capability. The offerors also should plan to demonstrate the projected on-equipment capability during the **ACTD** using planned personnel and equipment, and to refine their recommended support approach based upon *experience* gained during the **ACTD** and life cycle cost considerations. The government will need to assess the proposed approach in light of current policy. This not only provides insight into the support requirements of an offeror's proposal, but also provides the capability-for the government-to evaluate proposals and sources of support alternatives based on life cycle costs. It is never too early, or too late, to look at ways to reduce costs. This is especially appropriate in an **ACTD** when the system and operating concepts are evolving and being evaluated in terms of military utility.

If the system is to enter the development phase of **EMD** at the completion of the **ACTD**, the supportability effort is significantly reduced and is focused primarily on the support during the **ACTD** and during field operation of the residual capability.

Test and Evaluation

Overview

The test and evaluation (T&E) activities within an ACTD provide critical inputs to three separate products that are developed during the ACTD: a) the assessment of military utility performed by the user; b) the operational requirements developed by the lead service; and c) the Operational Assessment prepared by the Operational Test Agency (OTA). The nature of T&E during ACTDS and the relationship of T&E to each of these products is discussed below.

Assessment of Military Utility

As stated earlier, the primary purpose of an ACTD is to allow the user to evaluate the military utility of a capability being considered in a response to a critical military need, and to do so prior to a decision by DoD to acquire that capability. This assessment of utility has two basic parts. The first deals with the importance of the specific mission to the success of the military operations. This aspect is vital to the subsequent funding and acquisition decisions, but does not require input from the T&E effort. However, the second part of utility addresses the issue of how well the capability in question responds to the stated military need. This includes a determination of both the effectiveness of the capability in performing the mission and its suitability (i.e., availability, sustainability, reliability, maintainability, software, ILS) for operation by the user. Inputs from T&E are critical to this part of the utility assessment. They begin during the initial planning stages of the ACTD. At this point, the ACTD Operations Manager (OM) should seek the assistance of the test community (both DT and OT) in developing the set of measures of effectiveness, measures of suitability, measures of performance, and critical operational issues (COIs) that are appropriate indicators of military utility. The DM must be involved in this activity because it is central to the overall ACTD, but it is important that this effort is led by the OM because these measures will be central to the assessment of utility that is the responsibility of the user organization. These measures will also be important when the demonstrations or military exercises are being planned or being selected from large-scale exercises that are already planned for other purposes. That planning or selection activity needs to be driven by utility assessment considerations. Concentrating on these measures will ensure that the exercises, scenarios, and data collection plans will allow a "characterization" of the system that answers part two of the military assessment—"What can the system do?" and "Can it be operated and maintained by the user?" T&E personnel can also

provide critical support in gaining access to test assets, developing scenarios, preparing data collection plans, and executing the demonstration.

Support to the Development of Operational Requirements

ACTDS are initiated on the basis of a broad statement of need rather than a detailed set of operational requirements. One objective of the **ACTD** is to give the user the opportunity to gain experience with a system that represents a near term solution to the need, to develop a concept of operations to fully exploit the system capability, and to then develop a set of operational requirements that reflects the benefit of that experience. The characterization discussed in the preceding paragraph provides the user a quantitative description of the performance and suitability of the **ACTD** configuration. From this baseline the user can assess specific changes in the operational requirements, in terms of utility, cost, schedule, and risk; and can develop an ORD that reflects a good understanding of the tradeoffs involved.

Operational Assessment

As an input to an acquisition decision to proceed into LRIP, an operational assessment is needed from the operational testers to confirm that the system or capability in question is potentially effective and suitable. This assessment begins with the characterization of performance that has been previously discussed. The assessment is then developed by the operational testers in parallel and perhaps iteratively with the development of requirements by the user. The objective of this interactive relationship is to provide the user information on risks associated with any increases in operational requirements being considered relative to the **ACTD** configuration. At the same time, cost and acquisition schedule implications of these increased requirements are being provided by the developer. This gives a complete picture of cost, schedule, and risk implications associated with such requirements and allows the user to make an informed choice between acquiring a capability quickly that is close to the **ACTD** performance level, or requiring a higher performance level and incurring the increased cost, schedule and/or risk. Once the user completes these tradeoffs and prepares the Operational Requirements Document, the operational tester can issue the operational assessment against those requirements. This assessment will be provided to the acquisition decision maker as a formal part of the transition process.

Affordability and Cost as an Independent Variable (CAIV)

The objective of an ACTD is to facilitate the transition of concepts using mature or emerging technologies into the operational force structure. One potential roadblock to a successful transition is the lack of understanding of likely acquisition and ownership (Operation and Support--O&S) costs. A discussion of affordability issues associated with potential acquisition and follow-on O&S costs of the objective system(s) is part of the ACTD Management Plan. The purpose is to focus on affordability issues that could potentially block successful transition.

Cost as an Independent Variable (CAIV) is a key consideration throughout a procurement and may play a role in the transition to, and progress within, the acquisition process"

A key tenet of the CAIV approach for acquisition is a far stronger user role in the process through participation in setting and adjusting program goals throughout the program, particularly in the cost-performance tradeoff process. To some extent, this is hand-in-hand with the execution of an ACTD. The objectives of cost as an independent variable include:

1. **setting realistic but aggressive cost objectives early in each acquisition program**
2. **managing risks to achieve cost, schedule and performance objectives**
3. **devising appropriate metrics for tracking progress in setting and achieving cost objectives**
4. **motivating government and industry managers to achieve program objectives**
5. **putting in place for fielded systems additional incentives to reduce operating and support costs**

Where applicable, these objectives should be addressed in the ACTD Management Plan and/or during ACTD implementation. The High Altitude Unmanned Aerial Vehicle (UAV) ACTD and the Tactical UAV ACTD are examples of early establishment of cost objectives.

Execution of the ACTD should result in a better informed assessment of the performance of an ACTD, thus making cost-performance trades more robust. Certainly, proposed improvements to the production version of the ACTD need to be examined in light of life cycle cost implications.

Funding

Background

Programmatic flexibility and speed in adjusting to change are critically important to success with an initiative as

technologically intensive as the ACTD. In the current environment, technology is accelerating at a tremendous rate. Our speed and flexibility to **leverage, exploit,** and transition mature or emerging technologies into the operational force structure is hampered by resource and budget **constraints—e.g.** , the inability to perform timely programming of funding during the Program Objective Memorandum (POM) process. RDT&E funding for ACTDs can currently be planned, programmed, and budgeted through two sources: 1) The Military Departments/Agencies **supplying** the underlying technologies provide the funding associated with those technology programs, and 2) OSD can supplement the service/agency funding to cover cost in three areas: a) added costs incurred when the technology programs are reoriented to support **the ACTD**; b) costs due to any requirement to provide additional quantities of hardware; and c) cost for technical support for two years of field operations following the ACTD. However, funding to support the follow-on activity (development, LRIP, full rate production, or purchase of additional quantities of commercial items) is not typically funded in OSD Or the Service/Agency until the ACTD demonstrates the military utility of the capability being assessed. This lack of prior funding creates a significant challenge that must be addressed as part of the transition effort.

Road Map

- a. To leverage and transition mature or emerging technologies smoothly, the Lead Service will, at the appropriate time, define and establish a funding methodology for effective insertion of the ACTD follow-on acquisition into the DoD resource allocation process. The appropriate time will depend upon the circumstances associated with the particular ACTD and the funding alternative that is selected.
- b. At the time a proposed ACTD is approved, the Deputy Under Secretary of Defense (Advanced Technology) also approves the funding for an ACTD, to include any supplemental funding provided by OSD. The Executing Agent will designate an ACTD Demonstration Manager (DM), who is responsible for managing the execution of all funds associated with an ACTD. It is also the responsibility of the DM to develop a life cycle cost estimate for the system to serve as a basis for planning, programming, and budgeting of the resources by the Lead Service for subsequent acquisition.

Follow-on Funding Alternatives

The strategy for follow-on acquisition **should** be tailored to fit the circumstances of an individual ACTD. Three alternative strategies for follow-on funding are described below:

1. High Military Utility-No Resources Programmed - Decrement Another Program(s) .

When an ACTD is judged to provide significant enhancement in military capability and no resources have been provided to support the effort, the follow-on funding issue can be presented to the Defense Resource Board (DRB) or Enhanced Defense Resource Board (ERDB) for discussion and resolution. The funding request would ask the DRB or EDRB (for intelligence programs) for funding to support the follow-on to the ACTD. Ongoing programs will have to be decremented in order to provide the necessary funding to support the ACTD. This type of funding strategy should be used when the "urgency of need" warrants rapid acquisition and overrides the formal PPBS cycle.

2. Military Utility Established-No Resources Programmed - Programming Resources Causes Two-Year Delay.

The Lead Service programs for resources at the end of the ACTD, assuming that military utility has been demonstrated. This alternative results in funds becoming available two years after completion of the ACTD. In the interim, the residual capability from the ACTD that was left with the user will provide a limited operational capability. However, this means that the continuity from an ACTD to an acquisition program may be broken, and momentum lost.

3. Assume Success For Some ACTDs--Program Resources In Anticipation Of Follow-On Acquisition.

One way to avoid or at least minimize the break in continuity between an ACTD and the follow-on acquisition program is for the Lead Service to establish, at some point during the ACTD, a budget line with funding, dedicated solely to acquisition of the ACTD. This approach would be best suited to an ACTD for which the military utility is expected to be high, and where there are early indications that the expectations will be met. If it is possible to establish this budget line two years prior to the anticipated decision point to enter development or LRIP, the break in continuity may be avoided altogether. This funding strategy, of establishing early ACTD specific funding in a RDT&E or procurement line, provides the transition funding bridge to support the follow-on acquisition. If the program becomes a joint program, the Lead Service can transfer the appropriate

resources to the designated Joint Program Lead Service for execution. The funding approach **will** also contribute to overall defense program stability, not having to decrement ongoing programs to **"find"** necessary resources.

A specific example would be programming funds in the POM cycle for follow-on production of an **ACTD** where success is anticipated, such as for Global Hawk, even though flight testing has not yet demonstrated high military utility.

The Army already has a similar strategy in place to fund emerging technologies, such as Advanced Technology Demonstrations (**ATDs**) and Advanced Warfighting Experiments (**AWES**) . During the development process of the **FY98-03 POM**, the **Army** established a Task Force XXI budget line, with **RDT&E** funds identified and submitted in the FY98 budget request. The establishment of the **RDT&E** line, to support Force XXI requirements, provides the Service the flexibility to leverage, exploit and transition new technologies, buy prototype systems, and put them in the hands of the soldiers quickly.

Requirements

The Lead Service designated at the origination of the **ACTD** will coordinate the development of the appropriate requirements documentation, such as an Operational Requirements Document (**ORD**) with Key Performance Parameters (**KPPs**), and recommend an organization to execute the proposed follow-on acquisition. A requirement should be included in the demonstration for the development of a system performance specification concurrently with the development of the **ORD**. A system performance specification, based on the **ORD**, **will** then be developed to serve as the functional configuration baseline for initiation of the follow-on efforts.

ACTDs are normally initiated based on broad descriptions of a user need for which mature or nearly mature technology offers a potentially effective response. As noted earlier, the **ACTD** provides the user with a **fieldable prototype** for use in assessing the military utility of the capability and in refining the operational requirements for the capability. A useful approach to **ORD** development is to begin with an initial draft that reflects the **ACTD** configuration and to flag areas where excursions need to be assessed, and then incorporate changes as understanding and experience evolve during the **ACTD**. This focuses attention on areas of greatest interest. During the exercises, the user then has an opportunity to review and assess each of the flagged areas to determine the value of increasing or decreasing their requirements.

During the **ACTD**, the developer also gains significant insights into the design of the system and is, therefore, in a good position to provide information on the cost and schedule implications of modifying the design to reflect excursions in the operational requirements. Similarly, the Operational Test Agency (**OTA**) participating in the **ACTD** produces a characterization of the prototype system. The **OTA** can also address excursions in the operational requirements relative to the **ACTD** prototype, and the impact of those excursions on risk of entering the acquisition process at the intended point, e.g. LRIP.

This experience gained by the Lead Service, developer, and the **OTA** create a unique opportunity to work together in an **IPT**-like relationship to fully define these requirement excursions in terms of operational benefit, impact on unit and life cycle cost (as discussed in the **CAIV** section), impact on delivery dates for fielding of the system, and the risk of entry into the intended point in the acquisition process. The lead service can then make better decisions on the operational requirements because they are based on a much better understanding of the implications than is normally available. At the same time the **ORD** is completed, an Acquisition Strategy and an Operational Assessment can be completed, based on the same set of requirements. Crucial to the success of this approach is close interaction among these three organizations during the **ORD** development.

Acquisition Program Documentation

One of the major objectives of current acquisition policy is to minimize the volume of mandatory guidance, particularly with respect to documentation for acquisition programs. DoD 5000.2R contains mandatory documentation requirements that are applicable to major defense acquisition (**ACAT 1**) programs. These documentation requirements are driven largely by legislation, but the milestone decision authority has flexibility to tailor those driven by DoD regulations. If a program is less than a category 1 program, the milestone decision authority has total flexibility to tailor documentation requirements. For this case, DoD 5000.2R can be used as a guide. Table I will be included in this paper guide and in the Defense Acquisition **Deskbook** as a reference guide that serves as a starting point for tailoring information through the **IPT** process. It highlights statutory and regulatory information requirements for **ACAT 1** programs that enter the acquisition process, beginning at Low Rate Initial Production. A more complete table is also included in the **Deskbook** as a reference to illustrate what should be considered when an **ACTD** is expected to transition to a specific milestone.

SUMMARY

Potential difficulties of the transition of an ACTD into the acquisition process are discussed in this paper. Suggestions which can help the ACTD Demonstration Manager to minimize negative consequences are provided. The underlying theme is that continuity of the ACTD to the formal acquisition program is accomplished by up-front planning. This planning should not, however, dilute the focus of the ACTD.

Information	5000.2-R Reference	Referenced Elsewhere	Mandatory Format
APR		10 USC 2435	
Acquisition Strategy	3.3		
- CAIV	1.5	5000.1	
- Env., Health & Safety Eval.	3.3.0		
- Risk Management	3.3.2		
- Industrial/ Tech Base	3.3.1.3	10 USC 2440 B. 750K	
- LRIP Quantity	1.4.4.1 & 3.3		
- Interl Cooperation		10 USC 2350	
-			
CDC	2.3		
TFMP		10 USC 2399	
-			
- IFT&E Waiver Certification	3.4.9 Appdx IV	10 USC	
- OT&E Plan	3.4.6 Appdx III,		
Manpower Estimate	3.5.2	10 USC 2434	

Table 1 Information the Program Manager prepares, assuming entrance at LRIP