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## **Improving the “Front-End” of the DOD Acquisition Process**

Gene H. Porter, Project Leader  
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R. Royce Kneece, Jr.

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# Executive Summary<sup>1</sup>

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This research builds on previous work by the Institute for Defense Analyses (IDA) into the causes of acquisition program cost growth in Major Defense Acquisition Programs (MDAPs).<sup>2</sup> The previous study confirmed that much of the cost growth observed in eleven important DOD acquisition programs emanated from weaknesses in the processes at the start of the programs—that is at the “front-end” of the process. This study examines that front end for several programs expected to become MDAPs. The study team conducted its investigations via non-attribution interviews with participants and former participants in the “front end” processes of the Office of the Secretary of Defense (OSD) and Joint Staff, as well as through document reviews. The study also considered the implications of the Weapon System Acquisition Reform Act (WSARA) of 2009, which, together with the National Defense Authorization Act (NDAA) of 2008, prescribed major changes to the DOD acquisition process, including the front-end.

## Background

How should major new acquisitions (MDAPs) be initiated? Most would agree that a new acquisition program should be started as a cost-effective response to the identification of a capability needed by DOD forces to successfully execute the tasks necessary to defend the nation. Although those tasks are very broadly defined in the President’s *Nation Security Strategy*, the Secretary of Defense’s *National Defense Strategy*, and classified programming guidance documents, in practice, proposals to start programs that will eventually become MDAPs are usually initiated by the Military Services in support of their interpretation of national needs. Since, by definition, an MDAP has the potential to require a substantial amount of defense resources, the decision to start one should be made within a *Department-wide* perspective of needs versus costs. The Military Services cannot provide that perspective; therefore, organizations with Department-wide responsibilities must.

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<sup>1</sup> This paper is redacted from IDA Paper P-4710 of the same title. Several figures labeled For Official Use Only (FOUO) in Chapter 3 were excised along with associated text. The excised figures illustrate presentation materials at Defense Acquisition Board meetings for Materiel Development Decisions. The excised material is not essential for understanding the findings, conclusions and recommendations of this paper.

<sup>2</sup> Gene H. Porter, C. Vance Gordon, Nicholas S. J. Karvonides, R. Royce Kneese, Brian G. Gladstone, Jay Mandelbaum, and William H. O’Neil, *The Major Causes of Cost Growth in Defense Acquisition*, IDA Paper P-4531 (Alexandria, VA: Institute for Defense Analyses, December 2009).

During the 1970s OSD was more extensively involved in deciding “what to buy” than it has been in recent years.<sup>3</sup> As a result, it was able to provide broader perspectives to, and thereby influence, the content of acquisition program initiatives originally grounded in more narrow Military Service priorities. However, steps to streamline the acquisition process in the past two decades have had the effect of reducing OSD involvement in the earlier phases, thus significantly limiting OSD’s influence on early assessments of acquisition program needs and affordability. In reaction to serious problems in several large programs in the decade between 2000 and 2010 that are plausibly attributable to issues in the initial stages of the program, the latest issuance of the DOD Instruction 5000.02, which governs the acquisition process, reinstates and reinvigorates OSD oversight of the early stages of MDAPs. This study examines those early stages—prior to the Milestone B decisions to enter full-scale development.

### **The Joint Capabilities Integration and Development System Process**

The Chairman of the Joint Chiefs of Staff (CJCS) has a statutory responsibility to advise the President and the Secretary of Defense regarding military requirements. The Joint Requirements Oversight Council (JROC) is a committee of Military Service vice-chiefs, chaired by the Vice Chairman of the Joint Chiefs of Staff. It was established by statute to assist the Chairman in that responsibility, and the Joint Capabilities Integration and Development System (JCIDS) is a process that supports the JROC. Broadly speaking, JCIDS seeks to determine future capability needs through analytical processes that identify “gaps.” The analytical results are presented in a Capabilities-Based Assessment (CBA). Currently, CBAs are performed by the Military Service that sponsors a proposed new program (in the past, the Joint Forces Command has performed these assessments for *joint programs*). The Chairman’s JCIDS process also requires that, once gaps have been identified within a capability area, they are to be prioritized and assessed for potential non-materiel and/or materiel solutions. Upon JROC approval of a Service recommendation, the component prepares a “requirements” document—known as an Initial Capabilities Document (ICD).

OSD staff members are able to participate in JROC/JCIDS activities only as “advisors,” and the study found that their participation was limited. As a result, today, responsibility for providing a Department-wide perspective on acquisition program initiation is largely delegated to the Joint Staff, so a major new acquisition program can gain momentum before the Secretary (acting through his/her staff) has a realistic opportunity to influence it.

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<sup>3</sup> See, for example, William H. O’Neil and Gene H. Porter, *What to Buy? The Role of Director of Defense Research and Engineering (DDR&E) Lessons from the 1970s*, IDA Paper P-4675 (Alexandria, VA: Institute for Defense Analyses, January 2011). Draft Final.

## **Material Development Decisions**

A JROC endorsement of a Service proposal to initiate a major new program leads to the scheduling of a “Material Development Decision” (MDD) review by the Defense Acquisition Executive, the entry point into the formal DOD acquisition process. Preparations for the MDD review are made by an OSD-led Overarching Integrated Process Team (OIPT) established for that purpose. The main function of the MDD review is to assess the need for a materiel solution to the capability gap identified by the JROC and to provide guidance for the ensuing Analysis of Alternatives (AoA). There is no formal requirement for an assessment of affordability at the MDD, and the study team found no evidence in the MDD materials that it reviewed that affordability had been addressed.

## **Analysis of Alternatives Studies**

The AoA provides the analytical basis for the next decision milestone (a Milestone A decision to begin the Technology Development phase of the acquisition process). Guidance is prepared by the OSD Director, Cost Analysis and Program Evaluation (DCAPE). AoAs compare alternatives to assist decision-makers in determining whether the additional effectiveness offered by the alternatives is worth the likely cost. Thus, a sound, well-structured, properly scoped, objective AoA is a necessary foundation for the decision to launch a new acquisition program.

## **Affordability Assessment**

Program affordability assessments are also required before Milestone A. This is an analysis of whether fiscal resources are likely to be available for the proposed new program over the entire span of its acquisition, fielding, and operation. Such analyses depend on many factors and assumptions, such as the reliability of the cost estimate at this early stage in program definition, and competing program funding demands.

## **Development Planning**

The precursor to this study identified the absence of high-quality systems engineering as a major contributor to cost growth in eleven key programs. Recently, the Under Secretary of Defense (Acquisition, Technology & Logistics) took steps to strengthen front-end systems engineering and technical planning. There should be a strong relationship between those efforts and conducting a sound AoA, since the AoA materiel alternatives must be based on solid, technically-feasible, and affordable design concepts. Early clarity in design concept definition is particularly important to reliable estimates at Milestone A of the likely cost of a new system. It is premature to judge how

well these new steps will work. Issues of concern include the extent to which the Assistant Secretary of Defense (Research and Engineering) (ASD(R&E)) has the resources necessary to fulfill this role effectively.

## **Capability Portfolio Managers**

The Capability Portfolio Management (CPM) process, established in 2008, empowered certain managers to advise the Deputy Secretary of Defense and the heads of the DOD components on how to optimize capability investment portfolios across the defense enterprise. The CPM process offers one approach for addressing key problems in initiating sound acquisition programs. The civilian CPM leads are presidential appointees who are responsible for overseeing Departmental activities in the designated capability areas. The C4ISR,<sup>4</sup> Battlespace Awareness, and logistics-related CPMs reportedly made some contributions to recent program/budget reviews. Little was accomplished by the other CPMs, according to interviews conducted by the IDA study team.

An alternative to the only partially functional CPM process—the Capability Area Assessments (CAA) process—was defined in a high-level IDA study<sup>5</sup> for the Deputy Secretary in 2009. The present study evaluated the features of the two approaches as potential contributors to a more effective acquisition front-end. Both processes have similar objectives; however, the CAA would put more emphasis on analysis, and it proposes a more manageable mission area/portfolio taxonomy than CPM. The proposed CAA process would, to some extent, re-institute similar processes that were employed in the 1970s-1980s. Another key difference is a more explicit, stronger role for the DCAPE and ASD(R&E) in this front-end process. Both predecessor organizations to the current offices of DCAPE and OASD(R&E) played essential roles in the earlier processes.

## **Conclusions and Recommendations**

### **Secretarial Oversight of Acquisition Requirements**

The current process does not provide the Secretary (or his/her senior staff) with analytically-based information of sufficient breadth and quality to support decisions initiating major new acquisition programs.

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<sup>4</sup> Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance.

<sup>5</sup> Robert R. Soule et al., “Unifying DOD Management Processes; Part 1,” Unpublished IDA briefing to the Deputy’s Advisory Working Group, 8 December 2009.

## **Identification of Capability Gaps and Solutions**

This study found considerable variation in the degree to which CBAs and ICDs provide a sound analytical framework for the decision to start a new acquisition program. Most fell short in important respects. The shortcomings were most apparent in failures to identify the basis for and risks inherent in the gaps identified (particularly considering joint-Service capabilities), in their failures to connect the “needed” capabilities to specific improvements in national security (again especially in light of joint capabilities), in the specification of performance requirements without consideration of the technical feasibility and probable costs of achieving them, and the priority or urgency associated with particular investments versus competing demands.

While the JROC/JCIDs process provides an important joint perspective and facilitates robust Combatant Command involvement, almost thirty years after the Goldwater-Nichols reforms emphasizing the joint perspective, the observed deficiencies suggest that the problem is *structural* and that the DOD should look elsewhere for ways to provide the Department-wide perspectives needed in the acquisition front-end process.

## **Preparing for Materiel Development Decisions**

Based on its examination of the documentation for several MDDs, the IDA study team found evidence that pre-MDD processes are *not* providing adequate insights regarding the need for a new acquisition program to fill a critical gap in projected U.S. military capabilities. Without analytically sound assessments, it is not possible for the decision-maker to assess the criticality of addressing the capability gaps *and* whether starting a major acquisition program is the most cost-effective remedy. Since the Army’s ground combat vehicle (GCV) acquisition new start was preparing for a Milestone A decision at the time of this study, it was a good candidate for an in-depth examination of the process. We found that the GCV exemplified many of the problems identified in this study’s review.

## **Changes to WSARA and the 2008 NDAA**

The 2008 NDAA required estimates of total program costs by Milestone A and WSARA strengthened the provision. Nonetheless, these estimates are inherently subject to a large degree of uncertainty, and we believe it would be helpful for that expected uncertainty to be more explicitly recognized by the Congress. The NDAA also contains a provision stating that the approval of a new acquisition program by the Secretary’s Defense Acquisition Executive must be consistent with priorities established by the JROC. As a practical matter, we found no evidence that the JROC establishes priorities among competing Service programs on any systematic basis. More importantly, the provision does not clearly recognize that the Secretary ultimately establishes the

Department's priorities. Therefore, we believe the language either should be deleted or modified to more clearly reflect the Secretary's responsibilities.

## **Recommendations**

The above findings and conclusions lead us to essentially one major recommendation:

*An analytically-based process, not overly dependent on component analytical support, is needed to allow the Secretary of Defense to exercise appropriate governance over acquisition new starts.*

Short of that far-reaching recommendation, the study team identified several steps to strengthen the current process:

- OSD should oversee Capabilities-Based Assessments as it does for Analyses of Alternatives; such oversight would bring more rigor to the process and ensure that the studies reflect the Secretary's priorities.
- Affordability assessments covering the full time span of the prospective new acquisition programs should be required before Materiel Development Decisions.
- OIPTs should make more thorough investigations into the basis for proposed new starts, including in-depth reviews of the analyses that support the proposal.
- The ASD(R&E) should be empowered to delay any MDD if the proposed technical concept was assessed to be inadequately defined.
- OSD's role in the oversight of AoAs should be strengthened by exercising tighter control over the analysis process to ensure that appropriate alternatives are fully and objectively analyzed.

Based on our review of WSARA and the 2008 NDAA, we recommend that the DOD consider responding to Congress's invitation to suggest WSARA revisions by raising the following issues:

1. The need to more clearly recognize the modest limits on the accuracy of the forecasts of likely total program costs at Milestone A
2. The need to acknowledge more clearly that the Department's priorities for acquiring new capabilities are ultimately established by the Secretary, and that the JROC's role is, and should remain, advisory

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# 1. Introduction

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Well-publicized problems with the acquisition process in the Department of Defense (DOD) have a long history. The symptoms include excessive cost growth, long delivery times, and failure to meet performance objectives—in other words, a generalized perceived failure to meet the needs of DOD’s combat forces for new weapons systems in a timely and affordable manner. The present builds on a previous Institute for Defense Analyses (IDA) study on the basic causes of acquisition program cost growth in Major Defense Acquisition Programs (MDAPs).<sup>1</sup> That study confirmed that much of the cost growth observed in eleven important DOD acquisition programs emanated from weaknesses in the processes at the start of the programs—that is at the “front-end” of the process. This is generally understood to be the time from the identification of the need for a new program up to Milestone B, the point at which the program enters Engineering and Manufacturing Development. This is also the point where the program is established as a formal acquisition program for Congressional reporting and long-range program budgeting purposes. The focus of both the previous effort and this study is restricted to programs that are, or are expected to eventually be, MDAPs, meaning that their estimated costs exceed Congressionally-established thresholds (or are designated as such by the Defense Acquisition Executive (DAE)).

Thus the primary focus of this paper is on investigating the factors affecting the acquisition front-end process, primarily how “requirements”<sup>2</sup> for new programs are determined and eventually translated into performance, schedule, and cost objectives. A secondary objective is to examine the impact of the Weapon System Acquisition Reform Act of 2009 (WSARA), which, together with the National Defense Authorization Act of 2008, prescribed major, important changes to the DOD acquisition process, including the front-end, and to suggest potential changes to the law.

This study responds to tasking from the Office of Director for Acquisition Resources and Analyses, in the Office of Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD(AT&L)). The study team conducted its investigations

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<sup>1</sup> Gene H. Porter et al., *The Major Causes of Cost Growth in Defense Acquisition*, IDA Paper P-4531 (Alexandria, VA: Institute for Defense Analyses, December 2009).

<sup>2</sup> This term is in quotes because it has a long history of both use and abuse in DOD. A more accurate term is “capability needs,” but the term “requirements” is deeply embedded in the DOD vernacular.

via interviews with key officials, participants, and former participants in the Office of the Secretary of Defense (OSD) and Joint Staff processes that govern the front-end of the acquisition process and through document reviews. Since the interviews were conducted on a non-attribution basis, the views in this paper will not be linked to those who expressed them.

## 2. The “Front-End” of the DOD Acquisition Process

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### A. The Process for Defining “Requirements” for Major Defense Acquisition Programs (MDAPs)

How should MDAPs be initiated? MDAPs, by definition, involve the expenditure of significant amounts of DOD’s financial resources. In the aggregate they account for 10 to 15 percent of total DOD spending and are major contributors to the United States’ warfighting capabilities. Thus, the process that results in such programs being initiated should be appropriately deliberative. A new acquisition program should be started in response to the identification of a capability needed to enable DOD forces to efficiently and successfully execute tasks necessary for the defense of the nation. Those tasks are defined by statements of national security objectives and strategy specified by the national leadership. The President’s *National Security Strategy* and the Secretary of Defense’s *National Defense Strategy* are documents that provide such objectives. Those documents, which are unclassified, tend, however, to be quite broad and lack the degree of specificity necessary to define the need for specific weapons systems.

More specific guidance regarding the programs that DOD should be emphasizing is issued by the Secretary in classified “defense guidance”-type documents—currently called the Defense Planning and Programming Guidance (DPPG). Although the DPPG (and its predecessors) occasionally give very specific guidance with regard to the initiation of acquisition programs, proposals to start such programs are initiated most often by the DOD components (military departments, primarily, but also occasionally by Defense Agencies) in response to more general guidance. Such “capability needs” are, in theory, determined through the analysis of DOD’s projected future ability to accomplish missions and tasks within “Defense Planning Scenarios” (DPSs). The DPSs are defined to enable the Department to assess whether future capabilities will be adequate to meet the national security objectives defined in the manner outlined above and as approved by the Secretary of Defense for that purpose.

In practice, guidance from the Secretary allows for broad interpretation by the DOD components, and each component has its own processes for identifying future capability needs. In practice, it is not clear whether the Secretary’s guidance drives the creation of a requirement or whether the capability the component determines is needed is “reverse

engineered” to mesh into the guidance. During the 1970s the OSD was more extensively involved in deciding “what to buy” than has been the case in recent years.<sup>8</sup>

The current process, with its strong focus on component preferences for new equipment and systems, has been firmly in place for the past two decades.<sup>9</sup> This study will discuss those aspects of the current process that IDA researchers have found to be most problematic in launching new acquisition programs.<sup>10</sup>

One of the key objectives of this study is to identify management approaches that will provide independent and objective analytical information to DOD decision-makers regarding the initiation of new acquisition programs to fill capability needs and achieve the goal of delivering effective systems on time and within costs.

## **B. Identifying Capability Needs**

### **1. The Joint Capabilities Integration and Development System (JCIDS) Process**

The Chairman of the Joint Chiefs of Staff (CJCS) has a statutory responsibility to advise the President and the Secretary of Defense regarding military requirements; the Joint Staff supports the Chairman in that role. The Joint Requirements Oversight Council (JROC) is a committee established by statute<sup>11</sup> (chaired by the CJCS, but delegated to the Vice Chairman) to:

Assist the Chairman in identifying, assessing, and approving joint military requirements (including existing systems and equipment) to meet the national military strategy, and in identifying the core mission area associated with each such requirement.<sup>12</sup>

The JCIDS process has been put in place to support the JROC in performing that function in general and for vetting new acquisition programs proposed by the Services in particular. The functioning of the JCIDS is specified in the Chairman of the Joint Chiefs of Staff Instruction 3170 (CJCSI 3170), the most recent version of which is dated March 1, 2009. It is beyond the scope of this paper to present a full description of JCIDS; however, an abbreviated description is needed for the reader to understand many of the issues regarding the initiation of MDAPs.

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<sup>8</sup> William O’Neil and Gene H. Porter, *What to Buy? The Role of Director of Defense Research and Engineering (DDR&E) Lessons from the 1970s*, IDA Paper P-4675 (Alexandria, VA: Institute for Defense Analyses). Draft Final.

<sup>9</sup> See Porter et al, *The Major Causes of Cost Growth*, for an overview of current processes.

<sup>10</sup> Based on interviews, documents reviewed, and findings reported in Porter et al, *The Major Causes of Cost Growth*.

<sup>11</sup> Title 10, United States Code, section 181.

<sup>12</sup> CJCSI 5123.01E, page A-1, para. 2.a.(1). This instruction prescribes the operations of the JROC.

CJCSI 3170 states:

The primary objective of the JCIDS process is to ensure the capabilities required by the joint warfighter are identified with their associated operational performance criteria in order to successfully execute the missions assigned. This is done through an open process that provides the JROC the information they need to make decisions on required capabilities. The JCIDS process supports the acquisition process by identifying and assessing capability needs and associated performance criteria to be used as a basis for acquiring the right capabilities, including the right systems.<sup>13</sup>

The basic principle is that capability needs should be determined through analytical processes that result in the identification of “gaps” in future military capabilities.<sup>14</sup> Such analytic processes have been given various names, such as campaign analyses, mission area analyses, functional area analyses, operational assessments, etc. To be useful to the decision-maker, the analysis should not only identify gaps but also assess the near- and long-term risks that the gaps entail. Once gaps have been identified and assessed for risks, solutions to fill the gap are developed (while preserving the option of simply accepting the risks inherent in the gaps). The solutions might best be filled by developing new equipment or systems, or possibly from modifications to strategies, tactics, organizations, training, etc.<sup>15</sup> Such analyses, generally performed by the Services, are used to support developing the first product required by the formal JCIDS process in order for a new acquisition program to be considered by the JROC—the Capabilities-Based Assessment (CBA) (discussed in the next section).

By statute, various organizations within the OSD participate, to a limited extent, in the JROC and in the JCIDS process.<sup>16</sup> CJCSI 5123.01E states, under the heading “JROC Advisors,” that the Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)), the Under Secretary of Defense, Comptroller (USD(C)) and the Director, Cost Analysis and Program Evaluation (DCAPE) “shall serve as advisors to the JROC on matters within their authority and expertise.”<sup>17</sup>

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<sup>13</sup> CJCSI 3170.01G, *Joint Capabilities Integration and Development System (JCIDS)*, (Washington, D.C., 1 March 2009), Enclosure A, A-1–2.

<sup>14</sup> The JCIDS process was also intended to identify excesses and unneeded duplication, but this function has never been effectively implemented.

<sup>15</sup> Known as DOTMLPF solutions—Doctrine, Organization, Training, Materiel, Logistics, Personnel, and/or Facilities.

<sup>16</sup> Title 10, U.S. Code Section 181(d).

<sup>17</sup> CJCSI 5123.01E, *Charter of the Joint Requirements Oversight Council (JROC)*, (Washington, D.C., 17 April 2010), Enclosure A, A-2.

The Joint Staff has established Functional Capability Boards (FCBs) to oversee various capability areas (as defined by a system of Joint Capability Areas (JCAs)<sup>18</sup>). The FCBs are O-6-level working groups with representatives from the Military Services and other DOD components with interests in the particular functional area. There is also an intermediary group called the Joint Capabilities Board, comprising the FCB heads, general-officer-level representatives of the Services, and chaired by the Joint Staff Director for Force Structure, Resources and Assessments (J-8, a three-star flag officer). These bodies review the Service products and make recommendation before the proposals are taken to the JROC. The FCBs are also charged with oversight of CBA studies and the drafting of the resulting requirements documents.

A 2008 report by the Government Accountability Office (GAO) addressed the JCIDS process,<sup>19</sup> finding that “The JCIDS process has not yet been effective in identifying and prioritizing warfighting needs from a joint, department wide perspective.” It also noted that “virtually all capability proposals that have gone through the JCIDS process since 2003 have been validated—or approved.” The Report further concludes:

DOD lacks an analytical approach to prioritize joint capability needs and determine the relative importance of capability proposals submitted to the JCIDS process. Further, the Functional Capability Boards, which were established to manage the JCIDS process and facilitate the prioritization of needs, have not been staffed or resourced to effectively carry out these duties. Instead, the Military Services retain most of DOD’s analytical capacity and resources for requirements development.

The Department’s response<sup>20</sup> to that criticism is instructive for this study. The response stated that “JCIDS is not intended to be the primary means of prioritizing and balancing the DOD investment portfolios.” It then noted seven other DOD processes that contribute to that function, including the Capability Portfolio Management and the Materiel Development Decision processes discussed in some detail below.<sup>21</sup>

Subsequent to the interviews for this study, an internal DOD working group was formed to review the entire JCIDS process. Later the study team was informed that the review had been put on hold because of the departure of one of the directors in J-8. Just prior to submission of this study for publication, IDA learned through press reports that

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<sup>18</sup> See Deputy Secretary of Defense Memorandum, *Joint Capability Areas (JCAs)*, 14 February 2008, [http://www.dtic.mil/futurejointwarfare/cap\\_areas.htm](http://www.dtic.mil/futurejointwarfare/cap_areas.htm).

<sup>19</sup> U.S. Government Accountability Office, *DoD’s Requirements Determination Process Has Not Been Effective in Prioritizing Joint Capabilities*, GAO-08-1060, September 2008.

<sup>20</sup> Included as Appendix IV of the GAO report, *DoD’s Requirements Determination Process*.

<sup>21</sup> The others were: “Strategic Guidance, The Analytic Agenda, Joint Concepts and Experimentation, Defense Acquisition System, Planning, Programming and Budgeting, and Execution System.”

the Vice Chief of the Joint Staff had requested that the Defense Business Board conduct an independent review of the JROC/JCIDs process.

## 2. Capabilities-Based Assessments (CBAs)

CJCSI 3170 defines the CBA as follows:

The CBA is the Joint Capabilities Integration and Development System analysis process. It answers several key questions for the validation authority prior to their approval: define the mission; identify capabilities required; determine the attributes/standards of the capabilities; identify gaps; assess operational risk associated with the gaps; prioritize the gaps; identify and assess potential non-materiel solutions; provide recommendations for addressing the gaps.<sup>22</sup>

Although this quote describes the CBA as the JCIDS “analysis process,” the fact is that most CBAs are performed by the sponsoring component.<sup>23</sup> The job of the CBA is thus to examine a “capability area” and determine where critical gaps exist in the ability of DOD forces and other organizations to perform required tasks. Several circumstances could give rise to such gaps—new threats have or are projected to emerge that will render currently programmed U.S. capabilities inadequate; existing systems may be aging, obsolete, and/or difficult or excessively costly to support; or new missions or missions with increasing priority emerge or are projected to emerge as a result of changing strategies that existing systems are incapable of or inadequate in performing. There is clearly a strong subjective element in identifying such gaps, as evidenced by words such as “(in)adequate,” and in judgments about the likelihood of the emergence of new threats, their capabilities and seriousness.

Once gaps have been identified within a capability area, they are to be prioritized and assessed for potential solutions. As noted in the quote above from CJCS 3170, non-materiel solutions must be sought—i.e., solutions based on changes to doctrine, organization, training, leadership, personnel (DOT\_LP). (In many cases, a DOT\_LP solution will serve as a temporary remediation until a new acquisition program can be brought to fruition.) The results of these analyses are brought before the JROC for approval of the recommended solution, whether materiel or non-materiel. If the JROC approves a recommendation for a new acquisition program to fill one or more capability gaps, the component is asked to prepare a “requirements” document for the new system—known as an Initial Capabilities Document (ICD).

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<sup>22</sup> CJCSI 3170.01G, *Joint Capabilities Integration*, GL-3.

<sup>23</sup> The Joint Forces Command (JFCOM) has performed CBAs for “joint” acquisition programs that do not fall exclusively into the Title 10 responsibilities of a single military department. Most are command, control, and communications programs.

### 3. Initial Capabilities Documents (ICDs)

CJCS 3170 defines the ICD as follows:

Summarizes a CBA and justifies the requirement for a materiel or non-materiel approach, or an approach that is a combination of materiel and non-materiel, to satisfy specific capability gap(s). It identifies required capabilities and defines the capability gap(s) in terms of the functional area, the relevant range of military operations, desired effects, time and doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) and policy implications and constraints. The ICD summarizes the results of the DOTMLPF and policy analysis and the DOTMLPF approaches (materiel and non-materiel) that may deliver the required capability. The outcome of an ICD could be one or more joint DCRs<sup>24</sup> or recommendations to pursue materiel solutions.<sup>25</sup>

The ICD thus focuses on a particular gap, or set of related gaps, and outlines in broad terms the capabilities that a materiel solution must have to fill the gap(s).<sup>26</sup> The breadth should be sufficient to support the examination of a range of potential solutions: from the modification of existing systems, to the acquisition of non-development item (NDI) solutions, to the start of a new acquisition program. If the ICD recommends the start of a new acquisition program and if that recommendation is approved by the JROC,<sup>27</sup> then the proposed system is ready for entry into the formal DOD acquisition process, overseen by the DAE (normally the Under Secretary for Defense for Acquisition, Technology and Logistics) and governed by Department of Defense Directive (DODD) 5000.1 and Department of Defense Instruction (DODI) 5000.02.

### C. The Materiel Development Decision Process (MDD)

The entry point into the DOD acquisition process is the Materiel Development Decision, as directed by DODI 5000.02. The term was introduced by this latest issuance of the instruction, replacing the term “Concept Decision” (CD) (as explained in more detail below). This change made mandatory an earlier point for a decision by the DAE, as Chairman of the Defense Acquisition Board (DAB), than had existed for the previous decade. Thus, the MDD is the point in the formal DOD acquisition process that interfaces with the JCIDS requirements process, as well as with the Planning, Programming, and Budgeting System (PPBS) process. The two main purposes of the MDD are, first, to

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<sup>24</sup> DOTMLPF Change Recommendation.

<sup>25</sup> CJCSI 3170.01G, *Joint Capabilities Integration*, GL-5.

<sup>26</sup> As a practical matter, non-material approaches to filling gaps are not subjected to JROC review because the component is generally free to initiate its desired approach within available resources without needing JROC approval.

<sup>27</sup> Via issuance of a JROC Memorandum (JROCM).

validate the *prima facie* need for a materiel solution to a capability gap, and second, to provide guidance for the Analysis of Alternatives (AoA) to be performed in the ensuing Materiel Solutions Analysis (MSA) phase (see below). Thus the MDD constitutes the first critical juncture at which fiscal discipline can be introduced (at least at the DOD level), and at which the impact of the proposal on the Department's overall modernization portfolio can be examined.

As background to the MDD discussion, it should be noted that the processes for managing the early phases of the acquisition process at the DOD level has had a somewhat checkered history. The 5000 series of DOD directives originated in the early 1970s. The 1975 version defined the initial entry point as a Milestone 0. This decision point was supported by the component's submission of a "Mission Element Need Statement" (MENS<sup>28</sup>) to the Secretary. Milestone 0 disappeared in the 1986 version, only to re-appear in the 1987 version, and disappear again in the 1990 version, re-appear in the 1996 version, disappear again in the 2000 version.<sup>29</sup> The October 2000 version explicitly stated that the processes to determine acquisition new starts lay outside the instruction.<sup>30</sup> Nonetheless, it still recognized the need for an "...Integrated management framework ...to forge a close and effective interface among the Department's principal decision support systems: The Requirements Generation System, the Defense Acquisition System, and the Planning, Programming, and Budgeting System." Much of this turbulence was associated with the competing pressures to reduce the number of senior reviews of new programs while also providing the additional oversight deemed necessary as a response to well-publicized program problems.

The 2003 DODI 5000.2 recouped some of the ground lost in the 2000 version, in that the document envisioned "an integrated, collaborative process to define desired capabilities to guide the development of affordable systems."<sup>31</sup> It also defined the objective of a "concept refinement" phase which was "to refine the initial concept and

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<sup>28</sup> Later called the Materiel Needs Statement (MNS). Another term used was the "Justification for a Major Systems new start." None is in current use.

<sup>29</sup> Acquisition History Project Working Paper Number 3, <http://www.history.army.mil/acquisition/research/working3.html>.

<sup>30</sup> "Pre-system acquisition is composed of on-going activities in development of user needs, in science and technology, and in concept development work specific to the development of a materiel solution to an identified, validated need. The responsible authority outside of this Instruction defines policies and directives for development of user needs and technological opportunities in science and technology." page 12, and on page 10: "Programs entering system acquisition will comply with requirements governing new starts (reference(j))." (Reference (j) is the DOD Financial Management Regulation.) For the purposes of compliance with statutes, the document states that "milestone A will serve as Milestone 0."(page 4), U.S. Department of Defense, *Operation of the Defense Acquisition System*, DODI 5000.2, 23 October 2000 (incorporating Change 1, January 2001).

<sup>31</sup> U.S. Department of Defense, *Operation of the Defense Acquisition System*, DODI 5000.2, 12 May 2003, 5.

develop a Technology Development Strategy” and which began with a decision point called a “Concept Decision (CD).” (Notably, though, it did *not* follow the previous version in drawing attention to the need for the requirements processes and acquisition processes to work closely with the resource (PPBS) processes). Although the DODI established this framework, the instruction did not actually require that CD reviews be held. Given continuing pressures to reduce the burden imposed by top-level reviews, no process was put in place in OSD at that time to support CD reviews. Consequently, very few CD reviews were actually conducted; and in fact very few Milestone A reviews were conducted. Several large, complex and costly programs were initially reviewed at the DOD level and formally entered the acquisition process only at Milestone B—after most major design concept decisions had been made and momentum established.

By 2006, it was becoming increasingly evident that the formal acquisition management structure at the Department level needed improvement, especially with regard to initiating new starts. The 2006 Quadrennial Defense Review (QDR), recognizing the need for a process by which the Secretary (through his/her staff) could exercise earlier guidance over the initiation of new acquisition programs, stated:<sup>32</sup>

[T]he Department will reach investment decisions through collaboration among the joint warfighter, acquisition and resource communities. Joint warfighters will assess needs in terms of desired effects and the time frame in which capabilities are required. Assessments of potential solutions should be informed by the acquisition community’s judgment of technological feasibility and cost-per-increment of capability improvement, and by the resource community’s assessment of affordability. These inputs will be provided early in the decision-making process, before significant resources are committed.<sup>33</sup>

This direction gave rise to a Departmental effort to re-define the “Concept Decision” process around two key features:

- It should be an integrated effort by the three communities, to be overseen by an USD(AT&L)-headed “tri-chair” group, the two other members being the Vice Chairman of the Joint Staff, and the Director, Program Analysis and Evaluation (now CAPE).
- The decision to start an acquisition program should be supported by an analytical process—an *evaluation of alternatives* (EoA) that would verify and

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<sup>32</sup> See Porter et al, *The Major Causes of Cost Growth*, for several examples, the most salient of which is probably the Future Combat System (FCS).

<sup>33</sup> U.S. Department of Defense, *Quadrennial Defense Review Report* (Washington D.C., 6 February 2006), 67.

prioritize capability gaps, identify solutions, perform trade-offs, and assess affordability

The idea was implemented on an “experimental” basis, and five test programs (called “pilots”) were selected to be overseen by Department-wide steering and working groups.<sup>34</sup> Evaluation of alternative analyses of varying degrees of sophistication were performed for each of the pilot programs, and a few actual tri-chair CD meetings were held. At the end of the experiment, it was proposed that the process be formalized, supported by a new staff element with funds made available for analytical support.<sup>35</sup> However, the Deputy Secretary did not act on the recommendation, and with the appointment of a new USD(AT&L) in July 2007, the idea essentially died.

What did survive, found in the current (December 2008) version of DODI 5000.02, is a *mandatory* new start decision point called the Materiel Development Decision. The main differences between the MDD process and the QDR-inspired CD process are:

- No “tri-chair” oversight body
- No independent analytical support

Thus, the MDD process is a review by the DAB chaired by the DAE who decides the outcome. Preparation for an MDD is performed by an Overarching Integrated Product (or Process) Team (OIPT). It is unclear to the IDA study team exactly what events result in the convening of an MDD OIPT nor the extent and depth of OIPT activities. Participation by the OUSD(AT&L) staff in JROCs and other JCIDS bodies at least provides an informal “heads-up” that forming an OIPT is appropriate. In any case, the team is chaired by either Director, Portfolio Systems Acquisition in OUSD(AT&L) or the counterpart in Office of Assistant Secretary of Defense, Networks and Information Integration (OASD(NII)). After reviewing the ICD, CBA (if it exists) and other pertinent analyses provided by the sponsoring component or others, the OIPT leader, when satisfied that consideration of an MDD is justified and adequately prepared for, sends a report to the DAE recommending that an MDD be scheduled, as either an actual meeting of the DAB or sometimes as a so-called “paper DAB.”<sup>36</sup> DODI 5000.02 states that at the MDD review “the Joint Staff shall present the JROC recommendations and the DOD component shall present the ICD...”

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<sup>34</sup> Joint Light Tactical Vehicle, Integrated Air Missile Defense, Global Strike Raid, Joint Rapid Scenario Generation, and Joint Air-to-Ground Missile.

<sup>35</sup> See Gene H. Porter et al, *Portfolio Analysis in the Context of the Concept Decision Process*, IDA Paper P-4294 (Alexandria, VA: Institute for Defense Analyses, February 2008).

<sup>36</sup> Wherein the entire process is conducted without having an actual meeting—this is appropriate if there are no significant issues and all DAB members agree to it.

This study reviewed the briefing materials for several recent MDDs, each of which will be summarized later.

The findings of the MDD are conveyed in an Acquisition Decision Memorandum (ADM), signed by the DAE. Assuming a positive decision, the proposed program enters the MSA phase of the acquisition process. The ADM normally conveys guidance for the AoA prepared by Director, CAPE.

## **1. Materiel Solutions Analysis Phase**

According to DODI 5000.02, the purpose of the MSA phase is “to assess potential materiel solutions and to satisfy the phase-specific entrance criteria for the next program milestone designated by the Milestone Decision Authority (MDA).”<sup>37</sup> For a totally new program the next milestone would be a Milestone A, for approval of entry into the Technology Development (TD) phase. Thus the only work of consequence in the MSA phase is the planning and conduct of the Analysis of Alternatives study.

## **2. Analysis of Alternatives (AoA) Studies**

The AoA builds on work previously performed to support the ICD, but is more narrowly focused, with greater specificity with regard to the candidate materiel solutions that best fill identified capability needs within the likely resources available. According the DODI 5000.02 the AoA should:

... focus on identification and analysis of alternatives, measures of effectiveness, cost, schedule, concepts of operations, and overall risk. The AoA shall assess the critical technology elements (CTEs) associated with each proposed materiel solution, including technology maturity, integration risk, manufacturing feasibility, and, where necessary, technology maturation and demonstration needs. To achieve the best possible system solution, emphasis shall be placed on innovation and competition. Existing commercial-off-the-shelf (COTS) functionality and solutions drawn from a diversified range of large and small businesses shall be considered.<sup>38</sup>

The AoA thus should produce two key outcomes essential to supporting the DAE at the Milestone A decision. The first is analytical support for beginning a new development—i.e., that other solutions, including modification of existing equipment and acquisition of an NDI, are options that are inferior to (generally considered to mean “less cost effective than...”) developing a new capability. If such support is not found to exist,

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<sup>37</sup> U.S. Department of Defense, *Operation of the Defense Acquisition System*, DODI 5000.02, (Washington D.C., 8 December 2008), 14.

<sup>38</sup> Ibid, 15.

then paths other than a new system development should be taken, and a TD phase should not be initiated. The second key result needed (given a positive finding for continuing planning for a new system development) is to identify technological risks that must be addressed and reduced in the TD phase, which in turn implies the establishment of a system design concept adequate to inform an effective TD plan. As in all analyses, it is also important to highlight the key assumptions and uncertainties that significantly influence the results.

The Defense Acquisition Guidebook promulgated by the Defense Acquisition University outlines the customary content and structure of an AoA. The cost-effectiveness comparisons of the study alternatives are a major outcome of an AoA. They assist decision-makers in determining whether additional effectiveness is worth additional cost. Thus, a sound, well-structured, properly scoped and objective AoA is an essential aid to the decisions that launch a new acquisition program.

#### **D. Development Planning**

Development planning refers to the technical planning process for developing a new materiel capability. Faulty or non-existent early systems engineering was identified as a major contributor to cost growth in the IDA cost growth study discussed in Chapter 1.<sup>39</sup> In response to these deficiencies, the USD(AT&L) signed a “Directive-Type Memorandum” (DTM-10-017) in September 2010 (amended May 16, 2011) to strengthen front-end engineering and technical planning. There is a strong relationship between early systems engineering efforts and the ability to conduct a sound AoA, since the AoA materiel alternatives must be based on solid, technically-feasible solutions (as opposed to a reliance on “PowerPoint” systems of questionable feasibility). Such clarity in early concept definitions is particularly important if the Department is to meet the requirement of WSARA that sound estimates of the likely cost of a new system be established at Milestone A.

In particular the DTM states:

Decisions must be based on effective development planning and a strong technical foundation. To support those decisions, in accordance with this DTM, the DOD components shall provide evidence at the MDD Review that will facilitate the MDA’s determination that:

- The candidate materiel solution approaches have the potential to effectively address the capability gap(s), desired operational attributes, and associated dependencies.

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<sup>39</sup> Porter et al, *The Major Causes of Cost Growth*, vol. 2, 48 and 50.

- There exists a range of technically feasible solutions generated from across the entire solution space, as demonstrated through early prototypes, models, or data.
- Consideration has been given to near-term opportunities to provide a more rapid interim response to the capability need.
- The plan to staff and fund analytic, engineering, and programmatic activities supports the proposed milestone entry requirements as identified in Reference (c).<sup>40</sup>

In addition, the DTM directs the Director, Defense Research and Engineering (DDR&E) (Now the Assistant Secretary of Defense (Research and Engineering) or ASD (R&E)) to “Cooperate with the Director, Cost Assessment and Program Evaluation, and, as agreed upon with that organization, serve as a standing participant and technical advisor in the development of AoA Study Guidance and on the AoA Study Advisory Group ...”<sup>41</sup>

It is premature to judge how well these steps will work. Key issues are the extent to which OASD(R&E) has the resources necessary to fill this role effectively, and the extent to which the military departments are structured and resourced to perform development planning.

## **E. Relationships with the DOD Planning, Programming, and Budgeting System**

The success of the acquisition process depends on a strong relationship with the PPBS since the availability of sufficient fiscal resources at appropriate times is essential to the successful implementation of acquisition decisions. There is substantial evidence<sup>42</sup> that underfunding early in a program contributes significantly to subsequent technical difficulties, cost growth, and schedule delays. (There is a natural tendency to underestimate the cost of a desired new program,<sup>43</sup> and consequently to underfund it, to maximize the chances for approval.)

A key issue is at what point, as plans for a new acquisition program are developing, should resources be included in the Future Years Defense Program (FYDP). Current rules state that there only needs to be resources programmed for the AoA at the MDD. At Milestone A, resources to support the TD phase must be in place, while at Milestone B,

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<sup>40</sup> The Under Secretary of Defense (AT&L), Directive-Type Memorandum, DTM 10-017, 13 September 2010 (Incorporating Change 1, 16 May 2011), 2.

<sup>41</sup> Ibid.

<sup>42</sup> Porter et al, *The Major Causes of Cost Growth*, vol. 2, 54.

<sup>43</sup> See Porter et al, *The Major Causes of Cost Growth*, vol. 2, 37 for a discussion and additional references.

resources to fully fund both development and procurement plans for which approval is sought must be identified in the sponsoring components' programs and budgets. If the TD phase is costly, significant resources could be committed before prospective longer term affordability is established.

Because acquisition and program/budget decisions are made at different times within the DOD fiscal planning process, there is a good chance that disconnects will occur, and in fact several such occurrences are well-documented.<sup>44</sup> For example, an acquisition decision might be made early in the year with the supporting resources in place in the FYDP extant at the time (at least at the component level). However, in final program or budget balancing, occurring months later, the funding could be cut, either by the component or OSD, leaving the carefully structured acquisition program potentially unexecutable—in need of restructuring with the likelihood of costly contract changes.

## **F. Capability Portfolio Managers**

The Capability Portfolio Management (CPM) process was established by DODD 7045.20 and signed on September 28<sup>th</sup> 2008 by Deputy Secretary England, with the following overall purpose (from the DODD):

The Department of Defense shall use capability portfolio management to advise the Deputy Secretary of Defense and the Heads of the DOD Components on how to optimize capability investments across the defense enterprise (both materiel and non-materiel) and minimize risk in meeting the Department's capability needs in support of strategy.<sup>45</sup>

The process was only partially implemented by the Bush Administration. So far the Obama Administration has not embraced the concept with particular vigor. In fact, the system appears to have, for the most part, fallen into disuse. However the CPM process offers one alternative (perhaps with some modifications) for addressing key problems in initiating sound acquisition programs, which is it is discussed at some length here. One potential benefit is that effective CPMs might provide a stronger interface with the PPBS.

Figure 1, taken from DODD 7045.20, names the portfolios and their leadership. Notably, the civilian CPM leads are the presidential appointees who are responsible in their appointed capacities for overseeing Departmental activities in the same areas. The first four CPMs listed in the figure achieved some functionality in recent program reviews. In the most recent program review, most of the other CPMs had been formed;

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<sup>44</sup> Another IDA study is currently addressing this issue.

<sup>45</sup> U.S. Department of Defense, *Capability Portfolio Management*, DODD 7045.20 (Washington D.C., 25 September 2008), 1.

but, with the exception of the first three listed, little was accomplished, according to interviews conducted by the IDA study team.

Capability Portfolio	CPM Civilian Lead	CPM Military Lead	SWARF Lead				CPM JS OPR	Functional Capability Boards
Command & Control	ASD(NII)	JFCOM	JFCOM				J3	JFCOM
Battlespace Awareness	USD(I)	STRATCOM	STRATCOM				J2	J2
Net Centric	ASD(NII)	STRATCOM	STRATCOM				J6	J6
Logistics	USD(AT&L)	TRANSCOM	TRANSCOM				J4	J4
<i>Building Partnerships</i>	<i>USD(P)</i>	<i>J5</i>	<i>JFCOM</i>				<i>N/A</i>	<i>J5</i>
<i>Force Protection</i>	<i>USD(AT&amp;L)</i>	<i>J8</i>	<i>STRATCOM</i>				<i>N/A</i>	<i>J8</i>
<i>Force Support</i>	<i>USD(P&amp;R)</i>	<i>J8</i>	<i>JFCOM</i>				<i>N/A</i>	<i>J8</i>
<i>Force Application</i>	<i>USD(AT&amp;L)</i> <i>USD(P)</i>	<i>JROC</i>	<i>JFCOM</i> <i>SOCOM</i> <i>STRATCOM</i>				<i>J8</i>	<i>J8</i>
<i>Corporate Management &amp; Support</i>	<i>DCMO</i>	<i>DJS</i>	<i>N/A</i>				<i>N/A</i>	<i>N/A</i>

**Figure 1. Portfolios and Responsible Offices from DODD 7045.20**

## G. Capability Area Assessments (CAAs)

Another IDA study has examined the interface between the front-end acquisition processes and the PPBS and requirements processes and developed proposals for improvement.<sup>46</sup> The objectives of the proposed improvements were to:

1. Strengthen front-end planning and decisions
2. Strengthen user perspectives and create an integrated process for meeting current and future mission needs
3. Build a realistic and agile defense program

A “desired outcome” of the proposal was “A defense program that reflects the strategy and priorities of the President and the Secretary of Defense.” The desired outcome of this study is the same, focused on the process by which decisions are made to define and start new acquisition programs.

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<sup>46</sup> This study has not been published to date; however, a briefing “Unifying DOD Management Processes” with findings and recommendations was given to the Deputy’s Advisory Working Group (DAWG) on 8 December 2009.

Part of the 2009 IDA proposal was a process that would replace the relatively weak CPM process with a similar but potentially stronger process called the “Capability Area Assessments” (CAA) process. Figure 2, from the study’s briefing to the Deputy’s Advisory Working Group (DAWG), is an overview of the process, and Figures 3 and 4, back-up charts from the briefing, provide more detail.

## Capability Area Assessments (CAAs)

### Providing An Analytic Basis For Defense Decision-Making

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- 1. A cross-cutting structure to emphasize current and future user perspectives**
  - CAA analyses link warfighting, technology, and resource analysis perspectives
  
- 2. A mechanism for meaningful CoCom involvement**
  - The analysis of capability gaps, duplications, and opportunities is keyed to identifying current and future combatant command mission needs, based on the strategy and SecDef priorities
  - Each CAA Team is supported by CoCom representatives, and may include a CoCom co-chair
  
- 3. Each CAA team is a standing analytical group with responsibility throughout the annual cycle**
  - Conduct Program Balance Reviews for the Program Planning Assessment and the Program Review
  - SecDef-directed Front End Assessments (FEAs) are assigned to CAA teams
  
- 4. Mandate for CAA teams is to develop resource-balanced trade-offs within the capability areas**
  - The process emphasizes focus on limited number of major issues
  
- 5. PRB Executive Committee prepares selected issues for review by the PRB**
  
- 6. Illustrative CAA Taxonomy**

1. Joint C2 and Networking	5. Maritime Combat and Presence	9. Strategic Deterrence
2. Battlespace Awareness	6. Air Superiority, SEAD, Deep Strike	10. Special Operations
3. Cyber	7. Close Combat and Forcible Entry	11. Homeland Defense, BMD
4. Mobility	8. Stability Ops & Building Partnerships	

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**Figure 2. The “Capability Area Assessments” Process**

## Capability Area Assessments (CAAs)

### Providing An Analytic Basis For Defense Decision-Making

- 1. A cross-cutting structure to emphasize current and future user perspectives**
  - Strengthens analytical capabilities to address full range of issues across CoCom plans and component programs
  - CAA analyses link warfighting, technology, and resource analysis perspectives
  - CAAs provide integrated analysis of force structure, readiness, and equipment issues for achieving needed capabilities in a cost-effective fashion
  - Maintain a corporate body of expertise to provide systematic analysis of needs, risks, and trades
- 2. A mechanism for meaningful CoCom involvement**
  - The analysis of capability gaps, duplications, and opportunities is keyed to identifying current and future combatant command mission needs, based on the strategy and SecDef priorities
  - Each CAA Team is supported by CoCom representatives, and may include a CoCom co-chair
- 3. Each CAA team is a standing analytical group with responsibility throughout the annual cycle for analysis and assessment of capabilities, risks, and alternatives**
  - CAA Program Balance Reviews are analyses of capabilities and capability gaps and opportunities, derived from operations, contingency and other plans, and SecDef-approved scenarios
    - Reviewed in winter during Program Planning Assessment, and in fall during program review
  - SecDef-directed Front End Assessments (FEAs) are assigned to CAA teams
  - Able to provide quick response capability
  - Capability Areas cover the bulk of defense forces and programs, using the President's Budget FYDP as the baseline
- 4. Supports and promotes linkages between the resource process and early program definition activities in the acquisition and requirements process**
  - CAA teams provide foundation for Integrated Analyses of Alternatives (I-AoAs) in support of acquisition and requirements process
- 5. PRB Executive Committee prepares selected issues for review by the PRB**

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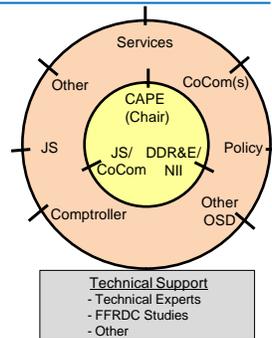
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**Figure 3. Description of Capability Area Assessments**

## Capability Area Assessments (CAAs) (Cont.)

- 6. Capability Area Assessment Teams**
  - Co-Chairs: CAPE (Chair), JS or CoCom, DDR&E or NII
    - CAPE provides analytic and programming lead
    - JS provides warfighting concepts and user perspectives
    - CoComs provide user perspectives and expertise
    - OSD proponent offices provide technology perspective
  - Other participants:
    - Service force providers
    - Other OSD offices and other organizations participate and contribute as needed
  - Each CAA Team has a tailored supporting structure to conduct detailed analytical and technical work
  - CAAs replace Capability Portfolio Management (CPM) structure, with support capabilities retained or developed as appropriate
- 7. Illustrative CAA Taxonomy**

1. Joint C2 and Networking	5. Maritime Combat and Presence	9. Strategic Deterrence
2. Battlespace Awareness	6. Air Superiority, SEAD, Deep Strike	10. Special Operations
3. Cyber	7. Close Combat and Forcible Entry	11. Homeland Defense, BMD
4. Mobility	8. Stability Ops & Building Partnerships	
- 8. Other Analyses to Support the Planning and Resources Process**
  - Annual regional Operational Assessments of current and future capability needs
  - Analyses of Human Capital/Manpower issues
  - Analyses of infrastructure, logistics, and O&M issues



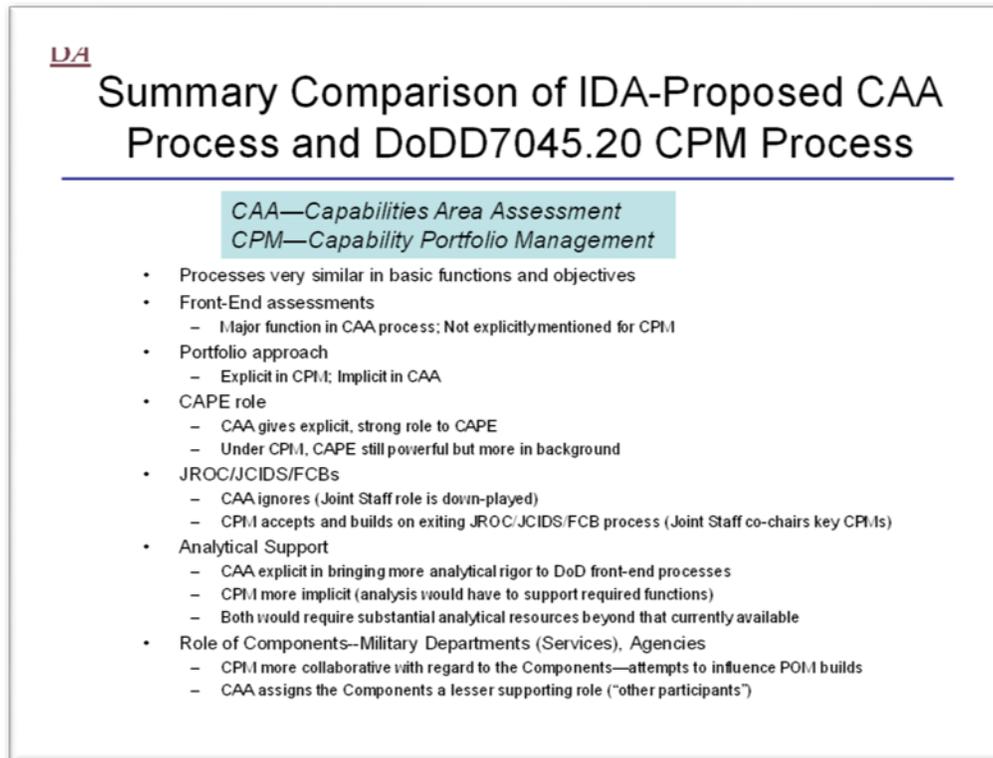
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**Figure 4. Description of Capability Area Assessments (cont.)**

## 1. Comparisons between the Capability Portfolio Management Process (CPM) and the Proposed CAA Process

Figure 5 is *this study's* summary comparison between the CPM and proposed CAA processes.



**Figure 5. Comparison of the CPM and Proposed CAA Processes (*made by this study*)**

The front-end of the acquisition process is intimately connected to processes addressed by both the CPM and the IDA-proposed CAA process. Since this study seeks to improve the acquisition front-end, there is value in examining these concepts in some detail. This examination is particularly timely since the CPM process is not functioning as intended (or as directed), and, as a result, it is currently incapable of strengthening the acquisition front-end (except in two or three capability areas). For that reason, this study provides a detailed comparison and evaluation of the two approaches, and ultimately recommends the features of a process that would best provide for a strengthened acquisition front-end. (But it should be kept in mind that addressing issues regarding initiation of acquisition programs is only one important function of both processes.)

Both processes decompose the overall mission of DOD to defend the nation’s vital interests into mission area taxonomies. Key differences are:

- The CPM taxonomy is based on the JCAs developed by the Joint Staff; the CAA proposal does not make use of the JCAs.

- The CAA concept divides the CPM’s broad “Force Application” portfolio into five illustrative mission areas (without retaining a “force applications” portfolio).
- In the CAA concept, support and infrastructure areas do not have separate, explicitly-identified teams (though these functions would be the subject of “Other Analyses to Support the Planning and Resources Process”); whereas CPM includes separate, explicitly-defined teams for “Logistics,” “Force Support,” and “Corporate Management and Support.”

While both processes have similar objectives overall, the CAA would put more stress on analysis. The requirement for analytical support is implicit in the CPM charter since the critical functions expected of the CPMs cannot be accomplished effectively without analytical support. But neither the extant CPM directive nor the IDA CAA concept briefing are clear on who would provide the analytical support for their mandates, nor how the funding required for such support would be provided.

Another possibly important difference lies in the emphasis in the CPM directive on “cross-component” capabilities, which might be interpreted to limit OSD involvement in Service-unique issues. Should it be interpreted that CPMs only address cross-component programs, defined narrowly, they would not be able to provide the acquisition front-end insights needed across the entire DOD program, which is dominated by programs that lie within a single component.

There are structural differences as well:

- Each CPM has a both civilian and a military lead (see Figure 1).
- Each CAA team would be chaired by CAPE, with Joint Staff and/or OSD Principal Staff Assistant co-chairs.
- CAA envisions a stronger role for DDR&E (now ASD (R&E)) in providing the expertise needed to ensure acquisition programs get off to a technically sound start.<sup>47</sup> (There is no explicit role for DDR&E in the current CPM directive.)
- Both stress key roles for the Combatant Commanders (COCOMs).

The governance structures for the two processes are somewhat similar (the CAA’s governance structure is only described in general terms in the IDA study).

- CPMs have an over-arching “CPM Council” with CAPE as “Executive Secretariat;” the CPMs answer to the DAWG.

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<sup>47</sup> See Figure 4, which specifies DDR&E as co-chairs of the CAA teams. The rationale for that choice was not given explicitly in the briefing.

- A “Planning and Resources Board” would oversee the CAA teams (similar to the DAWG).

Although the CPM directive calls for an overarching “CPM Council” headed by Director, CAPE, it does not appear that the council was actually formed in the program reviews that had CPM participation.

The assignment of responsibilities for the two processes differs markedly:

- CAPE
  - CPM: In its “executive secretariat” role CAPE would play a powerful, if somewhat behind-the-scenes, role in overall management of the CPM process. CAPE participation in the individual CPM’s analytical assessments is not addressed in the directive.
  - CAA: CAPE’s key role is up-front. It chairs all CAA teams and “provides analytic and programming lead.” (see Figure 4) CAPE would thus either conduct the necessary analyses itself or oversee others who would provide that support.
- Joint Staff
  - CPM: Co-leads “Force Application” (stated as “JROC”) and “Corporate Management and Support” (Dir., Joint Staff) portfolios. For other portfolios, there is an “OPR” (office of primary responsibility) listed for Joint Staff but “military leads” are JFCOM or STRATCOM.
  - CAA: Possible co-chair role (not clear); “Provides warfighting concepts and user perspectives.” (see Figure 3)
- COCOMs
  - CPMs: “Military Lead” designation for JFCOM (“C2”) and STRATCOM (“Battlespace Awareness,” and “Net Centric,” and TRANSCOM (“Logistics”).
  - CAAs: “Each CAA Team is supported by COCOM representatives, and may include a COCOM co-chair.”
- Other OSD Principal Staff Assistants
  - CPM: ASD(NII) co-leads “C2” and “Net-Centric” Portfolio; USD(I) co-leads “Battlespace Awareness;” AT&L co-leads “Logistics,” “Force Protection,” and “Force Application” (along with USD(P); USD(P) co-leads “Building Partnerships;” USD(P&R) co-leads “Force Support.”
  - CAAs: Joint Staff, DDR&E, or NII would co-chair, depending on area.

Other significant provisions are displayed in Table 1.

**Table 1. Comparison of Other Features of the CPM and CAA Processes**

	CPM	CAA
Develop and maintain “portfolio strategy”	✓	
Inform SECDEF guidance*	✓	
Identify gaps and risks	✓	✓
Set priorities	✓	✓
Advise/Inform component POM processes	✓	
Assess conformance to guidance*	✓	
Emphasis on “cross-component” perspectives	✓	
Emphasis on analytic support*		✓

\*Note: These topics explicitly mentioned in the respective descriptions; in fact both processes would logically cover these functions.

Several of these differences emanate from the skeletal nature of IDA’s CAA description, which has been drawn entirely from the DAWG “Unifying DOD Management Processes” briefing. Both processes would function throughout the programming cycle (see number 3 of Figure 3).

The difference in the mission area taxonomies is key because the “Force Application” portfolio is far too broad to provide effective oversight of virtually all operational force capabilities. The IDA proposal breaks that portfolio down into five mission areas, a structure that seems to be cast at a logical and more manageable level.

The IDA “Unified Process” briefing is explicit in specifying the role of CAAs in the acquisition process front-end, as described in Figure 3 under number 4.

## H. Mission Area Assessments

Mission area assessments were performed in the 1970s by the predecessor organizations to CAPE,<sup>48</sup> in close cooperation with the OSD acquisition organization then called DDR&E.<sup>49</sup> Those studies assessed capabilities within selected mission areas, similar in some ways to the ones proposed for Capability Area Assessments, as described in subsection G, above. They were generally similar in purpose to CBAs but were conducted in an entirely different manner. A companion IDA study documents in some

<sup>48</sup> Under various names: Studies and Analyses and Program Analysis and Evaluation, sometime headed by a “Director” and sometime by an Assistant Secretary.

<sup>49</sup> In that period, the office of Director, Defense Research and Engineering, contained several organizations that were subsequently incorporated in the current OUSD(AT&L), but outside the current DDR&E.

detail the relatively successful methods used in the 1970s to provide the Secretary with independent options for deciding on what future weapons systems the Department should commit to acquiring, including assessments of the merits of new concepts before they became formal component proposals.<sup>50</sup>

It is widely believed<sup>51</sup> that the choices that came out of those efforts resulted in development programs which were generally less troubled, overall, than in subsequent periods, and which produced systems that, on the whole, have served military needs well for several decades. While there was no single name for such studies, they can be generally characterized as Mission Area Analyses, or Mission Area Assessments. “Antisubmarine Warfare” would be one typical example of a “mission area,” although in some cases a narrower mission such as “air-to-air engagement” might have been defined. Such studies would be performed by teams of experienced systems analysts primarily from DDR&E and the predecessor organizations to CAPE. The basic procedure generally followed was to:

- Identify the threats posed in the future scenarios that the Secretary had approved for planning purposes;
- Assess the likely effectiveness of the then-programmed U.S. and allied forces in such scenarios (using relatively straightforward operations research techniques);
- Postulate solutions to any important weaknesses both in the form of revised operational concepts<sup>52</sup> and potential new weapons systems; and
- For potential new systems, identify feasible technical approaches that, if developed and fielded, would meet the need in an affordable manner.

But the foregoing mechanistic description oversimplifies key elements of the process. One key was for the OSD experts to identify and analyze emerging needs well before a Service became institutionally committed to a specific materiel solution. Getting out in front of the problem in that manner required OSD staff members to evidence a high degree of competence in both the particular warfare area and in the potential technical approaches under consideration, and to perform the studies with openness, transparency, and a lack of bias. That capability permitted the OSD staff to establish effective working relationships with the mid-level technical and operational staffs of the Services. That, in turn, provided the needed visibility into emerging planning for future new systems that

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<sup>50</sup> William O’Neil and Gene H. Porter, *What to Buy? The Role of Director of Defense Research and Engineering (DDR&E) Lessons from the 1970s*, IDA Paper P-4675 (Alexandria, VA: Institute for Defense Analyses). Draft Final.

<sup>51</sup> *Ibid.*, v.

<sup>52</sup> What are frequently referred to today as “DOT\_LPF” or non-materiel solutions.

would then allow the mission area analyses to proceed well in advance of formal DOD-level, or indeed, in many cases, Service-level reviews and commitments.

## **I. Affordability**

There is also an obvious relationship between the affordability of an acquisition program and the PPBS process. If they are to be executable, acquisition plans must match fiscally with resources clearly identified in the DOD FYDP and budgets. While ensuring that funds are in the FYDP is necessary, unfortunately that alone is far from sufficient to guarantee affordability. The big affordability problems usually materialize beyond the six-year FYDP.<sup>53</sup>

Since virtually any single conceivable program can be afforded within DOD's total spending plans that now routinely exceed \$500 billion per year, the context in which affordability is assessed is key, and conclusions about affordability will, to a certain extent, lie within the eye of the beholder. Typically, one looks at historical funding trends within mission areas or commodity classes to determine whether a proposed program can "fit" within likely resources. However, even within such contexts, an argument in favor of affordability might be made with the expectation that other funding demands will decrease—arguments along the lines of "since funding for new transport aircraft is winding down, we can begin a costly new fighter program that will be largely completed before we have to start funding our new bomber." A danger, however, is that in making such "macro" assessments, a Service may "starve" other needs, including the "bread-and-butter" minor procurements needed to maintain current capabilities. If such "starvation" tactics are actually implemented, it can take years for the consequences to become apparent. Conversely, if the continued need for minor procurements within a perceived mission area or commodity class ceiling is promptly acknowledged, then the resulting funding transfers can quickly unravel the carefully built plans for the major programs. (See the previously-cited IDA cost growth study for other potential ramifications of failing to give full consideration to affordability in the acquisition process.<sup>54</sup>)

Recent memoranda (September 14, 2010 and November 3, 2010) from the USD(AT&L) have stressed the importance of affordability assessments. The provisions regarding affordability in the November 3 memorandum are reproduced in Figure 6. This memorandum is addressed to DOD component heads.

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<sup>53</sup> See Porter et al, *The Major Causes of Cost Growth*, vol. 2, 17 and 53.

<sup>54</sup> Porter et al, *The Major Causes of Cost Growth*, vol. 2, 53.

## TARGET AFFORDABILITY AND CONTROLLING COST GROWTH

### Mandate affordability as a requirement:

Effective November 15, 2010, I will implement affordability-based decision making at milestone decision points for all Acquisition Category (ACAT I) programs. Specifically, I direct the following actions:

Baseline Portfolio and/or Mission Area Definitions: As a basis for affordability analysis, you will use standard budget categories to the extent possible. Representative examples include: tactical wheeled vehicles, tactical aircraft, surface combatants, and communications satellites.

Milestone (MS) A: You will establish an affordability target to be treated by the program manager (PM) like a Key Performance Parameter (KPP). This affordability target (initially, average unit acquisition cost and average annual operating and support cost per unit) will be the basis for pre-MS B decision making and systems engineering tradeoff analysis. This analysis should show results of capability excursions around expected design performance points to highlight elements that can be used to establish cost and schedule trade space. The affordability target should be presented in the context of an analysis of the resources that are projected to be available in the portfolio(s) or mission area(s) associated with the program being considered for the MS A decision, assuming programmed defense budgets and force structures. In order to meet this requirement, you will provide a quantitative analysis of the program's portfolio or mission area across the life cycle of all products in the portfolio or mission area, including acquisition and operating and support budget suitability to absorb the proposed new start as a content change. Specifically, if introducing a new program into a portfolio or mission area, you should indicate what specific adjustments will be made to absorb the new program.

Milestone B: You will present a systems engineering tradeoff analysis showing how cost varies as the major design parameters and time to complete are traded off against each other. The analysis will pay due attention to spiral upgrades. You will recommend for my approval to establish and document, in the Acquisition Decision Memorandum (ADM) and in the program baseline, an 'Affordability Requirement' for acquisition cost and for operating and support cost. This requirement will be the functional equivalent of Key Performance Parameters (KPPs) for baseline establishment and monitoring. You will provide cost tradeoff curves or trade space around major affordability drivers (including KPPs when they are major cost drivers) to show how the program has established a cost-effective design point for these affordability drivers.

**Figure 6. Affordability Excerpts from November 2010 USD(AT&L) Memorandum<sup>55</sup>**

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<sup>55</sup> USD (AT&L), *Implementation Directive for Better Buying Power—Obtaining Greater Efficiency and Productivity in Defense Spending*, Memorandum for Secretaries of the Military Departments and Directors of the Defense Agencies,” 3 November 2010.

It is equally important that affordability assessments be conducted by the Office of the Secretary of Defense. The reasons are two-fold: first, an affordability assessment across the entire Department should be available to the Secretary to inform acquisition and other programmatic decisions; and second, assumptions made in component affordability analyses may be overly optimistic in several regards—the cost of a proposed new system, the cost of competing systems, and the likely fiscal resources that will be available, both in the near and long term.

### **3. Preparing for an MDD and Review of Selected CBAs and ICDs**

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This chapter reviews the available materials used in preparation for several recent MDDs, including OIPT reports, DAB briefings, ADMs, and supporting ICDs and CBAs. We also reviewed several ICDs, and where available associated CBAs, that have *not* had (and may never have) MDDs. The MDD process and ensuing AoA for the Army's Ground Combat Vehicle (GCV) were reviewed in greater detail as a case study, discussed in Section C of this chapter.

#### **A. Review of MDD Documentation**

This section reviews the documented basis for several MDDs held since the process was established in December 2008.

##### **1. B-2 Defense Management System**

An MDD for the B-2 Defense Management System was held on April 1, 2010, and the ADM approving entry into the MSA phase was signed on June 7<sup>th</sup>. This is a program to modernize the suite of defensive systems on the B-2 aircraft. The need for such modernization is based both on component obsolescence and capability shortfalls against projected threats.

There was no ICD specifically for this system. The requirement for an ICD was satisfied by an electronic warfare (EW) ICD. The full version of that document is classified Top Secret; an abbreviated Secret extract was reviewed and found to contain no specific mention of the B-2. The OIPT report cites a January 2010 Air Force "ICD Traceability" memorandum citing three gaps from the EW ICD. Based on review of the information in charts presented at the MDD it appears that there was no JROC review of the requirement, since one of the briefing charts cites only a memorandum from the Force Application FCB. Other than citing the EW ICD, the MDD briefing does not appear to have provided any analytical justification for requirements. (The caveat is included because there is a classified chart, entitled "Current Ops Environment," that the IDA study team has not seen.)

The Air Force asked that it be allowed to release a Request for Proposal (RFP) for the TD phase after DAE approval of the TD strategy/plan, prior to Milestone A. The ADM approved the request. AoA guidance, while not attached to the ADM, is referenced in it and a draft of the guidance was summarized in the OIPT report. The draft guidance required the AoA to consider three alternatives: a minimum upgrade of critical components, a full modernization, and an incremental approach to modernization.

Given the nature of this program (not a full-blown new start but modifications to an existing system), it appears that the procedures followed for the MDD were adequate; but the lack of evidence of analytical support for the decision is of concern. For example, if there were a compelling case to replace the existing B-2 DMS on the basis of its obsolescence and projected future cost to support, the supporting analytical evidence should have been presented. If there is a further need to not only replace but to *upgrade* the system to meet project future threats, the analytical evidence supporting that course of action should have been offered.

## **2. Joint Cooperative Target Identification-Ground (JCTI-G)**

This is a program to develop systems to help prevent ground troops from being attacked by friendly fire—a long-standing, high priority problem for the Department. An MDD was held on May 4, 2010. The ADM, signed on June 23, 2010, approved entry into MSA and designated the Army as lead component for the “fires on dismounts” increment of the program.<sup>56</sup>

A June 2009 Deputy Secretary memorandum, in response to an Army reduction in funding for the program, had previously directed CAPE to review an Army/Marine Corps demonstration of JCTI-G and “prioritize capability needs, identify and compare system alternatives, and recommend a way-forward,...that will provide capability to the Warfighter soonest ...” The supporting ICD is a Joint Capabilities Document, Subject: “Combat Identification – Blue Force Tracking,”(CID-BFT) approved by the JROC April 2009. Figure 8 displays charts from the MDD briefing (the organization providing the briefing was not identified). Like the B-2 DMS, there was not an ICD for this system *per se*, rather the requirement is supported by reference to the CID-BFT JCD.<sup>57</sup> More importantly perhaps, as indicated above, was the memorandum from the Deputy Secretary indicating an urgency to improve protection of friendly troops from fratricide. (The proposed system only addresses the problem of ground fire against dismounted troops. A complementary program is to be initiated to address air-to-ground attacks.)

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<sup>56</sup> The ADM also directed Army, with the other Services, to provide a recommendation for the lead component of the air-to-ground increment.

<sup>57</sup> Joint Capabilities Document—similar to an ICD for joint capabilities for which no Service sponsor has been designated.

Although the first slide seen in Figure 8 states that the CID-BFT JCD contains “A detailed analysis of Joint Ground-Centric Gaps,” this assertion is belied by the document itself, which is much more modest regarding the detail and extent of the analysis. In fact, Appendix E (Ground Domain) of the JCD indicates that the threshold and objective performance standards were based on informed military judgment, not rigorous analysis.

The JCD states (again, in Appendix E) that the working group “located, documented, and researched more than 50 studies, reports, and reference documents related to CID and/or BFT during the CBA.” A pool of some sixty experts from Commands, Services and Defense Agencies (otherwise not identified) were polled to establish priorities. The JCD summarizes the methodology as drawing analytical results and insights from previous studies to produce a list of capability gaps that required solutions. The gaps were then prioritized using primarily expert military judgment to maximize combat effectiveness, reduce fratricide, and limit collateral damage in two approved planning scenarios.

What the study clearly did *not* do was to provide a quantitative assessment of currently programmed capabilities (for example, the probability of fratricide or collateral damage, or targets not engaged because they were misclassified as friendly or neutral) that would clearly indicate that gaps existed in currently programmed capabilities.<sup>58</sup> If it were possible to do that, one could, using the same modeling environment, evaluate benefits from potential solutions.

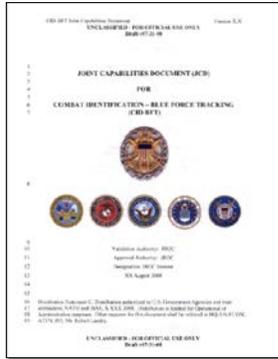
The issues regarding fratricide prevention are more subtle than in many other areas. There is a clear relationship between fratricide prevention and combat effectiveness. Undue concern about fratricide will limit combat effectiveness. On the other hand, improved combat identification capabilities can both reduce fratricide *and* increase combat effectiveness. Because of such effects, a goal of total elimination of any chance of fratricide is not only unobtainable, but undesirable as well. A more effective force will fight with fewer casualties overall. The objective should be to win with as few casualties as possible, not with the least amount of fratricide. Thus, it is important that a proposal for a system to reduce fratricide address these issues to appropriately inform the decision-maker. There was no evidence, from the document review, that those combat effectiveness issues had been dealt with.

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<sup>58</sup> It can be argued that models capable of reliably estimating such indicators may not exist. In fact, one gap identified by the JCD was deficiencies in modeling and simulation. To quote from the JCD: “Current operational-level and tactical force-on-force engagement models do not realistically account for fratricide and collateral damage incidents/effects.”



# CID-BFT JCD Supports the JCTI-G Materiel Development Decision



### Per DODI 5000.02, an ICD supports a Materiel Development Decision:

- Preliminary CONOPs
- Description of needed capability
- Operational Risk
- Basis for determining that non-materiel approaches will not mitigate the gap

### The Combat ID Blue-Force Tracking JCD Meets These Requirements:

- Current:
  - Validated by JROC in April 2009 (JROCM 062-09)
- Thorough:
  - A detailed analysis of Joint Ground-Centric Gaps:
    - > CONOPs
    - > Threat / Operational Environment
    - > Required Capabilities
    - > Prioritized Joint Ground Domain Capability Gaps
    - > Gaps recommended for action
    - > Risks of not addressing gaps

The CID-BFT JCD provides the requirements analysis to support the JCTI-G MDD

Figure 7. Chart from MDD DAB Briefing for JCTI-G (1 of 3)



# CID-BFT JCD Supports the JCTI-G Materiel Development Decision

## CID-BFT JCD Appendix E Contains Joint Prioritized Capability Gaps

E-2: Individual study gaps correlated to consolidated gaps

Table E-2: Individual study gaps correlated to consolidated gaps

Priority	Original Study	Consolidated Gap Description
1	02	Joint and coalition forces are deficient in the ability to identify neutral entities in adverse environmental conditions.
1	03	Identify neutral entities in adverse environmental conditions.
1	07	Visual identification and aided visual identification means are limited by range during the day and rendered inadequate by darkness and nighttime conditions. Even under ideal circumstances, visual identification is based on perceptible skills that depend on training and experience to achieve any degree of accuracy. Shortcomings in visual identification skills are compounded in real-world warfare when friendly and enemy forces use the same or similar platforms.
2	014	Forces are deficient in the ability to exchange their CID-BFT information with other military partners (Joint, coalition, and interagency).
2	101	Limited bandwidth availability.
2	102	Lack of dynamic capability to monitor and control bandwidth utilization.
2	103	Bandwidth capacity is significantly limited across the strategic, operational, and tactical levels.
2	104	Lack of Adequate Bandwidth - wide satellite system (e.g. Navy - GCES, M3 Navy to Navy Task Exchange - This gap covers the specific communication system failures related to inadequate bandwidth. This does not cover satellite or communication system availability.
2	105	Regular Forces SATCOM Network Loading.
2	106	Commercial SATCOM Architecture gaps insufficient capacity, bandwidth and reliability.
2	107	SOFCOA BFT: Lack of Two-Way Communication for SOFCOA BFT.
2	108	Functional Elements (FE) BFT systems are currently placing undue burden on the BFT physical communication infrastructure. Specific problems and potential remedies are described in this action.

### Immediate Focus:

- Fires on Dismounts
  - Soldier to Soldier, indirect fires on Soldiers, vehicle fires on Soldiers
- Fires from Air-to-Ground Platforms
  - Fixed, rotary wing, manned and unmanned on ground entities
  - Dismounts first priority

### JAN 10 VCSA-ACMC Memo:

MEMORANDUM OF UNDERSTANDING BETWEEN THE U.S. ARMY AND THE U.S. MARINE CORPS

SUBJECT: Implementation of Defense Advisory Working Group Direction for Joint Cooperative Target Identification - Ground-Way Ahead

1. Reference:

- a. 22 SEP 09 Defense Advisory Working Group
- b. 14 OCT 09 Control Identification Blue Force Tracking Executive Steering Committee Meeting Briefing, Joint Cooperative Target Identification Ground
- c. 27 OCT 09 Army-United States Marine Corps (USMC) Briefing, Joint Cooperative Target Identification Ground

2. The USMC and the U.S. Army are fully committed to implementing the Deputy Secretary of Defense's direction for the Joint Cooperative Target Identification Ground (JCTIG). While much work remains to be conducted, the Services have much common ground and agree on the following:

- a. Both Services have a requirement for fires on the Joint Cooperative Target Identification (CTI) and for air-to-ground (A-G) CTI, prioritized in that manner, to meet the needs of the current fight. Both Services view the A-G CTI as a joint issue and request Joint Force Command (JFCOM) assistance in this area. Both Services agree to ensure JCTIG CTI remains an equal priority, meeting development goals.
- b. An Analysis of Alternatives (AAO) is needed to explore the technologies that meet these requirements. This AAO is expected to take six months to complete, upon approval of the Joint Cooperative Target Identification (JCTIG) by the Secretary of Defense for Cost Assessment Program Evaluation (CAPE) and the A-G CTI. Both Services agree JCTIG to be assigned the leading role in AAO and is expected that JCTIG, Army, USMC, and Special Operations Command (SOCOM) will be key participants in the AAO. (Operational priority and that JFCOM, Army, USMC, Navy, Air Force, and SOCOM will be key participants in A-G Fires.)

"Both services have a requirement for fires on dismounts Cooperative Target ID (CTI) and for air-to-ground (A-G) CTI, prioritized in that manner, to meet the needs of the current fight."

Figure 8. Chart from MDD DAB Briefing for JCTI-G (2 of 3)

Study guidance for the AoA was attached to the ADM, with the study to be performed by JFCOM with Army and Marine Corps participation.

Given Secretary-level direction to seek solutions to the fratricide problem with some urgency, as well as the fact that this is one component of a system of systems, this is another program that is somewhat atypical as an acquisition new start. It also lacked a stand-alone ICD, and no analytical support for the initiative appears to have been presented at the MDD. This is perhaps why the MDD briefing, in the slide proposing language for the ADM, noted that the AoA should confirm that new start JCTI-G solution required to fill capability cap.<sup>59</sup> This is a legitimate function of an AoA, especially if the supporting CBA is incomplete and lacking in analytical rigor.

## **B. Review of Other ICDs and CBAs**

### **1. Integrated Air and Missile Defense (IAMD)**

The study team reviewed the IAMD ICD dated November 1, 2010, prepared by the Joint Forces Command. The document is a comprehensive review of global defense against all air and missile threats, from mortars to intercontinental ballistic missiles (ICBMs), supported by integrated global systems for command, control, communications, and battlespace awareness, and identifies nineteen critical IAMD capabilities.

#### **a. Basis for Gaps**

A total of 414 joint gaps were initially identified in the IAMD JCD. They were derived from several sources: Service and joint agency analyses of current and programmed systems' abilities to execute the IAMD critical capabilities in the 2015 timeframe; the Theater Air and Missile Defense ICD; the IAMD operational architecture; the Homeland Air and Cruise Missile Defense of North America (HACMD of NA) JCD; combatant commands' Integrated Priority Lists; and an extensive literature search.

#### **b. Assessments of Risk**

Each of the gaps was subjected to a risk assessment for each of the DPS scenarios and for homeland defense. These assessments identified sixty-three high-risk gaps associated with the nineteen critical IAMD capabilities.

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<sup>59</sup> However, such language did *not* appear in the signed ADM.

### **c. Scope of ICD**

This ICD, prepared for the Protection FCB, addresses only thirty-one of the sixty-three high-risk gaps; the remaining thirty-two are assigned to other FCBs or working groups. The thirty-one are divided into five categories: sensor, weapon, Command, Control and Battle Management, net-centric, and cross-functional. The ICD specifies the attributes, metrics of performance, and “Family of Systems minimum values [of performance]” for each gap--a total of ninety-one minimum values.

### **d. Supporting Capabilities-Based Assessment**

The ICD is supported by a CBA with a summary report dated June 4, 2009. The CBA was grounded in a Joint Requirements Oversight Council Memorandum (JROCM) dated November 28, 2005, that assigned to the Air Force the responsibility for conducting a Functional Solutions Analysis (FSA) to address the capability gaps within the *Homeland Air and Cruise Missile Defense of North America Joint Capabilities Document* (HACMD JCD). The JROCM directed that this FSA “satisfy the Homeland Defense specific gaps identified in the IAMD CBA.” A subsequent JROCM, dated May 1, 2006, assigned responsibility for three FSAs: FSA-1: *Detection, Tracking, and Determination of Intent of Asymmetric (Irregular) Air and Cruise Missile Threats to the Homeland* (assigned to the Air Force); FSA-2: *Detection, Tracking, Engagement, and Kill Assessment of Ballistic Missile and WMD Threats* (assigned to the Navy); and FSA-3: *Active Defense against Air and Cruise Missile Threats* (assigned to the Army). Thirty-one of the sixty-three gaps identified in the IAMD JCD were assigned to the three FSAs, and an additional two gaps related to Counter Rockets, Artillery, and Mortar (C-RAM) were assigned to FSA-3.

IAMD was designated as a “pilot program” under the “Concept Decision Experiment” of 2006-2007 discussed in Chapter 2, Section C. An “Evaluation of Alternatives” study was performed under that program. According to the ICD, the EoA was incorporated in the summary CBA of June 2009. This summary CBA summarizes analytical results from the three FSA studies and also provides some independent analyses.

### **e. Observations**

The ICD summary records that the IAMD review expanded its capabilities assessment from its initial focus on the Homeland Air and Cruise Missile Defense of North America to a far broader review of comprehensive global defense against all air and missile threats, from mortars to ICBMs, supported by integrated global systems for command, control, communications, and battlespace awareness.

The ICD thus does not, in itself, provide the analyses needed to meet its stated objective of intending “to serve as an overarching document for all sixty-three critical

capability gaps and cover the entire scope of IAMD.”<sup>60</sup> Although it lists all sixty-three critical capability gaps, based on JROC direction, it assesses only the thirty-one assigned to the Protection FCB. Those assessments were supported by the summary CBA discussed above, which in turn rested largely on three more detailed analyses conducted by the Air Force, Navy, and Army. This study did not examine any of those contributing studies; however, it is evident that substantial analyses were conducted. Again limited by resources and time, this study did not investigate that body of analytical work or whether their results were appropriately extracted and used for the summary CBA. What seems ultimately to be lacking is an overall discussion of technical and operational approaches, costs, and risks (including technology risks), and a definition of alternative integrated, coherent, resource-constrained investment strategies to address the risks identified.

## **2. Sea-Based Strategic Deterrence (SBSD)**

We reviewed the Sea-Based Strategic Deterrent ICD dated June 20, 2008.<sup>61</sup>

### **a. Required Capability**

The ICD addresses the degradation in the nation’s strategic nuclear deterrence that would result from a failure to replace the aging fleet of OHIO-class ballistic missile submarines. It defines the essential elements of deterrence thus:

“Deterrent influence requires forces that are:

- Effective
- Usable
- Persistently Present
- Survivable
- Poised for Prompt Response”<sup>62</sup>

The ICD exhaustively explores the implications of this clearly-articulated concept. It includes a penetrating analysis of the possible perceptions and motivations of potential adversaries in response to various U.S. deterrent postures, and examines the range of performance of U.S. deterrent forces under favorable and unfavorable conditions.

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<sup>60</sup> U.S. Joint Forces Command, JROC, DOD Requirements Branch, *Initial Capabilities Document for Integrated Air & Missile Defense (version 1.0)*, (Washington, D.C., 1 November 2010). SECRET.

<sup>63</sup> The recently re-issued GCV RFP for the TD phase listed this timing objective as a non-trade-able “must have.”

### **b. Basis for Gaps**

The ICD explicitly identifies the effects of reductions in SBSB and reviews the range of possible solutions to the resulting gaps. The gap analysis is comprehensive and rigorous.

### **c. Assessments of Risk**

Although there is no DPS for 2027, the year that the retirement of the OHIO-class fleet will begin, the ICD provides a compelling assessment of risk by examining the effects on potential adversaries of various U.S. strategic postures.

### **d. Observations**

This ICD is a model of rigorous analysis and clear presentation. It provides every element of information required to evaluate its sound premises, even-handed arguments, and inarguable conclusions.

## **C. The Ground Combat Vehicle Case (GCV) Study**

The GCV is an Army-proposed program to replace the Bradley Fighting Vehicle, which is the primary means of transporting infantry in the Army's Heavy Brigade Combat Teams (HBCT). Since this program is a recent genuine acquisition new start proposed for this year (2011), and since there was an opportunity for synergy with a separate study that IDA is performing for CAPE on the GCV AoA, this program became a good choice for a more in-depth examination. An MDD for the program was held in February 2010. A Milestone A review, originally scheduled for April 2011, has yet to occur as of this writing. This section will review the processes and events that led to the MDD as a case study.

### **1. Cancellation of the Future Combat Systems (FCS) Manned Ground Vehicles Programs**

In April 2009 the Secretary of Defense directed the Army to (1) terminate the acquisition of the Future Combat Systems manned ground vehicles (MGV); (2) re-evaluate manned ground vehicle requirements, technology and acquisition approach; and (3) define a new ground vehicle program based on revised requirements. The following is an extract from the press release (emphasis added):

“I will recommend that we cancel the vehicle component of the current FCS program, re-evaluate the requirements, technology, and approach – and then re-launch the Army’s vehicle modernization program, including a competitive bidding process. An Army vehicle modernization program designed to meet the needs of the full spectrum of conflict is essential. But because of its size and importance, ***we must get the acquisition right, even at the cost of delay.***”

**Figure 9. Secretary of Defense’s Press Announcement of Cancellation of the Future Combat System’s Manned Ground Vehicle Program**

ADMs of June 2009 and July 9, 2009 addressed restructuring the FCS program. At some point a wide-spread view developed that the Secretary wanted a new GCV that could start production within seven years. It appears that the seven-year target originated in verbal discussions with the Secretary. However the guidance was conveyed, we have found no one who doubts that it was, and the Army has taken this objective very seriously.<sup>63</sup>

The June 2009 ADM directed the Army to:

- In conjunction with the Marine Corps, initiate actions to assess joint capability gaps for manned ground combat vehicles, and consider:
  - Missions across the spectrum of operations [as reflected in DPSs]
  - Capabilities of the current combat vehicle fleet
  - The FCS MGCV preliminary design capability and the requirements gaps of the MGCV design
  - Lessons learned from ongoing operations
- Conduct a capability gap assessment strategy for JROC review consistent with timelines in JROC Memorandum 075-09 dated 4 May 2009
- Develop a capability gap assessment that will support the development of requirements for a new Ground Combat Vehicle program, targeting a Materiel Development Decision in 2010

In response to these decisions, the Army launched an intensive 120-day study of its ground combat vehicle needs, as part of a broader look at Army modernization known as Task Force 120 (TF 120), and in parallel began working on an ICD. The multi-faceted TF 120 study included several analytical efforts, one of which was characterized as a CBA;

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<sup>63</sup> The recently re-issued GCV RFP for the TD phase listed this timing objective as a non-trade-able “must have.”

however, much of the “analysis” was in fact little more than user and expert solicitation. This was probably unavoidable given the accelerated nature of the undertaking. In the end, however, the “CBA” did not make a compelling case for an urgent need to replace the Bradley Fighting Vehicle, compared with other capability needs within the tactical vehicle space.

## **2. The Materiel Development Decision**

The MDD review of the GCV Program was held on February 12, 2010. The subsequent ADM approving initiation of MSA directs the AoA to “examine the available trade space among new developmental capabilities, upgrades to existing platforms, and non-developmental solutions as well as hybrid approaches to fulfill the capability requirements at reasonable costs.” In a somewhat unusual move, the ADM also approved release of an RFP for the TD phase of the GCV Program, stating:

“...in light of the SecDef desire to expedite the Army's ground combat vehicle acquisition solution, concurrently soliciting industry's proposals for TD while conducting the AoA is prudent and relatively low risk.”<sup>64</sup>

However, as a practical matter such concurrency between analytic efforts to define the most cost-effective alternative and the initiation of industry efforts to solve specific technical problems pertaining to a particular vehicle design in fact pre-supposes the “answer” about which the AoA is to provide insights.

## **3. Issues with the GCV AoA**

### **a. Alternatives Considered**

The primary focus of the GCV AoA<sup>65</sup> was on providing a replacement for the Bradley M2 infantry fighting vehicle in the Army's HBCTs. Three alternatives were given serious consideration: the baseline Bradley M2 in the configuration used in Operation Iraqi Freedom (OIF) (M2 OIF), an improved version of the Bradley (Bradley Block II) proposed by the Bradley program office, and a new vehicle based on a preliminary design by the U.S. Army Tank Automotive Research, Development and Engineering Center (TARDEC), called the GCV Design Concept (GCV-DC).<sup>66</sup> Other

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<sup>64</sup> Ashton B. Carter, *Ground Combat Vehicle (GCV) Materiel Development Decision (MDD) Acquisition Decision Memorandum*, Memorandum for Secretary of the Army, 11 May 2010. FOR OFFICIAL USE ONLY.

<sup>65</sup> *Ground Combat Vehicle (GCV) Analysis of Alternatives (AoA)*, TRADOC Analysis Center, TRAC-W-TR-11-011, March 2011. FOR OFFICIAL USE ONLY.

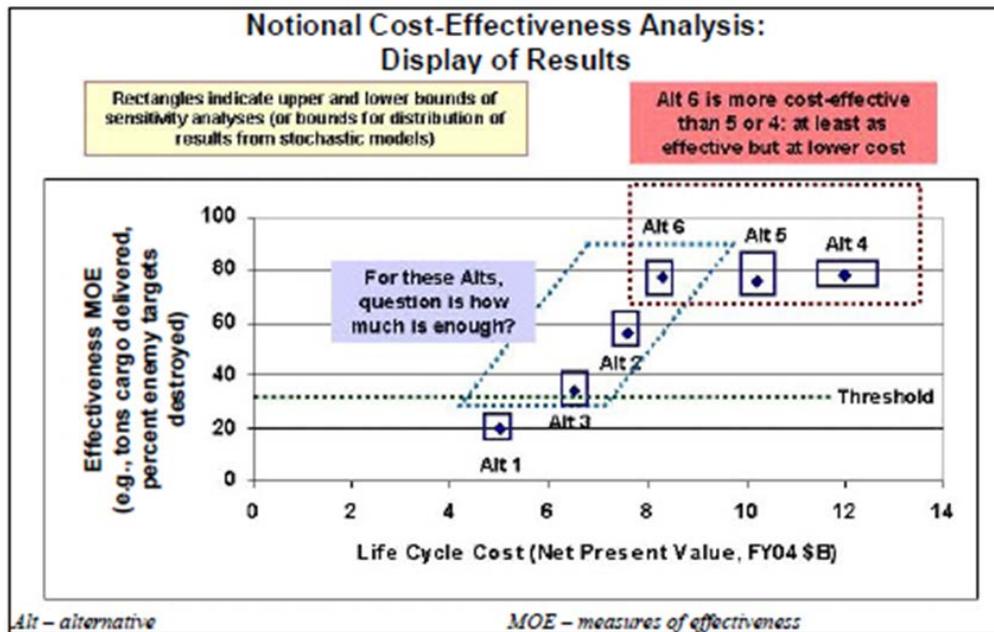
<sup>66</sup> The GCV-DC, while the only new-vehicle design available at the time the AoA was conducted, will be of little or no interest, once design proposals from industry are selected for the subsequent Technology Development phase of the program.

domestic alternatives, including the Stryker S-Mod and several types of mine resistant ambush protected vehicles, were given limited consideration, and two foreign non-development item (NDI) vehicles also were evaluated, largely qualitatively.

**b. Lack of Cost-Effectiveness Analysis**

The Defense Acquisition Guidebook promulgated by the Defense Acquisition University outlines the customary content and structure of an AoA. The cost-effectiveness comparisons of the study alternatives are a major outcome of an AoA. They assist decision-makers in determining whether additional effectiveness is worth additional cost. Most AoAs include exhibits of effectiveness and life-cycle costs similar to the notional example from the Defense Acquisition Guidebook shown in Figure 10. A scatter plot of this type was included in the GCV study plan (dated April 2010), but was not provided in the final briefing or report.

An IDA review of the GCV AoA developed displays like Figure 10 based on the cost and effectiveness results shown in the Army briefings to the AoA’s Joint Study Advisory Group (JSAG). Those displays showed the GCV Design Concept to be more effective commensurate with its higher costs for some measures but not for all. In at least one case, the upgraded Bradley Block II was slightly more effective (and considerably cheaper) than the new start GCV. Given that the Army results are based on stochastic combat simulations, such outcomes are not unexpected, but the Army did an inadequate job of explaining the reasons for them.



**Figure 10. Example Top-Level Cost-Effectiveness Depiction**

### **c. Limited Consideration of Technical/Performance, Schedule, and Cost Risks**

Although required by the CAPE guidance for the AoA, a comprehensive risk assessment was absent from the Army AoA report—a critical shortcoming.

Technological risk is the risk associated with achieving the promised combination of capabilities in a new system. This includes not only risks associated with specific new technologies (e.g., advanced armors), but also integration risk associated with trying to meld many capabilities simultaneously in a space- and weight-constrained vehicle. Technology Readiness Assessments, if done rigorously, provide some information on the level of risk associated with new technologies, but do not typically account for integration risks.

In the context of the GCV AoA, the level of technological risk is clearly not the same for the various alternatives. The foreign NDI vehicles, even considering the probable need to modify them to U.S. Army specifications, are more mature designs and thus carry less technological risk than does the Bradley Block II. The Bradley Block II, in turn, is probably a more mature design than a new start GCV and, thus, would have significantly less technological risk.<sup>67</sup>

Technological risk often manifests itself as schedule slippage, cost increases, and/or performance objectives not met. Schedule risk is the risk that the system will take longer to develop and field than anticipated. It is highest for programs planning to use less mature technologies, programs that require significant amounts of integration, system-of-systems programs, and programs for which aggressive milestones are imposed. If an entirely new vehicle along the lines of the GCV-DC were selected, the lower technological maturity of such a new design would lead to increased schedule risk for that alternative, relative to the others. Similarly, the increased integration risk associated with any new start relative to a modification of an existing design would add more schedule risk to a GCV-DC-like alternative. Finally, a policy-driven “seven-year” timeline to first production unit would add significant schedule risk to all of the alternatives, but especially to a new-start GCV, given the previous development timelines of similar programs.

Cost risk is simply the risk that the system cannot be acquired for the funding allocated. For the GCV AoA, different levels of technological risk drive different levels of cost risk for the various alternatives. In addition, the accelerated development schedule proposed for the GCV compounds the cost risk for that alternative. These factors result in

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<sup>67</sup> The qualifier, “probably,” is used because the GCV is, at present, an unknown. It is possible that a design would be selected that is based on an existing vehicle. In fact, the German Puma vehicle was reportedly to be the basis for the design of one of the competitors in the now-cancelled Request for Proposals for designs to enter the post Milestone A Technology Development phase. So it is quite conceivable that such designs would carry about the same level of risk as the Block II.

a significantly lower cost risk for the Bradley Block II than for the GCV-DC (and the NDI alternatives might entail even lower risks, depending on the extent of any modifications).

The cumulative result of these factors is that a new design GCV alternative has a significantly lower probability of delivering predicted capability, on time and within its cost estimate, than do designs based on existing vehicles such as the Bradley Block II. Designs based on significant modifications to existing vehicles, in turn, have a lower probability of delivering predicted capability on time and on schedule than do the NDI alternatives (if procured without significant modifications). The failure of the Army GCV AoA to address important differences in technical/performance, schedule, and cost risks fully and forthrightly decreases its utility to senior DOD officials in making prudent acquisition decisions.

#### **4. Insights from Review of the GCV Materiel Development Decision**

The June 2009 ADM on the cancellation of the FCS manned ground vehicle program in effect pre-empted much of the process that should take place before an MDD by directing that “The capability gap assessment *shall support* the development of requirements for a new Ground Combat Vehicle program, targeting a Materiel Development Decision in 2010.” (Emphasis added) This is a rather strange direction. Whether the CBA supports such requirements is an *output* of the CBA, not an input. It goes far beyond the statement made by Secretary Gates in his press conference cancelling the FCS ground vehicle program, which cited the need to “cancel the vehicle component of the current FCS program, re-evaluate the requirements, technology, and approach—and then re-launch the Army’s vehicle modernization program, including a competitive bidding process.” While this is, most likely, simply a case of sloppy wording, *prima facie* it implies that the decision to initiate a specific GCV program had already been made.

Nonetheless, the set of analyses conducted by the Army did consider the broader requirements for modernization of vehicles within BCTs. The findings of those analyses were not, however, brought forward to the MDD. Those analyses in fact lend considerable support to pressing needs to modernize several types of vehicles in the BCT to achieve improved combat effectiveness and troop protection. There seems, however, to have been no undertaking to evaluate how the funds available from the cancellation of the FCS ground vehicles should best be used to modernize BCT vehicles (per the Secretary’s press conference statement). As noted above, it is possible that undocumented discussions took place with the Secretary that gave stronger guidance with regard to starting a GCV specifically; however, even if that was the case, the evaluation process

should nonetheless have been followed.<sup>68</sup> Based on our review, it appears that the preparation for the MDD was inadequate—especially with regard to analytical support. Even the analysis that was completed does not seem to provide a convincing case supporting the decision to pursue a new start combat vehicle to replace the Bradley.

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<sup>68</sup> Whatever might have been said, the IDA study team does not find it credible that the Secretary intended for the process to determine highest priority requirements be short-circuited.

## **4. Findings, Conclusions, and Recommendations**

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### **A. Secretarial Oversight of Acquisition Requirements**

The initiation of a new major defense acquisition program represents a significant commitment of the future resources of the Department of Defense, and the nation. The potential for costly future problems in such major programs can be minimized by starting acquisition programs “right.” This means, in particular, that the basic requirement for the program must be firmly established, including the verification of a sound, affordable, technical approach.

To discharge his/her statutory responsibilities properly, the Secretary of Defense must be able to exercise effective control over the process by which acquisition programs are started, that is, the establishment of requirements. This study found that existing processes do not provide the Secretary (acting through his/her staff) sufficient analytically-based information and opportunities to exercise those responsibilities effectively.

Currently, the JROC, through the JCIDS, oversees and controls the process by which component-initiated acquisition programs are presented for eventual Departmental approval. Although by statute JROC recommendations are advisory, the IDA study team found, based on the several MDDs examined, that most JROC recommendations regarding capability gaps and materiel solutions appear to be accepted with little record of rigorous questioning. While there is some limited or occasional participation by the OSD staff in JCIDS bodies (FCBs and the JROC itself), their participation is only in an advisory role. We did not find that advice from OSD participants, if offered, has had any significant effect.

The JROC/JCIDS process provides an important joint perspective and facilitates robust Combatant Command involvement. However, almost thirty years after the Goldwater-Nichols reforms emphasized the joint perspective, the observed deficiencies suggest that the problem is structural and that the DOD should consider alternative ways to provide the Department-wide perspective needed in the acquisition front-end process. When the Military Services present a requirement for a major acquisition new start to the JROC, powerful forces are at work to press for approval. The Service Vice Chiefs of Staff sit as a member of the JROC. Frequently, the sponsoring Service’s Chief of Staff

(and often the Secretary of the military department) has declared that a program is necessary—sometimes quite publicly. Naturally, other members of the JROC will be extremely reluctant to seriously question such recommendations from their counterparts in that forum. It is unrealistic to expect otherwise. And once a major Service initiative has JROC approval, it is politically difficult for the Secretary (acting through his/her staff) to choose a different course—particularly in the absence of a strong, analytically persuasive case.

Thus, IDA’s review found no basis to disagree with the 2008 GAO finding that the JCIDS “...process has not proven to be an effective approach to increase the level of joint participation or to prioritize the capability needs of the services, COCOMs, and other DOD components” and that the “...department continues to lack an analytic approach and appropriate alignment of resources to balance competing capability needs.”<sup>69</sup> In the past, OSD-level “mission area assessments” were effective in helping the Secretary to “get out in front” with regard to defining the need for acquisition new starts.<sup>70</sup> The IDA-proposed Capability Area Assessments, if effectively implemented, should be able to play a similar role. The extant CPM process might do so as well, if suitably modified, empowered, and rigorously enforced.

Key features of such a revitalized capability area analysis process would be:

- The establishment of standing teams of expert analysts competent in both the technical and operational aspects of each mission/capability area and responsive exclusively to the Secretary’s needs for independent analyses
- Broad access by such teams, both formal and informal, to the early concepts and data essential to such analyses, including information on changing threats and national strategy goals

## **B. Identification of Capability Gaps and Solutions**

To the extent that resources permitted, the IDA study team examined several potential acquisition new starts. Three of those examined have passed MDD decision points. While a larger sampling would have been desirable, we believe that the sample examined provides a sound basis for drawing conclusions about the adequacy of the process for starting acquisition programs. Consistent with the description of the CBA given in Section 2.B.2 above, the pre-MDD process should provide insights into the following:

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<sup>69</sup> U.S. Government Accountability Office, *DoD’s Requirements Determination Process Has not Been Effective in Prioritizing Joint Capabilities*, GAO-08-1060, (Washington, D.C., September 2008), 18.

<sup>70</sup> O’Neil and Porter, *What to Buy*.

- What critical gaps exist in programmed U.S. military capabilities to execute the approved national defense strategy?
- What are the risks of not addressing those gaps?
- What feasible solutions are there? In particular, is there a compelling need for a materiel solution?
- If so, are there technically sound, achievable, and affordable materiel options deserving further consideration?

The evidence from these programs is that pre-MDD processes are *not* providing adequate insights regarding those questions, despite the laudable increased OSD attention to the early phases of acquisition evidenced by the MDD process itself and by the new Development Planning initiatives of the OUSD(AT&L).

There appears to be a lack of analytical rigor in most of the pre-MDD products we examined. The overall impression is one of “going through the motions” to satisfy bureaucratic demands, rather than shedding light for the decision-maker. Clearly many, if not most, areas of military operations are difficult to analyze rigorously, especially if by “rigorously” one expects quantitative assessments based on sound mathematical processes (i.e., models). In fact, none of the ICD/CBAs the IDA study team examined met this demanding criterion. The documents are exhaustive in describing gaps, but generally ignore the need to provide insights into (1) the technical, operational, and fiscal feasibility filling the gap and (2) the risks those gaps entail. Without those assessments it is not possible for the decision-maker to assess the criticality of addressing the capability gaps *and* whether starting a particular major acquisition program is the most cost-effective solution. The lone exception was the Sea-Based Strategic Deterrent ICD, which does provide one example of a well-reasoned and well-presented case for an acquisition new start.

Again, the IDA study team would like to point to the example of the mission area analyses that once proved effective in the 1970s. The success of that approach strongly suggests that a similar analytic approach be incorporated in a re-engineered front-end to the DOD acquisition process that would provide meaningful analytical insights into truly significant capability gaps and assign appropriate priorities to them.

### **C. Preparing for Materiel Development Decisions**

The current pre-MDD process, once an ICD has been approved by the JROC, revolves around the formation of an OIPT. The OIPT reviews the proposed program’s readiness for an MDD DAB. The CAPE participant works with the sponsoring component in preparing draft broad AoA guidance. Assuming there is a consensus on the readiness for a DAB review, an OIPT report is prepared for the Milestone Decision

Authority (DAB chair) recommending that an MDD be scheduled. If the OIPT assesses that the proposed program is *not* ready for an MDD, the sponsoring component would be provided feedback regarding the remedial steps required and a DAB review would be deferred. We have not found evidence that the OIPT routinely delves deeply into the CBA or other analyses that support the ICD. Rather, it appears that the JROC recommendation is taken as adequate to ensure that the requirement for a new start is sound.

The OPIT reports and DAB briefings appear to be merely exercises in “checking the box.” In other words, we found what appears to be a serious deficiency of the pre-MDD process. There is no independent verification on behalf of the Secretary of the existence and criticality of the capability gap (as implied by the risks of not addressing it). There are, of course, opportunities beyond the MDD to question the merits of a program and to cancel it if it doesn’t pass muster. But as programs gather momentum, cancellation becomes increasingly more difficult, since strong vested interests form to continue the program. In addition, it is wasteful to expend resources, however modest (prior to Milestone A), on programs with weak justification. It is far better to not initiate them to begin with—even before they come forward for an MDD.

Implementation of the affordability and cost growth provisions of the USD(AT&L) memoranda of September 14<sup>71</sup> and November 3, 2010<sup>72</sup> will be of great help in providing better analytical support for milestone reviews. The November memorandum directs the components to establish:

- Baseline Portfolio and/or Mission Area Definitions for all candidate programs
- Affordability targets to be treated like a Key Performance Parameter at Milestone A
- Systems engineering trade-off analyses at Milestone B that show how cost varies as major design parameters and time to complete are traded off against each other

At the same time, the memorandum raises concerns because it:

- Directs component heads to make affordability assessments, but such assessments also need to be made at the Department-wide level (furthermore, many important mission areas are not component-unique)

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<sup>71</sup> USD (AT&L), *Better Buying Power: Guide for Obtaining Greater Efficiency and Productivity in Defense Spending*, Memorandum for Acquisition Professionals, 14 September 2010.

<sup>72</sup> USD (AT&L), *Implementation Directive for Better Buying Power -- Obtaining Greater Efficiency and Productivity in Defense Spending*, Memorandum for Secretaries of the Military Departments and Directors of the Defense Agencies, 3 November 2010.

- Does not require affordability assessments and trade-off analyses to support the MDD

#### **D. Selected Aspects of the Weapon Systems Acquisition Reform Act of 2009 (WSARA) and the 2008 National Defense Authorization Act**

The study's tasking specified identifying potential changes to WSARA in the areas covered by the study. To understand the implications of WSARA the IDA study team also reviewed provisions of the 2008 National Defense Authorization Act (NDAA) that were modified by WSARA. By and large, we found that WSARA provisions are positive and helpful.

There are two general provisions within the areas addressed in the study: those that require that officials responsible for acquisition, budgeting, and cost estimation "have the opportunity" to make estimates and raise cost and schedule issues "before performance objectives are established," and those that specify or imply that the JROC perform trade-offs of cost, schedule, and performance objectives for "each new joint requirement" that it recommends and that the JROC perform portfolio management functions.<sup>73</sup> A third area of concern relates to a requirement for certification at Milestone A that was instituted by the 2008 NDAA and modified by WSARA. But that concern is more about the 2008 NDAA provision than the WSARA modification of it.

The first provision is entirely consistent with this study's findings. We not only believe that the senior DOD official should have the "opportunity" to raise trade-off issues early in the acquisition process, but that they have an *obligation* to do so. The recommendations in this paper would substantially strengthen DOD's ability to respond to the act's dictum. While, arguably, the Secretary and other "responsible officials" have always had "the opportunity" to make the trade-offs addressed in the act (for example, in the DOD program review process and within the CPM functions as required by DODD 7045.20), this study has found, as explicated above, that such trade-off analyses are not frequently made by OSD officials in the current process.

Regarding the second provision, the study team believes, for the reasons stated in Section A of this chapter, that the JROC cannot reasonably be structured bureaucratically to perform such cross-service functions effectively, and that, in any case, the responsibility for those functions more properly resides with the Secretary, supported by OSD. Again, a strengthened front-end process at the Secretary level would greatly

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<sup>73</sup> See U.S. Governmental Accountability Office, *DoD Weapon Systems: Missed Trade-off Opportunities During Requirements Review*, GAO-11-502, June 2011 which was published during the final editorial stage of this study.

facilitate performing those functions, and would allow the Joint Staff to participate fully in the process, contributing recommendations and insights from the JROC. Should the Department decide to respond to the Congressional invitation to suggest improvements in WSARA 2009, that area is one that might be addressed.

In addition, WSARA amends Section 943 of the 2008 NDAA, which in turn amended section 2366a of Title 10 U.S. Code, by adding a requirement for certification of programs at Milestone A attesting (among several requirements) that:

A cost estimate for the program has been submitted, with the concurrence of the Director of Cost Assessment and Program Evaluation, and that the level of resources required to develop and procure the program is consistent with the priority level assigned by the Joint Requirements Oversight Council.<sup>74</sup>

The IDA study team has two concerns with this provision. The first is in regard to the cost estimate. The cost provision was refined further in the WSARA by clarifying that CAPE would “conduct an independent cost estimate” in advance of such certification. Under the previous law (before the 2008 NDAA), a cost estimate was only required at Milestone B. That cost estimate covered the development, production, and twenty years of operations for the full set of systems planned for acquisition at Milestone B. Making a comparable estimate at Milestone A is limited by the lack of definition of the planned acquisition at that milestone. The final system design, the scope of the program, detailed inventory objectives, and support concepts are not yet fully defined. Thus total program cost estimates at Milestone A are inherently of low confidence. What is most important at Milestone A is: 1) that a determination that adequate funding has been allocated to achieve the intended reductions in technology risk before the full-scale development decision considered at Milestone B, and 2) that the likely resulting program appears to be affordable in both the mid-term and long term (well beyond the FYDP period) in light of other demands on the expected level of DOD resources. It would be useful to clarify those provisions by specifying that the intention of developing cost estimates at Milestone A is to serve those ends and that such estimates are understood to be subject to a substantial degree of uncertainty.

The second concern with this provision is the specification that the resources required by the program be “consistent with the priority level assigned by the [JROC].” The priority level assigned by the JROC is advisory for the Secretary (and the MDA acting as his agent). Therefore, this provision of the law is inconsistent with the responsibility of the Secretary to set priorities for the Department. Furthermore, the IDA study team is not aware of any formal process by which the JROC assigns priorities to acquisition programs, except in the Chairman’s Program Recommendations. And

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<sup>74</sup> U.S. Code, Title 10, Subtitle A, Part IV, Chapter 139, § 2366a.

normally the priorities in that document are stated broadly, not to the level of specific programs.

## **E. Recommendations and Discussion**

The above findings and conclusions lead the IDA study team to essentially one major recommendation:

*An analytically-based process, not dependent on component analytical support, is needed to allow the Secretary of Defense to exercise appropriate governance over acquisition new starts.*

The key characteristics of the recommended process should be that it is:

- Focused on the Secretary's priorities
- Independent of sponsoring components
- Focused on a clearly defined span of programs within capability/mission area
- Allowed unfettered, immediate access to data
- Adequately resourced

### **1. Capability Area Assessments**

The study team believes that, at the conceptual level, the IDA-proposed Capability Area Assessments is the best approach to providing the needed process. These assessments would be similar to the mission area assessments of the past. Under overall DCAPE direction, CAA teams would be standing analytical groups with responsibility throughout the annual PPBS cycle. Team membership would be tailored to the subject area, but would include concerned OSD offices, Joint Staff, COCOMs and the DOD components (Services and Agencies) as appropriate. Some analytical support could be provided from in-house resources (primarily CAPE and OASD(R&E)) but it is likely that additional analytical support (e.g., by Federally-Funded Research and Development Centers) would be required. CAA teams would have a broader charter than just acquisition program planning: they would also perform force level, and composition and mix studies, contribute to program front-end assessments, serve as issue teams during program/budget reviews, and could be tasked to do one-time/out-of-cycle issue analyses.

### **2. Modified CPM process**

Suitably modified and revitalized, strengthened acquisition planning functions could be performed by the Capability Portfolio Managers. This option has the advantage that the process is already "on the books." However, changes are needed in order for the

process to function effectively in providing the capabilities that this study is recommending. Minimum changes needed include a restructuring of the portfolios, especially the “force applications” portfolio, which is unmanageably large, and a more formal structure for providing analytical support similar to that described under the CAA process above. In fact the key conceptual difference between the CPM and CAA processes is the role of the DCAPE. Because these processes, however organized, require a strong analytical component, it is appropriate for CAPE, as the Secretary’s in-house analytical group, to play a strong role in either process. Should the CPM process be restructured, that leadership role for CAPE should be recognized more explicitly.

### **3. Process and Organizational Issues**

How the process will fit in with existing processes and organizations must be addressed in implementing any new process in the Department. Regarding our recommendation above, that issue requires more detailed study, though some preliminary thoughts are presented below.

### **4. Interface with AT&L**

At Milestone A reviews, which kick off the Technology Development phase of a new program, the decision authority should have not only the CAPE-led capability needs AoA and affordability analysis but also an independent determination that the proposed technical approach is sound and achievable within the planned resources and schedule. As we have noted in Chapter 2, a formal “Development Planning” process is currently being instantiated within OUSD(AT&L); that process would need to become formally integrated into any new CAA/CPM procedures. That process should provide the sound technical assessments of proposed new concepts that is needed to support this study’s recommendation. At a minimum, no new program proposal should be brought to the DAB for decision without a formal endorsement of the design concept and a risk reduction plan by the ASD(R&E).

### **5. Interface with JCIDS**

If this study’s recommendation was implemented, an ancillary question is how should JCIDS be restructured? While the study team is aware that JCIDS improvement studies are under way as of this writing, it is not expected that the result can meet the Secretary’s need for analysis that is independent of component preferences. This study did not delve deeply enough into JCIDS operations to make a firm recommendation; however, at least some nominal JCIDS functionality would be subsumed by CAA teams or CPMs. A corollary to our recommendation would be that resources now devoted to JCIDS could be reduced. Joint Staff participation in CAA teams or CPM groups would

provide joint military perspectives on capability needs potentially leading to MDAP new starts.

## **6. Interface with Overarching Integrated Product (or Process) Teams and Defense Acquisition Boards**

Under either a CAA- or CPM-based process, there would need to be a strong interface with OIPTs. The CAA team leaders would provide briefings and reports to convey the independent analyses that inform the upcoming decision. OIPT reports recommending that a proposed new program proceed to an MDD should have the explicit (i.e., initialed) concurrence of DCAPE and the ASD(R&E).

## **7. CBAs and ICDs**

Most CBAs that potentially result in MDAPs would be performed under the auspices of the CAA teams or CPMs. That would provide more analytical rigor to the process for assessing capability gaps and attendant risks, and evaluating solutions (materiel and non-materiel). It is essential that CAA teams or CPM working groups have appropriate representation from both the operational communities (COCOMs, Joint Staff and Services) and the technical communities (ASD(R&E) and component labs and technology/product centers) to contribute their expertise.

## **8. Access to Analysis and Data**

Once a component brings forward a request for an acquisition new start, the supporting analysis must be an “open book” for all stakeholders. That means that CAA/CPM teams, OPITs, and oversight groups must have complete, timely, and unhindered access to component analyses, including model documentation, inputs, outputs, and supporting data. “Stonewalling” and delay tactics in this regard are inimical to an effective corporate-level process and must not be tolerated. The DCAPE or ASD(R&E) (in their respective domains) should be the arbiters.

## **9. Component Analytical and Technical Organizations**

All three military departments have large, capable analytical organizations and technology centers. These resources support the current process. Under the study’s recommendation, some reduction in component establishments (especially analytical) might be made to provide resources for the CAA teams or CPMs. Whether or not that would occur, these organizations can and should be participants in the new process (but such participation must be constrained by the need for independence). For example, the component analysis organizations have numerous models that could be employed. The CAA teams or CPMs could task specific analyses to be performed using agreed

assumptions and data under close supervision of the CAA team or CPM to ensure responsiveness and objectivity.

## 10. Lesser Steps

If full implementation of this study's recommendation is considered too ambitious at the present time, more limited improvements could be achieved through the following steps:

- Charge the Director, CAPE with the responsibility of providing guidance and approval of study plans for CBAs similar to that now provided for AoAs. This should be followed up by more active involvement by CAPE and OUSD(AT&L) in ensuring that the analysis is responsive to the guidance and approved plans. This could be accomplished by establishing a "Joint Study Advisory Group" as is now done for AoAs. This approach does have the limitation, however, that components may find incentives to avoid full compliance, as the IDA study team observed in the case of some AoAs. Thus such an approach is not likely to provide as much analytical rigor as would implementation of the full recommendation.
- Although OSD's statutory role in JCIDS processes are "advisory," with *strong support from OSD leadership*, that advisory function could be substantially strengthened, leading to more rigorous JROC review of component proposals, with any OSD dissents explicitly identified to the subsequent OIPT and DAB reviewers.
- OIPTs (supported in particular by CAPE and OASD(R&E/SE)) could delve more deeply into JROC recommendations and insist that sound analytic bases be established for proposed new starts. If not, the component proposal should not be brought to the DAB. In essence, the DAB should be presented with the analytical evidence that provides a persuasive case for the new start. If such evidence is not presented, the DAB should disapprove the new start. A specific improvement would be for the OIPT to be more formally empowered to assess and approve both the adequacy of the development planning and the draft AoA study plan as a prerequisite for a DAB MDD review (e.g., by amendment to DODI 5000.02).
- CAPE's role in performing AoAs could be strengthened. AoA JSAGs could exercise tighter reins over the analysis process to ensure that appropriate alternatives are fully and objectively analyzed. For example, CAPE approval of the detailed AoA study plan should be made explicit, and CAPE should ensure that the alternatives evaluated in the AoA not only span the feasible set but are also *prima facie* affordable. The 5000.02 provision that AoAs must be submitted

sixty days prior to a Milestone A Defense Advisory Board review should be strictly enforced. Affordability analyses must be complete and credible (which will be the case if the provisions of the Defense Acquisition Guidebook are studiously followed).

## **11. WSARA Refinements**

As discussed above, the Department should consider responding to the Congress's offer to consider WSARA improvements by addressing the following needed clarifications:

- WSARA should more explicitly acknowledge the Secretary's fundamental responsibility for deciding what new weapon system capabilities need to be acquired, fully informed by the advice of the Chairman and JROC, and that the absence of a formal JROC ICD or priority level does not preclude the Secretary from initiating or approving a new acquisition program.
- Section 2366a, U.S. Code, should be amended to eliminate or modify the provision that, at Milestone A decisions, the MDA must certify that the program is consistent with priorities established by the JROC. An appropriate modification would be to say that the decision was "informed by priorities established by the JROC."



# Appendix A

## The Acquisition Policy Provisions of the Weapon Systems Acquisition Reform Act of 2009 (WSARA)

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### SEC 201: CONSIDERATION OF TRADE-OFFS

#### (a) CONSIDERATION OF TRADE-OFFS

(1) The Secretary of Defense to ensure consideration of trade-offs “as part of the process for developing requirements”

(2) (A) “The Department of Defense officials responsible for acquisition, budget, and cost estimation functions are provided an appropriate opportunity to develop estimates and raise cost and schedule matters **before performance objectives are established** for capabilities for which the Chairman and the Joint Requirements Oversight Council is the validation authority; and” (B) the Process for developing requirements to enable spiral and evolutionary development.

#### (b) DUTIES OF JROC

(1) JROC, in consultation with USD(AT&L), USD(C), and Director, CAPE, to ensure consideration of trade-offs.

(2) (C) JROC, in consultation with USD(AT&L), USD(C), and Director, CAPE, to assist the chairman in “**assigning priority levels for joint military requirements.** “[Title 10 Subtitle A Part I chapter 7 SEC 181 (3) requires the JROC to “assist the Chairman in reviewing the estimated level of resources required in the fulfillment of each joint military requirement and in ensuring that such resource level is consistent with the level of priority assigned to such requirement.”]”

(3) and (4) are technical edits

(5) JROC, in consultation with Combatant Commands (CoComs) and USD(AT&L), to assist the Chairman “in **establishing an objective for the overall period of time within which an [IOC] should be delivered to meet each joint military requirement.**” [Amends Sec 181(b)]

#### (c) REVIEW OF JOINT MILITARY REQUIREMENTS

The Secretary of Defense to ensure that each new joint military requirement recommended by the JROC **is reviewed to ensure** that the JROC has:

(1) Sought and considered CoCom input

(2) Considered trade-offs

(3) Considered issues of “joint portfolio management, including alternative material and non-material solutions . . .”

.....

(d) STUDY GUIDANCE FOR AOAs

Director, CAPE to ensure that the guidance requires

(1) Full consideration of trade-offs for each alternative considered

(2) **“An assessment of whether or not the joint military requirement can be met in a manner that is consistent with the cost and schedule objectives recommended by the [JROC]”**

(e) ANALYSIS OF ALTERNATIVES IN CERTIFICATION FOR MILESTONE A

(1), (2), and (3) are technical edits

(4) An MDAP may not receive MS A approval until the MDA certifies that an AoA **“has been performed consistent with study guidance developed by [Director, CAPE]”**

(f) DUTIES OF MDA (Milestone Decision Authority)

**A Major Defense Acquisition Program (MDAP) may not receive Milestone B approval until the MDA certifies that “appropriate trade-offs among cost, schedule, and performance have been made to ensure that” the program is affordable.**

.....

## **SEC 204: ACTIONS TO ADDRESS SYSTEMIC PROBLEMS PRIOR TO MS B APPROVAL**

(a) CERTIFICATION. An MDAP may not receive Milestone A approval . . . “or otherwise be initiated prior to Milestone B approval” until the MDA certifies

(1) That it fulfills an approved ICD

(2) That it is being executed by a competent entity

(3) That if it duplicates an existing capability, the duplication is necessary and appropriate

(4) That a cost estimate has been submitted and that **the resources committed to the program are consistent with the priority level assigned it by the JROC**

(b) NOTIFICATION.

(1) For MDAPS certified under SEC 204 (a), if the projected cost of the program, at any time prior to MS B, by at least 25 percent “or the program manager determines that the period of time required for the delivery of an [IOC] is likely to exceed the schedule objective established pursuant to section 181(b)(5) of this title by more than 25 percent,” the PM shall notify the MDA. The MDA may, in consultation with the JROC, conclude that the new resource levels [and, presumably, schedule] are acceptable. If not the MDA may rescind MS A approval.

(2) Within 30 days of notification by the PM, MDA to provide defense subcommittees a report that:

(A) Identifies root causes of cost or schedule growth

(B) Identifies performance metrics for the remainder of program development

(C) Certifies the need for the program or terminates it

(c) APPLICATION TO ONGOING PROGRAMS

(1) Each MDAP to be certified within by May 22, 2010

(2) (1) applies to any MDAP initiated before May 22, 2009 and not otherwise certified.



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## Appendix C

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## **Appendix D**

### **Abbreviations**

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ACC	Air Combat Command
ADM	Acquisition Decision Memorandum
AF	Air Force
AFROC	Air Force Requirement for Operational Capabilities Council
A-G	Air-To-Ground
AoA	Analyses of Alternatives
AROC	Army Requirement for Operational Capabilities
ASD	Assistant Secretary of Defense
ASD(R&E)	Assistant Secretary of Defense for Research and Engineering
BFT	Blue Force Tracking
BMD	Ballistic Missile Defense
C2BM	Command, Control, and Battle Management
CAA	Capability Area Assessment
CAPE	Cost Analysis and Program Evaluation
CBA	Capabilities-Based Assessment
CD	Concept Decision
CID	Combat Identification
CJCS	Chairman of the Joint Chiefs of Staff
CJCSI	Chairman of the Joint Chiefs of Staff Instruction
COCOM	Combatant Commander
CONOP	Concept of Operations
COTS	Commercial-Off-The-Shelf
CPM	Capability Portfolio Management
C-RAM	Counter Rockets, Artillery, and Mortar
CTE	Critical Technology Element
CTI	Cooperative Target ID
DAB	Defense Acquisition Board
DAE	Defense Acquisition Executive
DAWG	Deputy's Advisory Working Group
DC	Design Concept
DCAPE	Director, Cost Analysis and Program Evaluation
DCR	DOTMLPF Change Request

DDR&E	Director, Defense Research and Engineering
DDRE&E/SE	Director, Defense Research and Engineering/Systems Engineering
DMS	Defense Management System
DMSS	Distributed Maneuver Support and Sustainment
DOD	Department of Defense
DODD	Department of Defense Directive
DODI	Department of Defense Instruction
DOT_LP	Doctrine, Organization, Training, Leadership, Personnel
DOTMLPF	Doctrine, Organization, Training, Material, Leadership and Education, Personnel, and Facilities
DPPG	Defense Planning and Programming Guidance
DPS	Defense Planning Scenario
DTM	Directive-Type Memorandum
EFP	Explosively Formed Penetrator
EoA	Evaluation of Alternatives
ESC	Executive Steering Committee
EW	Electronic Warfare
FCB	Functional Capability Board
FCS	Future Combat Systems
FEA	Front-End Assessment
FNA	Functional Needs Analysis
FOUO	For Official Use Only
FSA	Functional Solutions Analysis
FYDP	Future Years Defense Program
GAO	Government Accountability Office
GCV	Ground Combat Vehicle
HACMD of NA	Homeland Air and Cruise Missile Defense of North America
HBCT	Heavy Brigade Combat Team
IAMD	Integrated Air and Missile Defense
ICBM	Intercontinental Ballistic Missile
ICD	Initial Capabilities Document
IDA	Institute for Defense Analyses
IOC	Initial Operational Capability
JCAs	Joint Capability Areas
JCD	Joint Capabilities Document

JCIDS	Joint Capabilities Integration and Development System
JCTI-G	Joint Cooperative Target Identification-Ground
JFCOM	Joint Forces Command
JFTACA	Joint Future Theater Airlift Capabilities Assessment
JFTL	Joint Future Theater Lift
JHL	Joint Heavy Lift
JROC	Joint Requirements Oversight Council
JROCM	Joint Requirements Oversight Council Memorandum
JSAG	Joint Study Advisory Group
MDA	Milestone Decision Authority
MDAP	Major Defense Acquisition Program
MDD	Material Development Decision
MENS	Mission Element Needs Statement
MGV	Manned Ground Vehicle
MS A	Milestone A
MS B	Milestone B
MSA	Material Solutions Analysis
NDI	Non-Development Item
NII	Networks and Information Integration
MNS	Material Needs Statement
OIF	Operation Iraqi Freedom
OIPT	Overarching Integrated Product (or Process) Team
OPR	Office of Primary Responsibility
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OASD(NII)	Office of Assistant Secretary of Defense for Networks and Information Integration
OUSD(AT&L)	Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics
PM	Program Manager
POM	Program Objective Memorandum
POR	Program of Record
PPBS	Planning, Programming, and Budgeting System
QDR	Quadrennial Defense Review
RFP	Request for Proposal
SASC	Senate Armed Services Committee

SBSD	Sea-Based Strategic Deterrent
SECDEF	Secretary of Defense
SOCOM	Special Operations Command
STOL	Short Take-Off and Landing
STRATCOM	Strategic Command
TARDEC	Tank Automotive Research, Development and Engineering Center
TD	Technology Development
TDS	Technology Development Strategy
TRANSCOM	Transportation Command
USD(AT&L)	Under Secretary of Defense for Acquisition, Technology, and Logistics
USD(C)	Under Secretary of Defense, Comptroller
USD(I)	Under Secretary of Defense, Intelligence
USD(P&R)	Under Secretary of Defense for Personnel and Readiness
USD(P)	Under Secretary of Defense for Policy
VTOL	Vertical Take-Off and Landing
WSARA	Weapon Systems Acquisition Reform Act of 2009

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