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# **Defense Acquisitions: How DOD Acquires Weapon Systems and Recent Efforts to Reform the Process**

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## Summary

The Department of Defense (DOD) acquires goods and services from contractors, federal arsenals, and shipyards to support military operations. *Acquisition* is a broad term that applies to more than just the purchase of an item or service; the acquisition process encompasses the design, engineering, construction, testing, deployment, sustainment, and disposal of weapons or related items purchased from a contractor.

As set forth by statute and regulation, from concept to deployment, a weapon system must go through a three-step process of identifying a required (needed) weapon system, establishing a budget, and acquiring the system. These three steps are organized as follows:

1. The Joint Capabilities Integration and Development System (JCIDS)—for identifying requirements.
2. The Planning, Programming, Budgeting, and Execution System (PPBE)—for allocating resources and budgeting.
3. The Defense Acquisition System (DAS)—for developing and/or buying the item.

The Defense Acquisition System uses “milestones” to oversee and manage acquisition programs. At each milestone, a program must meet specific statutory and regulatory requirements before the program can proceed to the next phase of the acquisition process. There are three milestones:

- Milestone A—initiates technology maturation and risk reduction.
- Milestone B—initiates engineering and manufacturing development.
- Milestone C—initiates production and deployment.

Both Congress and DOD have been active in trying to improve defense acquisitions. A comprehensive legislative effort to improve weapon system acquisition occurred in May 2009, when Congress passed and the President signed into law the Weapon Systems Acquisition Reform Act of 2009 (S. 454/P.L. 111-23). Key provisions in the act include appointment of a Director of Cost Assessment and Program Evaluation within DOD to establish guidance on cost estimating; appointment of a Director of Developmental Test and Evaluation; appointment of a Director of Systems Engineering; and a requirement that the Director of Defense Research and Engineering periodically assess technological maturity of Major Defense Acquisition Programs.

DOD has undertaken a comprehensive effort to improve defense acquisitions, including rewriting elements of the regulatory structure that govern defense acquisitions and launching the *Better Buying Power* and *Better Buying Power II* initiatives aimed at “implementing practices and policies designed to improve the productivity of the Department of Defense and of the industrial base.”

An oversight issue for Congress is the extent to which the Weapon Systems Acquisition Reform Act and the various DOD initiatives are having a positive effect on acquisitions, and what additional steps, if any, Congress can take to further the effort to improve defense acquisitions.

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## Introduction

This report provides an overview of the process by which the Department of Defense (DOD) acquires weapon systems and briefly discusses recent major efforts by Congress and DOD to improve the performance of the acquisition system. For a discussion on the process for dealing with significant cost growth in weapon systems, see CRS Report R41293, *The Nunn-McCurdy Act: Background, Analysis, and Issues for Congress*, by Moshe Schwartz.

## Background

The Department of Defense acquires goods and services from contractors, federal arsenals, and shipyards to support military operations. *Acquisition* is a broad term that applies to more than just the purchase of an item or service; the acquisition process encompasses the design, engineering, construction, testing, deployment, sustainment, and disposal of weapons or related items purchased from a contractor.<sup>1</sup> From a policy perspective, federal regulations and federal law generally use the terms *acquisition* and *procurement* interchangeably.<sup>2</sup> The term procurement, when used within the context of acquisitions, is different from the budget definition of procurement that generally references the Procurement budget appropriations account—a funding stream that is distinct from Research and Development, Operations and Maintenance, and other budget categories.

DOD’s acquisition process is highly complex and does not always produce systems that meet estimated cost or performance expectations. Congress has been concerned with the structure and performance of the defense acquisition system for many years. For example, the House Armed Services Committee’s report of the FY2007 defense authorization bill stated

Simply put, the Department of Defense (DOD) acquisition process is broken. The ability of the Department to conduct the large scale acquisitions required to ensure our future national security is a concern of the committee. The rising costs and lengthening schedules of major defense acquisition programs lead to more expensive platforms fielded in fewer numbers. The committee’s concerns extend to all three key components of the Acquisition process including requirements generation, acquisition and contracting, and financial management.<sup>3</sup>

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<sup>1</sup> The Federal Acquisition Regulation states that “[a]cquisition begins at the point when agency needs are established and includes the description of requirements to satisfy agency needs, solicitation and selection of source, award of contracts, contract financing, contract performance, contract administration, and those technical and management functions directly related to the process of fulfilling agency needs by contract.” See FAR 2.101.

<sup>2</sup> In the section of the Federal Acquisition Regulation that defines terms (2.101), the entry for the definition of Procurement states “(see ‘acquisition’).”

Title 10 of the *U.S. Code*, Chapter 137 (Procurement Generally), adheres to a definition of *procurement* that “includes all stages of the process of acquiring property or services, beginning with the process for determining a need for property or services and ending with contract completion and closeout.” See 10 U.S.C. §2302, referencing Title 41, §111. Title 41, §131, defines *acquisition* as “the process of acquiring, with appropriated amounts, by contract for purchase or lease, property or services (including construction) that support the missions and goals of an executive agency, from the point at which the requirements of the executive agency are established ... ” and includes development, solicitation, contract award, and contract performance, through final delivery and payment.

<sup>3</sup> H.Rept. 109-452. *Report of the Committee on Armed Services, House of Representatives on H.R. 5122*. May 5, 2006, p. 350.

Over the decades, congressional oversight has focused on many aspects of the acquisition process, from “micro-level” practices, such as characteristics of a particular contract, to “macro-level” practices, such as management and execution of the Joint Strike Fighter and other Major Defense Acquisition Programs (MDAPs).<sup>4</sup> Congress has held oversight hearings and enacted legislation in an effort to improve the defense acquisition structure and its practices.<sup>5</sup>

## Statutory and Regulatory Foundation

Title 10 of the *United States Code* governs the organization, structure, and operation of the Armed Forces of the United States. Several sections within the title charge the secretaries of the military departments (Army, Navy, and Air Force) with responsibility to “equip” the armed forces. General procurement provisions, many of which apply to MDAPs and MAISs (Major Automated Information Systems), are spread throughout the title, including assignment of responsibilities, establishment of acquisition procedures, and requirements for reporting to Congress. The annual National Defense Authorization Acts are one of the principal mechanisms by which Congress modifies the defense acquisition structure, also set forth in Title 10.

DOD procurement activities are generally governed by three sets of federal government regulations:

- The first set of regulations applies to the entire federal government (including DOD unless stated otherwise) and is found in the Federal Acquisition Regulation (FAR).
- The second set of regulations applies only to DOD and is found in the Defense Federal Acquisition Regulation Supplement.
- The third set of regulations applies only to individual DOD components and is found in component-unique FAR Supplements.<sup>6</sup>

Procurement actions in DOD must adhere to the various regulations, and program managers must take the regulations into account during the planning and execution of their programs.

## The Process for Buying a Weapon System

Every weapon system in the U.S. arsenal is intended to satisfy a specific military need (often referred to as a *requirement*), must be paid for by the federal *budget*, and is designed and built within an *acquisition system*. From concept to deployment, a weapon system must go through the

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<sup>4</sup> MDAPs are the Department’s most expensive acquisition programs. MDAPs are statutorily defined in 10 U.S.C. §2430 as DOD acquisition programs whose value based on FY1990 constant dollars exceeds \$300 million of Research, Development, Test and Evaluation funding (approximately \$442 million in FY2009 dollars), \$1.8 billion of Procurement funding (approximately \$2.578 billion in FY2009 dollars), or are designated MDAPs by the Under Secretary of Defense for Acquisition, Technology, and Logistics.

<sup>5</sup> Congress’s authority to reorganize the defense acquisition process stems primarily from Article I, Section 8, of the Constitution, which vests the legislature with the power to “raise and support Armies ... provide and maintain a Navy ... [and] make Rules for the Government and Regulation of the land and naval Forces.”

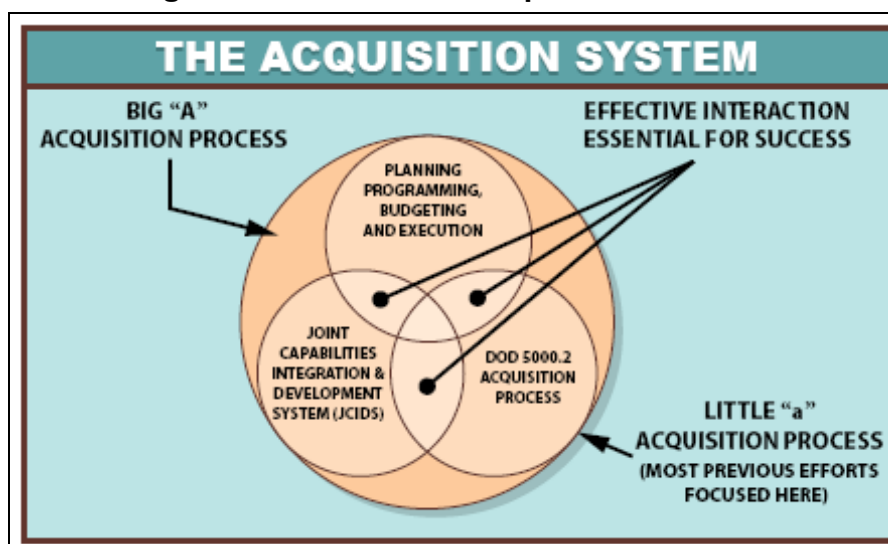
<sup>6</sup> Components with their own regulations include the Army, Air Force, Navy and Marine Corps, Defense Logistics Agency, and U.S. Special Operations Command.

three-step process of identifying the required weapon system, establishing a budget, and acquiring the system. These three steps are organized as follows:

1. The Joint Capabilities Integration and Development System—for identifying requirements.
2. The Planning, Programming, Budgeting, and Execution System—for allocating resources and budgeting.
3. The Defense Acquisition System—for developing and/or buying the item.

These three steps (each of which is a system onto itself), taken together, are often referred to as “Big ‘A’” acquisition, in contrast to the Defense Acquisition System, which is referred to as “little ‘a’” acquisition (see **Figure 1**).

**Figure 1. DOD’s Defense Acquisition Structure**



Source: Defense Acquisition Performance Assessment Report, February 2006, p. 4.

## The Requirements Process: Joint Capabilities Integration and Development System (JCIDS)

The Joint Capabilities Integration and Development System is the process by which DOD identifies, assesses, and prioritizes what capabilities the military requires to fulfill its mission. As such, JCIDS is often referred to as the requirements generation process. Requirements identified through JCIDS can be addressed in a number of ways, including changes in doctrine, training, and organization, or the acquisition of a new item, such as a weapon system.

The JCIDS process was created in 2003 in an effort to fundamentally change the way DOD developed requirements. Prior to 2003, DOD used a threat-based approach to identifying warfighter requirements.<sup>7</sup> With the advent of JCIDS, DOD shifted to a capabilities-based approach to identifying warfighter needs. In other words, instead of developing, producing, and

<sup>7</sup> This threat-based approach was known as the Requirements Generation System.

fielding systems based on specific perceived threats to the nation, DOD adopted a policy of identifying what capabilities it needs to meet the strategic direction and priorities set forth in high-level strategy and guidance documents such as the National Military Strategy, National Defense Strategy, and Quadrennial Defense Review.<sup>8</sup>

Many analysts suggest that under the threat-based approach, each military service identified a threat, and in response to the threat developed its own independent weapons. The shift to a capabilities-based approach served to promote a more collaborative method of identifying capability gaps across services instead of each service developing its own response. As a result, weapon systems are expected to be developed jointly among services.

JCIDS is governed by the *Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01H* and utilizes the procedures described in the *Manual for the Operation of the Joint Capabilities Integration and Development System*. According to DOD policy, the first step in the process is to conduct a Capabilities Based Assessment (CBA), which analyzes the military's capability needs and gaps, and recommends both materiel<sup>9</sup> and non-materiel ways to address the gaps.<sup>10</sup> If, as a result of a CBA or a comparable study a materiel solution (such as a weapon system) is considered, an Initial Capabilities Document (ICD) is prepared.<sup>11</sup> The ICD justifies the need for a materiel solution to satisfy the identified capability gap.

The Joint Requirements Oversight Council (JROC), the organization responsible for identifying and prioritizing warfighter requirements, must approve the ICD.<sup>12</sup> To approve the ICD, the JROC reviews and validates

- the capabilities required to perform the defined mission,
- the gap in capabilities required to perform the mission, and
- how the identified capability gap will be addressed (in whole or in part).

The JROC may approve an ICD and recommend a non-materiel solution to meeting the military need, such as a change to strategy or tactics. If the JROC approves a materiel solution, the program enters the Defense Acquisition System (“little ‘a’”). The documentation developed during the JCIDS process serves as the basis for decisions throughout the acquisition process.

Despite its important role, the JROC does not have binding authority; it serves in an advisory role to the Chairman of the Joint Chiefs of Staff. The Chairman is responsible for advising the

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<sup>8</sup> Chairman of the Joint Chiefs of Staff Instruction 3170.01H, *Joint Capabilities Integration and Development System*.

<sup>9</sup> A materiel item is any item “(including ships, tanks, self-propelled weapons, aircraft, etc., and related spares, repair parts, and support equipment, but excluding real property, installations, and utilities) necessary to equip, operate, maintain, and support military activities without distinction as to its application for administrative or combat purposes.” See DOD Dictionary of Military Terms, [www.dtic.mil/doctrine/dod\\_dictionary/index.html](http://www.dtic.mil/doctrine/dod_dictionary/index.html).

<sup>10</sup> CJCSI 3170.01H.

<sup>11</sup> Urgent or emergency operational needs may result in an Urgent Operational Need or Emergent Operational Need document instead of an ICD.

<sup>12</sup> Capability requirement documents such as the ICD can be delegated to components in certain circumstances. The JROC is a statutorily established council, defined in 10 U.S.C. §181. The roles and responsibilities of the JROC are delineated in CJCSI 5123.01F. The Vice Chairman of the Joint Chiefs of Staff serves as the JROC Chairman. Each military service has a representative on the JROC. Combatant Commands can serve as voting members and are encouraged to participate when issues related to the jurisdiction of the particular combatant command are before the council. See CJCSI 5123.01F, p. A-4.



Secretary of Defense on “the priorities of the requirements identified by the commanders of the unified and specified combatant commands” and on the “extent to which the program recommendations and budget proposals of the military departments and other components of the Department of Defense” conform to the priorities established in strategic plans.<sup>13</sup> Ultimately, the Secretary of Defense, as head of DOD, has authority, direction, and control over requirements and acquisitions (subject to the President and Congress).<sup>14</sup>

## **The Budgeting Process: Planning, Programming, Budgeting and Execution System (PPBE)**

The Planning, Programming, Budgeting, and Execution system develops DOD’s proposed budget for all acquisitions, including MDAPs.<sup>15</sup> The PPBE is intended to provide DOD with the best mix of forces, equipment, manpower, and support within fiscal constraints.<sup>16</sup>

The PPBE is an annual process consisting of four stages: planning, programming, budgeting, and execution.

- **Planning:** During this stage, a national defense strategy is defined and a plan is developed for executing the strategy. The plan sets forth priorities for developing programs (including military force modernization, readiness, and business processes and infrastructure support) and is published in the Joint Programming Guidance.<sup>17</sup> This document helps guide the DOD components’ efforts to propose or modify acquisition programs.<sup>18</sup>
- **Programming:** During this stage, proposed programs are fleshed out and a Program Objective Memorandum (a document that outlines the anticipated missions and objectives of the proposed weapon system and anticipated budget requirements) is submitted. These memoranda are reviewed and, as deemed appropriate, integrated into an overall defense program.
- **Budgeting:** Budgeting occurs concurrently with the programming stage. Proposed budgets are reviewed in a different manner than proposed programs. Upon completion of a program decision or as a result of a budget review, Program Budget Decisions are issued.
- **Execution:** During execution, programs are evaluated and measured against preestablished performance metrics, including rates of funding obligations and expenditures.

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<sup>13</sup> 10 U.S.C. §153(a)(4).

<sup>14</sup> 10 U.S.C. §113.

<sup>15</sup> DAU offers an online course on PPBE at <https://learn.dau.mil/html/clc/Clc.jsp>.

<sup>16</sup> Department of Defense Directive 7045.14, *The Planning, Programming, Budgeting, and Execution (PPBE) Process*, January 25, 2013, p. 2.

<sup>17</sup> See <https://dap.dau.mil/aphome/ppbe/Pages/Programming.aspx>.

<sup>18</sup> DOD components include the Office of the Secretary of Defense; the Military Departments; the Chairman, Joint Chiefs of Staff and Joint Staff; the Unified Combatant Commands; the Defense Agencies; and DOD field activities.



## The Defense Acquisition System

The Defense Acquisition System is the management process by which DOD develops and buys weapons and other systems.<sup>19</sup> It is governed by Directive 5000.01, *The Defense Acquisition System*,<sup>20</sup> and Instruction 5000.02, *Operation of the Defense Acquisition System*,<sup>21</sup> and utilizes the procedures described in the Defense Acquisition Guidebook.<sup>22</sup>

The Defense Acquisition System is not intended to be a rigid, one-size-fits-all process. Acquiring information technology systems is different than acquiring missiles, which is different than acquiring a nuclear attack submarine. As Instruction 5000.02 states:

the structure of a DOD acquisition program and the procedures used should be tailored as much as possible to the characteristics of the product being acquired, and to the totality of circumstances associated with the program including operational urgency and risk factors.

Despite these differences, and the variations of the process contained in the 5000.02 instruction, the general framework of the acquisition system remains the same. This section of the report outlines that framework (based on the hardware-intensive model), pointing out selected instances where deviations may occur.

Generally, the defense acquisition system uses “milestones” to oversee and manage acquisition programs (see **Figure 2**). The milestones serve as gates that must be passed through before the program can proceed to the next phase of the acquisition process. To pass a milestone, a program must meet specific statutory and regulatory requirements and be deemed ready to proceed to the next phase of the acquisition process. There are three milestones:

- Milestone A—initiates technology maturation and risk reduction.
- Milestone B—initiates engineering and manufacturing development.
- Milestone C—initiates production and deployment.

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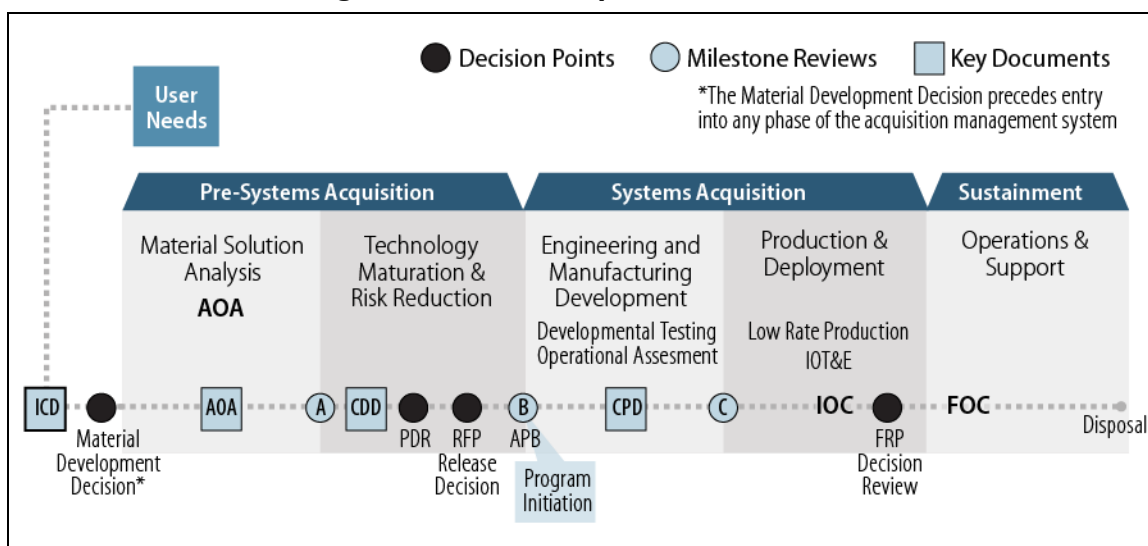
<sup>19</sup> The policies and regulations governing the defense acquisition process are set forth in Department of Defense Directive 5000.01, *The Defense Acquisition System* (a 10-page document that describes the overarching principles of the acquisition system), and the more detailed Department of Defense Instruction (DODI) 5000.02, *Operation of the Defense Acquisition System* (a 150-page document that describes the process and requirements associated with acquisitions). The Defense Acquisition Guidebook serves as a reference for acquisition professionals and contains best practices, detailed guidance, and additional background information. Whereas Directive 5000.01 (issued May 12, 2003, and certified as current November 20, 2007) and Instruction 5000.02 (issued as a new interim instruction November 26, 2013) are static documents, the Defense Acquisition Guidebook is constantly updated to reflect best practices and updated guidance. As of September 16, 2013, the guidebook was more than 1,200 pages.

<sup>20</sup> Department of Defense, *The Defense Acquisition System*, DOD Directive 5000.01, Certified Current, November 20, 2007.

<sup>21</sup> Office of the Under Secretary of Defense (AT&L), *Operation of the Defense Acquisition System*, DOD Instruction 5000.02, November 26, 2013.

<sup>22</sup> The Guidebook can be viewed at <https://acc.dau.mil/CommunityBrowser.aspx?id=654219>.

**Figure 2. Defense Acquisition Milestones**



Source: CRS graphic based on DODI 5000.02, p.12.

Each acquisition program, such as the F-35, Littoral Combat Ship, or Joint Light Tactical Vehicle, is managed by an acquisition program office. The program office is headed by a Program Manager. Program managers can be military officers or federal civil servants. They are supported by a staff that can include engineers, logisticians, contracting officers and specialists, budget and financial managers, and test and evaluation personnel. Program managers usually report to a Program Executive Officer.<sup>23</sup> Program executive officers can have many program managers who report to them. Like program managers, program executive officers can be military officers or federal civil servants. They, in turn, report to a Component Acquisition Executive.<sup>24</sup> Most component acquisition executives report to the Under Secretary of Defense for Acquisition, Technology, and Logistics, who also serves as the Defense Acquisition Executive.<sup>25</sup>

The official responsible for deciding whether a program meets the milestone criteria and proceeds to the next phase of the acquisition process is referred to as the Milestone Decision Authority (MDA). Depending on the program, the MDA can be the Under Secretary of Defense (Acquisition, Technology, & Logistics), the head of the relevant DOD component, or the component acquisition executive.

### Entering the Defense Acquisition System—Materiel Development Decision

For a program to enter the Defense Acquisition System, it must pass a Materiel Development Decision review, which determines whether a new weapon system is required to fill the identified

<sup>23</sup> Some program managers are labeled “Direct Reporting Program Managers” and report directly to the component acquisition executive or milestone decision authority.

<sup>24</sup> The component acquisition executive for one of the military services (e.g., the Army or the Air Force) is known as the Service Acquisition Executive.

<sup>25</sup> DODD 5000.1 states that the Defense Acquisition Executive takes precedence on all acquisition matters after the Secretary and the Deputy Secretary of Defense. Examples of some other reporting chains include the Defense Information Systems Agency (DISA) acquisition executive, who reports to the director of DISA, and the Special Operations Command (SOCOM) acquisition executive, who reports to the SOCOM commander.

gap (or whether a non-materiel solution, such as a change in training or strategy, is sufficient). The Material Development Decision is based on the requirements validated by the JROC and set forth in the Initial Capabilities Document (or equivalent document).

To pass the Material Development Decision, the MDA must

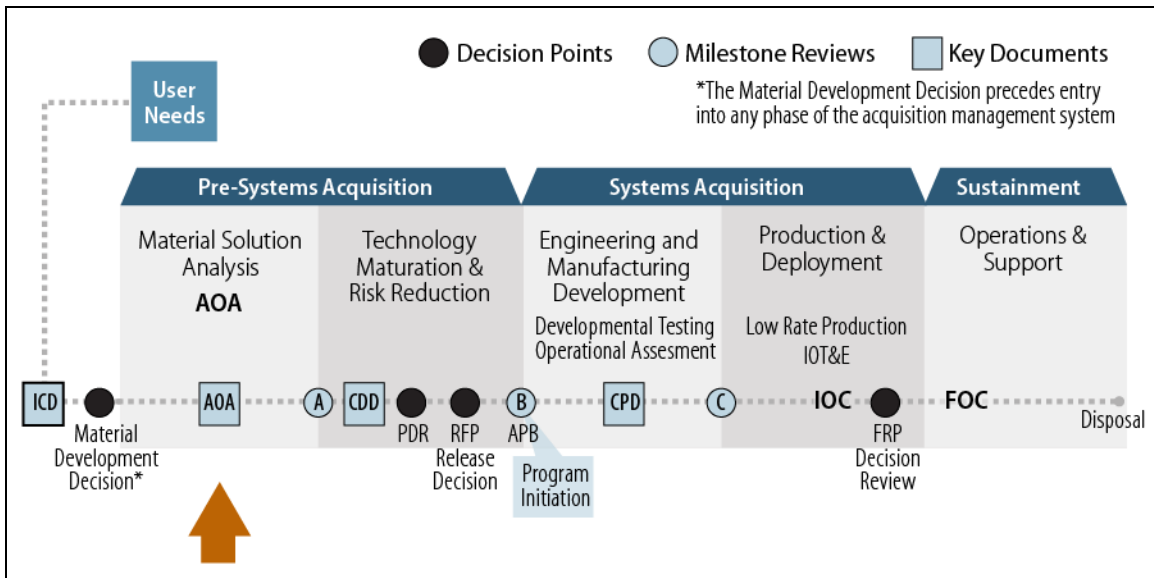
- determine that a materiel solution is necessary,
- approve the plan for developing an Analysis of Alternatives (described in the next section),
- designate the DOD component that will lead the program, and
- identify at which phase of the acquisition system the program should begin.<sup>26</sup>

MDA decisions made at the Material Development Decision review are documented in an Acquisition Decision Memorandum.

### Material Solution Analysis Phase—Determining the Right Solution

The Materiel Solution Analysis Phase is where competing systems are analyzed to determine which one is best suited to meet the validated requirements. This phase occurs prior to any of the milestones (see **Figure 3**).

**Figure 3. Materiel Solution Analysis and the Pre-Milestone Phase**



During this phase, the Analysis of Alternatives is conducted. The Analysis of Alternatives explores the competing methods of meeting the identified requirement. This analysis should include the comparative effectiveness, cost, schedule, concepts of operations, overall risks, and

<sup>26</sup> A program can enter the acquisition system at any point in the process as long as the program meets the requirements for that phase of the system. For example, a program can begin at Milestone B (or C) if a Material Development Decision is made, the program meets the criteria for entering into Milestone B (or C) as set forth by statute and DOD policy, and the MDA authorizes the program to enter at Milestone B (or C).

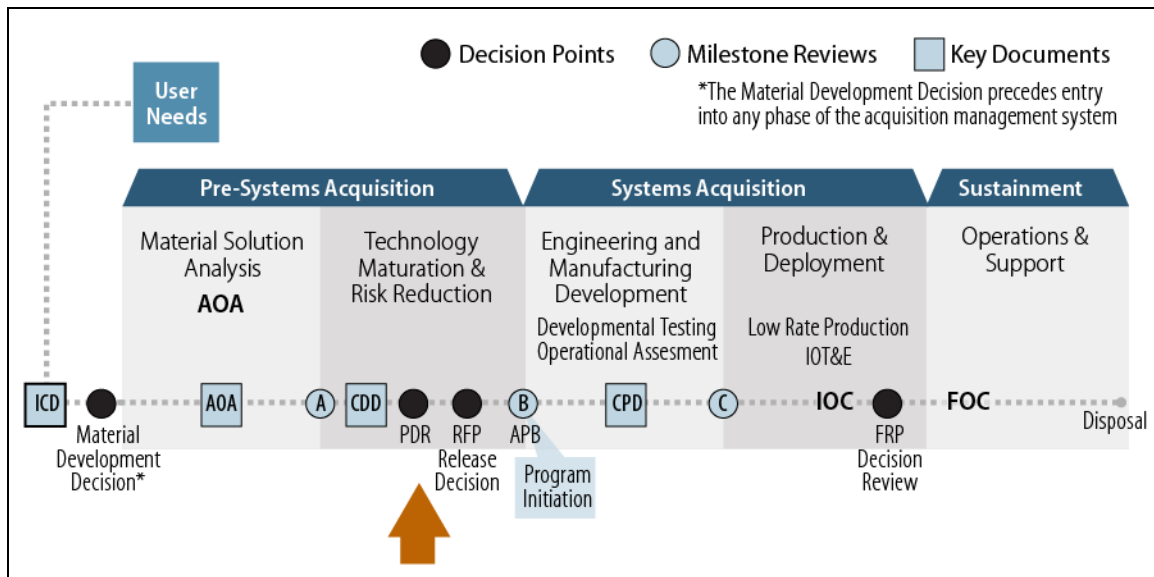
critical technologies associated with each proposed alternative, including the sensitivity of each alternative to possible changes in key assumptions or variables. The Analysis of Alternatives also addresses total life-cycle costs. During this phase, a program manager is selected and a program office is established.

The materiel solution phase ends when the Analysis of Alternatives is completed, a specific solution is chosen to continue through the acquisition process, and the program meets the criteria for the milestone where the program will enter the acquisition system.

### Milestone A and the Technology Maturation and Risk Reduction Phase

A program must pass through Milestone A to proceed to the Technology Maturation and Risk Reduction phase (see **Figure 4**).

**Figure 4. Milestone A: The Technology Maturation and Risk Reduction Phase**



To pass Milestone A,

- the Milestone Decision Authority must approve the proposed materiel solution (based on the Analysis of Alternatives) and the Acquisition Strategy,
- the lead component must submit a cost estimate for the proposed solution (including life-cycle costs),<sup>27</sup>
- the program must have full funding for the length of the Future Years Defense Program,<sup>28</sup> and

<sup>27</sup> Life-cycle costs are the total estimated cost of a program over its full life, including costs for research and development, testing, production, facilities, operations, maintenance, personnel, environmental compliance, and disposal.

<sup>28</sup> The Future Years Defense Program documents the links between DOD resources and programs. The report summarizes resources (such as manpower, equipment, and forces) by fiscal year, with associated programs. This document reflects the decisions embodied in the various Planning, Programming, Budgeting, and Execution (PPBE) (continued...)

- if technology maturation is to be contracted out, the program must have a Request for Proposal (RFP) that is approved by the MDA and ready for release.

MDA decisions made at this milestone are documented in an Acquisition Decision Memorandum.

The Technology Maturation and Risk Reduction phase is when nascent technologies and the system design are matured to the point that a decision can be made with reasonable confidence that a system can be developed to meet military requirements and fit within affordability caps. To meet these twin objectives, requirements are refined and cost caps are finalized.

During this phase, a Capability Development Document<sup>29</sup> and Reliability, Availability, and Maintainability strategy<sup>30</sup> must be developed and approved. These documents will inform the Preliminary Design Review, which is held during this phase to ensure that the preliminary design and basic system architecture are complete, and that there is technical confidence the capability need can be satisfied within cost and schedule goals.<sup>31</sup> This phase is also where competitive prototyping occurs, which is when industry teams develop competing prototypes of a required system.

The Development RFP Release Decision Point is held during this phase. This is one of the critical decision points in the acquisition process because this is when the acquisition strategy is initiated and industry is asked to bid for the development contract. As the DODI 5000.02 emphasizes,

[P]rior to the release of the final RFP(s), there needs to be confidence that the program requirements to be bid against are firm and clearly stated; the risk of committing to development and presumably production has been or will be adequately reduced prior to contract award and/or option exercise; the program structure, content, schedule, and funding are executable; and the business approach and incentives are structured to both provide maximum value to the government and treat industry fairly and reasonably.<sup>32</sup>

## **Milestone B and the Engineering and Manufacturing Development Phase**

Most programs begin at Milestone B, the point at which a program becomes a program of record. A program must pass through Milestone B to proceed to the Engineering and Manufacturing Development Phase (see **Figure 5**).

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(...continued)

documents, such as the Strategic Planning Guidance. The Future Years Defense Program is updated with every program and budget submission to OSD and with the President's budget submission each year.

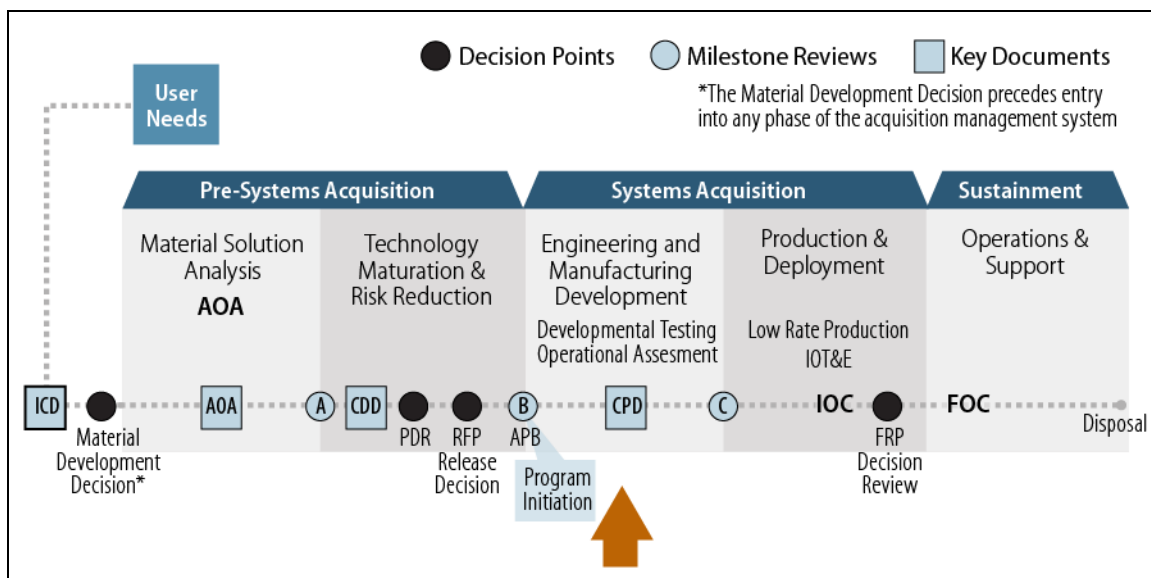
<sup>29</sup> A Capability Development Document details the operational performance parameters for the anticipated system.

<sup>30</sup> Reliability, Availability, and Maintainability (RAM) refers to the reliability, availability, and maintainability of a system. Reliability is the probability of a system performing a specific function under stated conditions for a specified time. Availability is the measure of time a system is operable and able to be committed to a mission. Maintainability is the extent to which a system can be kept in or restored to a specific operating condition. See Department of Defense, *DOD Guide for Achieving Reliability, Availability, and Maintainability*, August 3, 2005, p. 1-1, at [http://www.acq.osd.mil/sse/docs/RAM\\_Guide\\_080305.pdf](http://www.acq.osd.mil/sse/docs/RAM_Guide_080305.pdf).

<sup>31</sup> See *Defense Acquisition Guidebook* ([https://acc.dau.mil/docs/dag\\_pdf/dag\\_complete.pdf](https://acc.dau.mil/docs/dag_pdf/dag_complete.pdf)), p. 261. Preliminary Design Review is held prior to Milestone B unless waived by the MDA. See DODI 5000.02, p. 19.

<sup>32</sup> *Ibid.*, p. 22.

**Figure 5. Milestone B: The Engineering and Manufacturing Development Phase**



To pass Milestone B,

- a program must have passed the Development RFP Release Decision Point;
- requirements must be validated and approved;<sup>33</sup>
- the program must have full funding for the length of the Future Years Defense Program;
- an independent cost estimate must be submitted to the MDA;
- all sources of risk (including cost, technology development,<sup>34</sup> integration, and sustainment) must be sufficiently mitigated to justify fully committing to the development of the program; and
- the Milestone Decision Authority must approve an updated Acquisition Strategy.

Upon passing Milestone B, the MDA approves the Acquisition Program Baseline (APB), which details the performance, schedule, and cost goals of the program.<sup>35</sup> The APB is signed by the MDA and the program manager, and serves as the basis against which execution of the program will be measured. MDA decisions made at this milestone are documented in an Acquisition Decision Memorandum.

The Engineering and Manufacturing Development Phase is where a system is designed and developed, all technologies and capabilities are fully integrated into a single system (full system

<sup>33</sup> Before Engineering and Manufacturing Development can occur, a program must have approved Key Performance Parameters (KPPs). These KPPs can be amended later.

<sup>34</sup> Not all technologies intended for the system are required to be mature to proceed to Milestone B. Some technologies that are still immature may remain in technology development while others proceed to Milestone B as long as the technologies proceeding to Milestone B provide an affordable, militarily useful capability. DOD's approach to proceeding with detailed design and integration of mature technologies while continuing risk reduction of other less mature technologies that will be integrated later is called Evolutionary Acquisition.

<sup>35</sup> The APB contains both objective (desired) and threshold (acceptable) values.

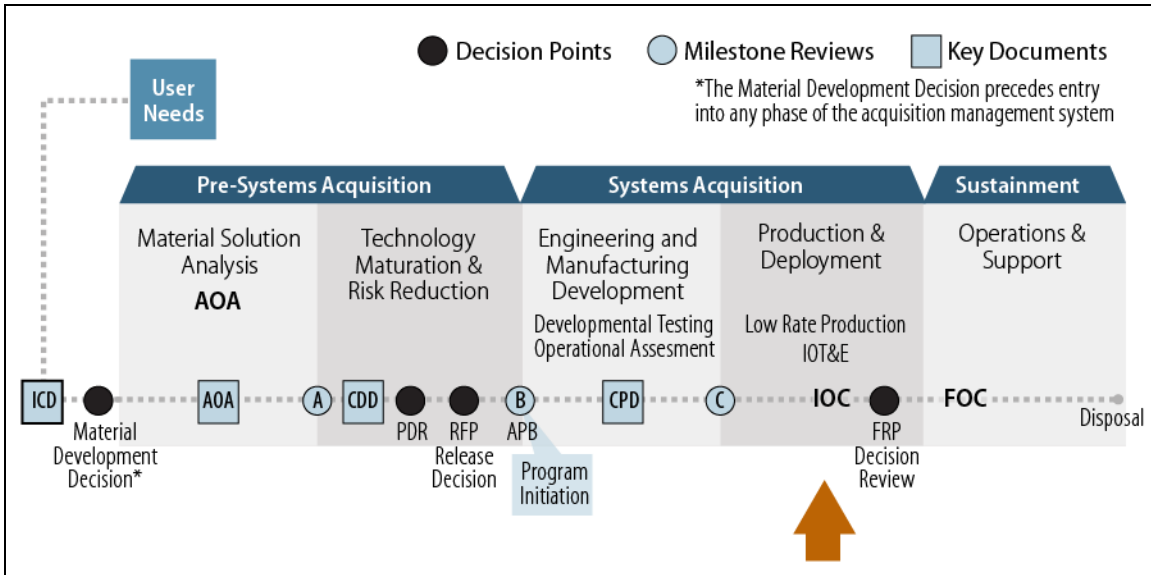
integration), and preparations are made for manufacturing (including developing manufacturing processes, designing for mass production, and managing cost).

During the detail design effort, the office of Developmental Test and Evaluation tests the maturity and adequacy of the design and provides the results of its analyses to the Program Manager. During system integration, the various subsystems are integrated into one system and a development model or prototype is produced.<sup>36</sup> For example, on an aircraft carrier, system integration would be when the aircraft launching system, radar, nuclear reactor, and other subsystems are all integrated onto the ship. Operational testing and evaluation also takes place during this phase, both at the subsystem and integrated-system level. Operational testing and evaluation is intended to determine whether a system is operationally effective, suitable, and survivable.

### Milestone C and the Production and Deployment Phase

A program must pass through Milestone C to proceed to the Production and Deployment phase (see Figure 6).

**Figure 6. Milestone C: The Production and Deployment Phase**



To pass Milestone C,

- the production design must be stable,
- the system must pass developmental testing and operational assessment,
- software must meet the predetermined maturity,

<sup>36</sup> Programs that have very expensive units, such as satellites or ships, may not build test prototypes. In such cases, Milestone B & C may occur simultaneously and the first unit will serve as the test unit and then be fielded. See DODI 5000.02, p. 26.



- the system must demonstrate that it is interoperable with other relevant systems and can be supported operationally,
- estimated costs must be within the cost caps,
- the program must have full funding for the length of the Future Years Defense Program,
- the Capability Production Document must be approved,<sup>37</sup> and
- the Milestone Decision Authority must approve the updated Acquisition Strategy.

MDA decisions made at this milestone are documented in an Acquisition Decision Memorandum.

During the Production and Deployment phase, the MDA authorizes the beginning of low-rate initial production, which is intended to both prepare manufacturing and quality control processes for a higher rate of production and provide test models for operational test and evaluation. A program can enter full-rate production when it has completed sufficient operational testing and evaluation, demonstrated adequate control over manufacturing processes, and received approval of the MDA to proceed with production.

When enough systems are delivered and other predefined criteria are met, an Initial Operating Capability can be attained, allowing for some degree of operations. Full Operational Capability is achieved when the system is ready to operate as required.

## **Operations and Support Phase**

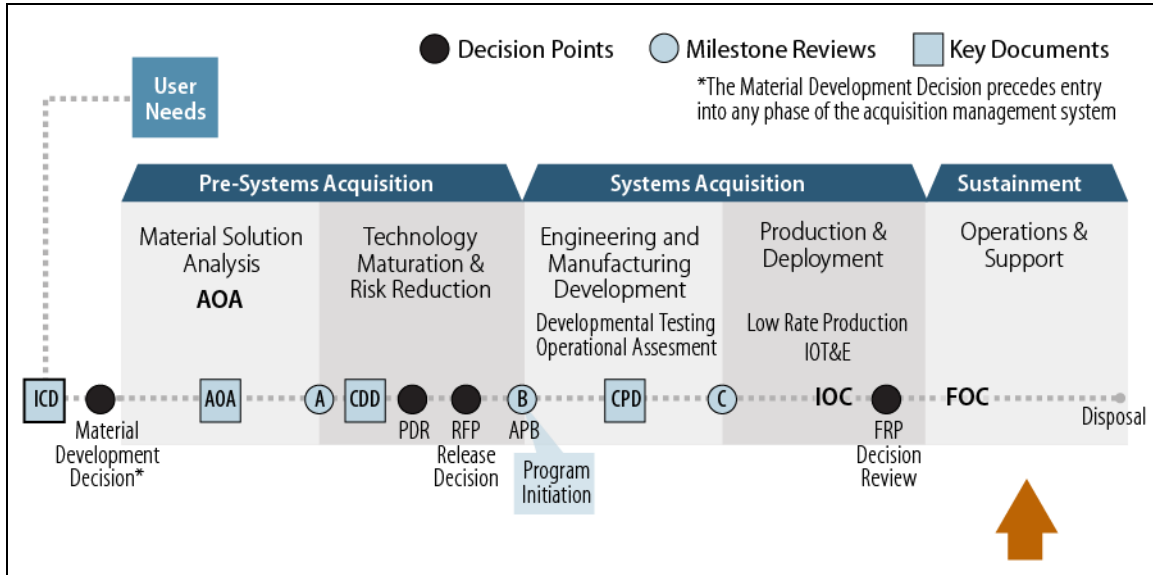
Operations and Support is the final phase of a weapon system's life (see **Figure 7**). In this phase, the system is fully deployed, operated, supported, and ultimately retired. Up to 70% of the total life cycle costs of a system can occur in the operations and support phase.<sup>38</sup>

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<sup>37</sup> The Capability Production Document refines the performance attributes and Key Performance Parameters contained in the Capability Development Document. Cost and engineering estimates are also refined in this document.

<sup>38</sup> Systems that consume fuel, require more frequent maintenance, and rely on a more extensive support infrastructure tend to have higher operations and support costs. As such, operations and support represent a higher percentage of total cost for aircraft and ships, and a lower percentage of costs for satellites and missiles.

**Figure 7. The Operations and Support Phase**



## Acquisition Categories

Programs are divided into acquisition categories (ACATs) based primarily on program cost. The level of management oversight of an acquisition program increases as the cost of the program increases. The most significant DOD and congressional oversight activities apply to MDAPs,<sup>39</sup> which are categorized as ACAT I programs.<sup>40</sup> **Table 1** illustrates the thresholds and decision authorities for all ACATs.

**Table 1. Description of Acquisition Categories**

Category	Reason for Acquisition Category (ACAT) Designation	Decision Authority
ACAT I	<p>Program is a Major Defense Acquisition Program</p> <ul style="list-style-type: none"> <li>Value of the program (including all increments) is estimated by the Under Secretary of Defense (Acquisition, Technology, and Logistics) to require                             <ul style="list-style-type: none"> <li>- Research, Development, Technology, and Engineering in excess of \$480 million; or</li> <li>- is estimated to have procurement costs of more than \$2.79 billion (in FY2014 constant dollars)</li> </ul> </li> </ul> <p style="text-align: center;">or</p> <ul style="list-style-type: none"> <li>Milestone Decision Authority designates program as an ACAT I</li> </ul>	<p>ACAT ID: Under Secretary of Defense (Acquisition, Technology, and Logistics) or as delegated</p> <p>ACAT IC: Head of DOD Component or, if delegated, the Component Acquisition Executive</p>

<sup>39</sup> A number of statutory reporting and oversight requirements applicable only to MDAPs are codified at 10 U.S.C. §144.

<sup>40</sup> Major Automated Information Systems (MAIS) have different dollar thresholds than MDAPs, as shown in **Table 1**.

Category	Reason for Acquisition Category (ACAT) Designation	Decision Authority
ACAT IA <sup>a,b</sup>	<p>Program is a Major Automated Information System (MAIS)</p> <ul style="list-style-type: none"> <li>• An Automated Information System<sup>b</sup> that is estimated (in FY2014 constant dollars) to require more than                             <ul style="list-style-type: none"> <li>- \$40 million for all expenditures directly related to the system, incurred in any single year (including all increments); or</li> <li>- \$165 million for all expenditures directly related to the system, incurred from the start of the Material Solution Analysis Phase through deployment at all sites (including all increments); or</li> <li>- \$520 million for all expenditures directly related to the system, incurred from the start of the Material Solution Analysis Phase through sustainment for the estimated life of the system (including all increments)</li> </ul> </li> </ul> <p style="text-align: center;">or</p> <ul style="list-style-type: none"> <li>• Milestone Decision Authority designates program as an ACAT IA</li> </ul>	<p>ACAT IAM: Under Secretary of Defense (Acquisition, Technology, and Logistics) or as delegated</p> <p>ACAT IAC: Head of the DOD Component or, if delegated, the Component Acquisition Executive</p>
ACAT II <sup>c</sup>	<p>Program does not meet criteria for ACAT I or IA and is a Major System</p> <ul style="list-style-type: none"> <li>• Value of the program estimated to require                             <ul style="list-style-type: none"> <li>- Research, Development, Technology, and Engineering in excess of \$185 million; or</li> <li>- is estimated to have procurement costs of more than \$835 million (in FY2014 constant dollars)</li> </ul> </li> </ul> <p style="text-align: center;">or</p> <ul style="list-style-type: none"> <li>• Milestone Decision Authority designates program as an ACAT II</li> </ul>	<p>Component Acquisition Executive or as delegated</p>
ACAT III	<p>Program does not meet criteria for ACAT I, IA, or II, or is an Automated Information System that is not a Major Automated Information System</p>	<p>As Designated by the Component Acquisition Executive</p>

**Source:** Department of Defense Instruction 5.000.02.

- a. When a MAIS program also meets the definition of a Major Defense Acquisition Program, the Defense Acquisition Executive will determine whether the program will be classified as an MDAP or a MAIS program and will be the Decision Authority unless delegated.
- b. An Automated Information System is a system of computer hardware, computer software, data, or telecommunications that performs functions such as collecting, processing, storing, transmitting, and displaying information. Some computer resources are excluded, including hardware and software systems that are an integral part of a weapon system.
- c. Major Automated Information System programs cannot be categorized as an ACAT II.

## Acquisition Reform

Concerns over defense acquisitions generally center around significant cost overruns, schedule delays, and an inability to provide troops in the field with the equipment they need when they need it. Many analysts believe that cost overruns and schedule delays have a debilitating effect on

the nation's military and threaten America's technological advantage and military capabilities.<sup>41</sup> For more than 50 years, both Congress and DOD have initiated numerous attempts to improve defense acquisitions. Despite the numerous initiatives, studies and reports (many of which echo the same themes and highlight the same weaknesses in the acquisition process), congressional hearings, and legislative fixes, DOD acquisition reform efforts have failed to rein in cost and schedule growth.

In recent years, DOD and Congress have taken another look at defense acquisitions and embarked on an effort to improve the process. Some analysts believe that the efforts currently underway are the most comprehensive in more than 20 years.

## **DOD Reform Efforts**

In recent years, DOD has embarked on a number of initiatives aimed at improving the process for buying weapon systems. For example:

- On January 10, 2012, DOD issued updated versions of the instructions *Charter of the Joint Requirements Oversight Council* and *Joint Capabilities Integration and Development System*.
- On January 19, 2012, DOD issued an updated version of the *Manual for the Operation of the Joint Capabilities Integration and Development System*.<sup>42</sup>
- On November 26, 2013, DOD issued an updated “interim” instruction *Operation of the Defense Acquisition System* (5000.02).

DOD has also undertaken a comprehensive effort to improve the overall operation of the defense acquisition system. On September 14, 2010, then-Under Secretary of Defense for Acquisition, Technology and Logistics Ashton Carter issued the memorandum *Better Buying Power: Guidance for Obtaining Greater Efficiency and Productivity in Defense Spending*. The memorandum outlined 23 principal actions to improve efficiency, including making affordability a requirement, increasing competition, and decreasing the time it takes to acquire a system. In November 2012, Secretary Carter's successor, Frank Kendall, launched the Better Buying Power 2.0 initiative, an update to the original Better Buying Power effort, aimed at “implementing practices and policies designed to improve the productivity of the Department of Defense and of the industrial base that provides the products and services” to the warfighters.<sup>43</sup> Better Buying Power 2.0 contained 34 separate initiatives, including reducing the frequency of senior-level reviews and improving requirements and market research.<sup>44</sup> According to officials, Better Buying Power 3.0 is in development.

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<sup>41</sup> Other issues include the impact of the overall cost of defense acquisitions on the federal budget and the health of the defense industrial base.

<sup>42</sup> The manual can be found at <https://dap.dau.mil/policy/Documents/2012/JCIDS%20Manual%2019%20Jan%202012.pdf>. A four-page errata sheet was issued on September 20, 2012 (see <https://dap.dau.mil/policy/Documents/2012/JCIDS%20Manual%20Errata%20-%2020%20Sept%202012.pdf>).

<sup>43</sup> While much of the original effort remains intact, the new version does contain some changes. For example, the original effort called for increased use of fixed-price contracts, whereas the newer version emphasizes the use of an appropriate contract type, depending on the circumstances. Quote taken from document provided to CRS by DOD entitled *Better Buying Power (BBP) 2.0 Summary*.

<sup>44</sup> The full text of the *Better Buying Power 2.0* memorandum is available at <http://bbp.dau.mil/doc/USD-ATL%20Memo%2024Apr13%20-%20BBP%202.0%20Implementation%20Directive.pdf>.

These and other related DOD initiatives generally focus on

- rewriting the rules and regulations to create a more efficient and effective acquisition process,
- improving the culture and professionalism of the acquisition workforce, and
- improving the overall performance of the acquisition system.

Although these efforts are not aimed solely at weapon system acquisition, if such efforts succeed in improving acquisitions *writ large*, weapon system acquisitions should similarly improve.

## **Congressional Reform Efforts**

In recent years, the primary mechanism through which Congress has exercised its legislative powers to reform the defense acquisition structure has been the annual National Defense Authorization Act (NDAA). Sections of the acts have prescribed requirements applicable to both specific acquisition programs and acquisition structure overall, the latter of which has typically been addressed in Section VIII, usually titled “Acquisition Policy, Acquisition Management, and Related Matters.” Generally, the requirements prescribed in this section have focused on specific issues rather than a comprehensive overhaul of the entire defense acquisition structure. In the National Defense Authorization Acts for FY2008-2012, the titles dealing with acquisitions included more than 240 sections.<sup>45</sup>

The most recent legislation that had a significant impact on weapon system acquisitions was enacted in May 2009, when Congress passed and the President signed into law the Weapon Systems Acquisition Reform Act of 2009 (S. 454/P.L. 111-23). Key provisions in the act included

- the appointment of a Director of Cost Assessment and Program Evaluation within DOD who communicates directly with the Secretary of Defense and Deputy Secretary of Defense and who issues policies and establishes guidance on cost estimating and developing confidence levels for such cost estimates;
- the appointment of a Director of Developmental Test and Evaluation who serves as principal advisor to the Secretary of Defense on developmental test and evaluation and develops policies and guidance for conducting developmental testing and evaluation in DOD, as well as reviewing, approving, and monitoring such testing for each Major Defense Acquisition Program;
- the appointment of a Director of Systems Engineering who serves as principal advisor to the Secretary of Defense on systems engineering and who will develop policies and guidance for the use of systems engineering, as well as review, approve, and monitor such testing for each MDAP;
- a requirement that the Director of Defense Research and Engineering periodically assess technological maturity of MDAPs and annually report findings to Congress, requiring the use of prototyping, when practical;
- a requirement that combatant commanders have more influence in the requirements-generation process;

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<sup>45</sup> Based on a CRS review of the National Defense Authorization Acts for FY2008-FY2012.

- changes to the Nunn-McCurdy Act, including rescinding the most recent milestone approval for any program experiencing critical cost growth;
- a requirement that DOD revise guidelines and tighten regulations governing conflicts of interest by contractors working on MDAPs; and
- a requirement that a principal official in the Office of the Secretary of Defense be responsible for conducting performance assessments and analyses of major defense acquisition programs that experience certain levels of cost growth.

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