

Chapter 11

Materiel System Research, Development, And Acquisition Management

“We must ensure that our warfighters have the capabilities they need to accomplish the Nation’s military demands in this new and emerging global environment...We must develop, acquire, and sustain key military capabilities that enable us to prevail over current challenges and to hedge against, dissuade, or prevail over future threats...The world situation demands an Army that is strategically responsive and dominant at every point on the spectrum of military operations. We are working hard to ensure that America’s soldiers continue to be the best trained, best led, and best equipped land force on earth.”

Claude M. Bolton, Jr., Assistant Secretary of the Army (Acquisition, Logistics, and Technology)

Section I
Introduction

11–1. Department of Defense (DOD) and U.S. Army Management System

This chapter describes the DOD and U.S. Army management system used for the research, development, and acquisition (RDA) of materiel systems - major defense acquisition programs (MDAP), major and non-major programs. The RDA management system can be viewed simply as a combination of structure, process, and culture.

- Structure is the sum of the guidance provided by law, policy, regulation or objective, and the organization provided to accomplish the RDA function.
- Process is the interaction of the structure in producing the output.
- Culture is the cumulative sum of past practices and their impact on interpretation of guidance and attitude toward institutional changes to the system.

11–2. System focus

For the Army, the focus of materiel acquisition management output is producing military units that are adequately trained, equipped, and maintained to execute Quadrennial Defense Review (QDR) effectively. The focus of the RDA management system is the development and acquisition of systems that are affordable and support the QDR. The RDA management system is a fully coordinated effort concerned with the total fielding of a system and encompasses the elements of system acquisition (Table 11–1). To facilitate an understanding of the process, this chapter will begin by highlighting some of the critical aspects of structure.

Table 11–1
Systems Acquisition Management Individual Element

System	Acquisition	Management
Hardware	Determine Need	Plan
Software	Design	Organize
Logistic Support	Develop	Staff
Manuals	Test	Control
Organizations	Produce	Lead
Doctrine	Field	
Facilities	Support	
Personnel	Improve	
Training	Replace	
Spares	Dispose	

Section II
DOD organization and management

11–3. DOD policy

a. The basic policy is to ensure that acquisition of Defense systems is conducted efficiently and effectively in order to achieve operational objectives of the U.S. Armed Forces in their support of national policies and objectives within the guidelines of the *Office of Management and Budget (OMB) Circular A–11, part 3: Major System Acquisitions*, *DOD Directive 5000.1: The Defense Acquisition System*, *DOD Instruction 5000.2: Operation of the Defense Acquisition System*, and a guidebook containing additional supporting discretionary, best practices, lessons learned, and expectations posted to the DOD 5000 Resource Center at <http://DOD5000.dau.mil> are the documents that provide the

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DOD guidance for system acquisition policy and procedure. These documents establish an integrated management framework for a single, standardized DOD-wide acquisition system that applies to all programs including highly sensitive, classified programs. Within the DOD system there are three acquisition program-size categories with decision authority placed at the lowest practical level. The system is characterized by three activities, five phases, six work efforts, and three formal milestone decision reviews (discussed later in the chapter) which track a DOD program's progress throughout its development and program life. "Tailoring" is encouraged in the process to reflect specific program needs. In accordance with *DODD 5000.1*, "There is no *one* best way to structure an acquisition program to accomplish the objective of the Defense Acquisition System." The essential features of the DOD materiel acquisition system are:

- a clear acquisition strategy (AS),
- a thorough program plan,
- risk management techniques, and
- systematic program tracking against the plan.

b. An acquisition program is defined as a directed, funded effort designed to provide a new, improved or continuing weapon system or information technology system (IT) capability in response to a validated operational need. Acquisition programs are divided into three different acquisition categories (ACATs), which are established to facilitate decentralized decision-making, and execution and compliance with statutory and regulatory requirements. Acquisition phases provide a logical means of progressively translating broadly stated mission needs into well-defined system-specific requirements and ultimately into operationally effective, suitable, and survivable systems. All the tasks and activities needed to bring the program to the next milestone occur during acquisition phases. A milestone (MS) is the major decision point that initiates the next phase of an acquisition program. MDAP milestones may include, for example, the decisions to begin technology development, or to begin low-rate initial production (LRIP).

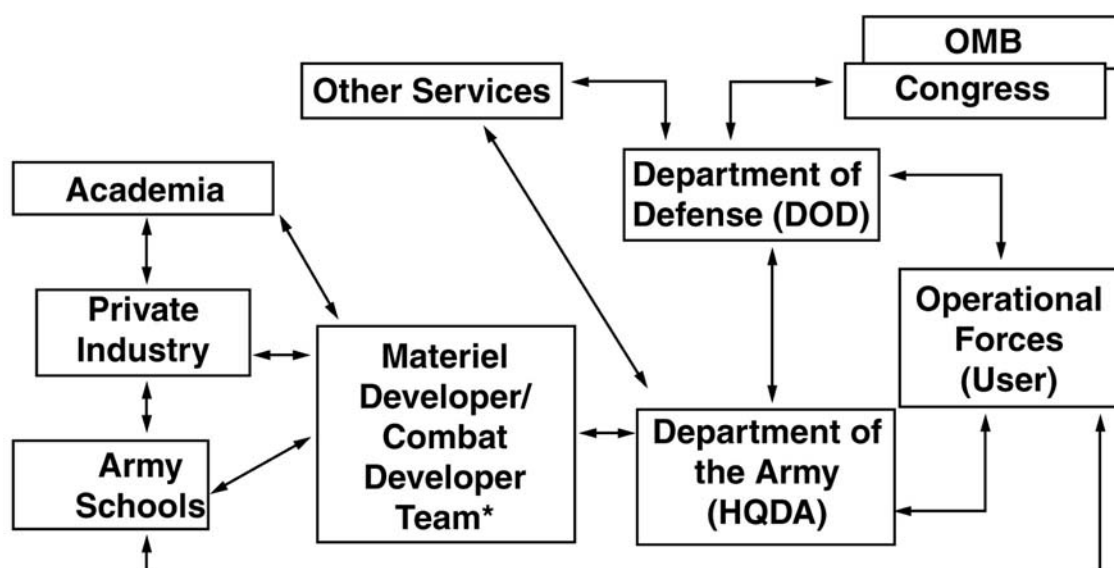
11-4. DOD acquisition management

a. The Under Secretary of Defense for Acquisition, Technology and Logistics (USD(AT&L)) is the senior procurement executive and the principal staff assistant and adviser to the Secretary of Defense (SECDEF) and takes precedence in DOD for all matters relating to the materiel acquisition system - research and development; test and evaluation; production; logistics; command, control, and communications, and intelligence activities related to acquisition; military construction; and procurement.

b. The USD(AT&L) serves as the Defense Acquisition Executive (DAE) with responsibility for supervising the performance of the entire DOD acquisition system in accordance with the laws, Congressional guidance and direction, and *OMB Circular No. A-11, part 3*. The DAE establishes policy for all elements of DOD for acquisition. The basic policies of the DAE are established and implemented by *DODD 5000.1* and *DODI 5000.2*. The DAE also serves as the chairman of the Defense Acquisition Board (DAB), assisted by overarching integrated product teams (OIPTs) that relate to the acquisition process. As DAB chairman, the DAE recommends to the SECDEF acquisition resource matters and other acquisition management matters required to implement acquisition milestone decisions. A clear distinction exists between responsibility for weapon systems acquisition and budgetary authority. While the DAE, as DAB chairman, makes recommendations on whether to proceed with plans to acquire major materiel systems, the Senior Leader Review Group (SLRG), chaired by the Deputy Secretary of Defense (DEPSECDEF), makes budgetary recommendations on the same programs. Acquisition programs must operate within the parameters established by the SLRG and the SECDEF through the Planning, Programming, Budgeting, Execution (PPBE) process.

11-5. Organizational linkage

The managerial process of transforming a materiel requirement into a fielded and supported system consisting of hardware, software, and personnel is conducted by various organizational structures in DOD and the Services responsible for RDA. Figure 11-1 shows the primary elements involved for the Army, including the linkage between the Defense community, industry, and academia. The arrows in the figure depict the flow of business in the process of this transformation.



* Materiel Developer Includes Program Executive Officers (PEOs); Program, Project, Product Managers (PMs); and the U.S. Army Materiel Command (AMC). The Army's primary Combat Developer is U.S. Army Training and Doctrine Command (TRADOC), TRADOC Battle Labs, Integrated Concept Teams (ICTs), and Integrated Product Teams (IPTs) support the MATDEV/CBTDEV Team.

Figure 11-1. Organizational linkage for Army materiel acquisition

11-6. DOD Science and Technology (S&T)

Since World War II, owning the technology advantage has been a cornerstone of our national military strategy. Technologies like radar, jet engines, nuclear weapons, night vision, global positioning, smart weapons, and stealth have changed warfare dramatically. Maintaining this technological edge has become even more important as U.S. force structure decreases and high technology weapons become readily available on the world market. In this new environment, it is imperative that U.S. forces possess technological superiority to ensure success and minimize casualties across the broad spectrum of engagements. The technological advantage enjoyed by the United States in Operation Enduring Freedom (Afghanistan) in 2002 and Operation Iraqi Freedom in 2003, and still enjoyed today, is the legacy of decades of wise investments in science and technology (S&T). Similarly, our warfighting capabilities 10 to 15 years from now will be substantially determined by today's investment in S&T.

11-7. Defense Science and Technology Strategy

The *Defense Science and Technology Strategy* provides DOD's S&T vision, strategy, plan, and a statement of objectives for the planners, programmers, and performers. It is supported by the *DOD Basic Research Plan (BRP)*, *DOD Joint Warfighting Science and Technology Plan (JWSTP)*, *Defense Technology Area Plan (DTAP)*, and *Defense Technology Objectives (DTOs) of the Joint Warfighting Science and Technology Plan and Defense Technology Area Plan*. These documents and the supporting individual S&T master plans of the Services and Defense agencies guide the annual preparation of the DOD S&T budget and program objective memoranda (POMs).

a. *Basic Research Plan (BRP)* presents the DOD objectives and investment strategy for DOD-sponsored basic research (6.1) performed by universities, industry, and Service laboratories. In addition to presenting the planned investment in 12 technical disciplines, the current plan highlights six strategic research areas (SRAs) holding great promise for enabling breakthrough technologies for 21st century military capabilities.

b. *Joint Warfighting Science and Technology Plan (JWSTP)* objective is to ensure that the S&T program supports priority future Joint warfighting capabilities. The *JWSTP* looks horizontally across the Services and agencies and together with the *DTAP* ensures that the near-, mid-, and far-term needs of the joint warfighter are properly balanced and supported in the S&T planning, programming, budgeting, and assessment activities of DOD. The *JWSTP* is structured to support the technological achievement of capabilities associated with the Joint Functional Concepts associated with the concepts are developed by the Functional Capabilities Boards (FCBs) in accordance with the Joint

Capabilities Integration and Development System (JCIDS) discussed previously in chapter 5 and later in this chapter. The *JWSTP* is issued annually as Defense guidance. Advanced concepts and technologies identified as enhancing high priority Joint warfighting capabilities, along with prerequisite research, receive funding priority in the President's Budget (PB) and accompanying Future Years Defense Program (FYDP).

c. *DOD Technology Area Plan (DTAP)* presents DOD objectives and the applied research (6.2) and advanced technology development (6.3) investment strategy for technologies critical to DOD acquisition plans, Service warfighter capabilities, and the *JWSTP*. It also takes a horizontal perspective across the Service and Defense agency efforts, thereby charting the total DOD investment for a given technology. The DTAP documents the focus, content, and principal objectives of the overall DOD S&T.

d. *Defense Technology Objectives (DTOs)*. The focus of the S&T investment is enhanced and guided through DTOs. Each DTO identifies a specific technology advancement that will be developed or demonstrated, the anticipated date of technology availability, and the specific benefits resulting from the technology advance. These benefits not only include increased military operational capabilities but also address other important areas, including affordability and dual-use applications that have received special emphasis in the *Defense Science and Technology Strategy*. Each of the current 392 DTOs identifies funding required to achieve the new capability. 130 DTOs from the *DOD Joint Warfighting Science and Technology Plan (JWSTP)* directly support achievement of the functional and operational capabilities of the Joint Functional Concepts. The additional 262 DTOs derived from the *Defense Technology Area Plan (DTAP)* support the Joint Functional Concepts as well as maintaining advancement of applied research and technology development on a horizontal basis across the Defense services and agencies.

11-8. Defense Advanced Research Projects Agency (DARPA)

DARPA is a unique management tool of the SECDEF. It consists of a mix of military and civilian scientists and engineers, and has a broad charter to conduct advanced research that fills research and development (R&D) gaps between Service lines of responsibility or handles high priority problems that cross Service lines. DARPA is charged with the maintenance of leadership in forefront areas of technology so DOD can be aware as soon as possible of developments of potential military significance. DARPA's purpose is to review ongoing R&D, determine whether or not the concept is feasible, determine its usefulness, and transfer it to the appropriate Service. DARPA does not have its own in-house research facilities and relies on the Services and other Government agencies for technical and administrative support. Once a decision to support a research proposal is made, responsibility for contracting is generally assigned to one of the Services.

11-9. Defense Acquisition University (DAU)

The Defense Acquisition University is a corporate university that includes the Defense Systems Management College (DSMC). Its operation and structure is designed to be similar to a state university with many campuses each specializing in certain acquisition disciplines. The *Defense Acquisition Workforce Improvement Act (DAWIA)* required the formation of the DAU with operation commencing in 1992. Also, the law required the establishment of a senior course for personnel serving in critical acquisition positions (CAPs) that is equivalent to existing senior professional military education programs. The USD(AT&L) has oversight authority for the acquisition curriculum of the course, located at the Industrial College of the Armed Forces (ICAF) of the National Defense University.

11-10. Defense Systems Management College (DSMC)

The DSMC is the USD(AT&L) institution for ensuring the up-to-date training of military and civilian professionals in the management of materiel acquisition programs in DOD. One such course is the Advanced Program Management Course (APMC), a required 14-week course for individuals seeking level III certification in the Program Management Acquisition Career Field (ACF). The DSMC, founded 1971, is a Joint military professional institution, operating under the direction of the DAU Executive Board, to support acquisition management as described in *DOD Directive 5000.1*, and to assist in fulfilling education and training requirements set out in appropriate DOD directives and public laws. The mission of the DSMC is to:

- a. Conduct advanced courses of study in defense acquisition management as the primary function of the college.
- b. Conduct research and special studies in defense acquisition management.
- c. Assemble and disseminate information concerning new policies, methods, and practices in defense acquisition management.
- d. Provide consulting services in defense acquisition management.

Section III

Army organization and management

11-11. Army's RDA Goals

a. The Secretary of the Army (SA) is responsible for functions necessary for the research, development, logistical support and maintenance, preparedness, operation, and effectiveness of the Army. Also required is supervision of all

matters relating to Army procurement. The SA executes his acquisition management responsibilities through the Army Acquisition Executive (AAE).

b. Special emphasis is placed on medium and long-range materiel planning, product modification, and life extension programs. Major state-of-the-art advancements are sought only in carefully selected areas. Stability of materiel acquisition programs is a matter of utmost interest, especially after the system passes the system development and demonstration (SDD) milestone B decision. Reliability, availability, and maintainability (RAM) goals; manpower and personnel integration (MANPRINT); integrated logistics support (ILS); survivability; effectiveness; safety; and product quality are incorporated into system performance objectives. Contractual incentives for the improvement of RAM and ILS are encouraged.

11–12. Army Acquisition Executive (AAE)

The Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA[ALT]) is the AAE. The AAE is designated by the SA as the Component Acquisition Executive (CAE) and the senior procurement executive within Department of the Army (DA). He is the principal HQDA staff official for the execution of the AAE responsibilities. When serving as the AAE, the ASA(ALT) is assisted by a military deputy (MILDEP).

a. The MILDEP is assigned to the Office of the ASA(ALT) and provides staff support to the AAE in managing the R&D, developmental test, and the acquisition of materiel for all Army major weapon and support systems. The MILDEP, delegated down from the AAE, is the Army's Director, Acquisition Career Management (DACM). The DACM is responsible for directing the Army Acquisition Corps (AAC) as well as implementation of the acquisition career management requirements set forth in the *DAWIA* legislation. The day-to-day management of Army acquisition programs is shown in figure 11–2.

b. Similar to the DAE, the AAE develops Army acquisition policies and procedures and manages the Army's production base support and industrial mobilization programs. The AAE, acting with the full authority of the SA, is responsible for administering acquisition programs according to DOD policies and guidelines, and exercises the powers and discharges the responsibilities as set forth in *DODD 5000.1* for component acquisition executives (CAEs). In addition, the AAE:

- (1) Appoints, manages, and evaluates program executive officers (PEOs) and direct-reporting program, project, or product managers (PMs).

- (2) Coordinates with Office of the Assistant Deputy Chief of Staff, G–3/5/7 (OADCS, G–3/5/7) to establish policy and guidance for analysis of alternatives (AoAs); for acquisition category (ACAT) I and II programs, designates the organization responsible for performing system engineering trade-off analyses for the AoA; and provides issues and alternatives to OADCS, G–3/5/7 for inclusion in the AoA tasking document. ACATs are defined in figures 11–3a and 11–3b.

- (3) Carries out all powers, functions, and duties of the SA with respect to the acquisition work force within the Army, subject to the authority, direction, and control of the SA.

- (4) Develops guidance, in coordination with the OADCS, G–3/5/7, and serves as co-proponent for the Army's Research, Development, and Acquisition (RDA) Plan.

- (5) Formulates Army-wide S&T base strategy, policy, guidance, and planning.

- (6) Establishes and validates Army technology base priorities throughout the planning, programming, budgeting, execution system (PPBE).

- (7) Approves and resources Army advanced technology demonstrations (ATDs).

- (8) Acts as the final authority of all matters affecting the Army's acquisition system, except as limited by statute or higher-level regulation.

- (9) Develops and promulgates acquisition, procurement, and contracting policies and procedures.

- (10) Chairs all Army Systems Acquisition Review Council (ASARC) meetings.

- (11) Directs the Army Science Board (ASB).

- (12) Appoints the source selection authority (SSA) for specified programs. The *Federal Acquisition Regulation (FAR)* is the primary contracting regulation. It is the first regulatory source to which DA acquisition personnel refer. The ASA(ALT) issues the *Army Federal Acquisition Regulation Supplement (AFARS)* to implement and supplement the *FAR* and the *Defense Federal Acquisition Regulation Supplement (DFARS)* and to establish uniform policies and procedures for use in the Army.

- (13) Reviews and approves, for ACAT ID programs, the Army position at each decision milestone before the Defense Acquisition Board (DAB) review. This includes the review and approval of acquisition program baselines (APBs). The AAE also serves as the milestone decision authority (MDA) for ACATs IC, IAC, selected II, and assigns the MDA for ACAT III programs to PEOs. The MDA is the individual designated to approve entry into the next acquisition phase.

- (14) Approves the establishment and termination of all program management offices (PMOs) and PEOs. The AAE has authority to designate a system for intensive, centralized management and prescribe the appropriate level of management at any point in the program management process.

c. DA system coordinator (DASC). The DASC is the primary acquisition staff officer at DA. The DASC is

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responsible for the day-to-day support of his/her assigned program and serves as the PM's representative and primary point of contact (POC) within the Pentagon. The DASC reports to the ASA(ALT), Deputy for Acquisition and Systems Management. The DASC is responsible for keeping the acquisition chain of command informed of the status of the assigned acquisition program. In addition, the DASC assists the PM in issue resolution at DA and Office Secretary of Defense (OSD) levels. The DASC is the "eyes and ears" of the PM at the Pentagon and ensures that the PM is advised of any actions or circumstances that might negatively impact their program.

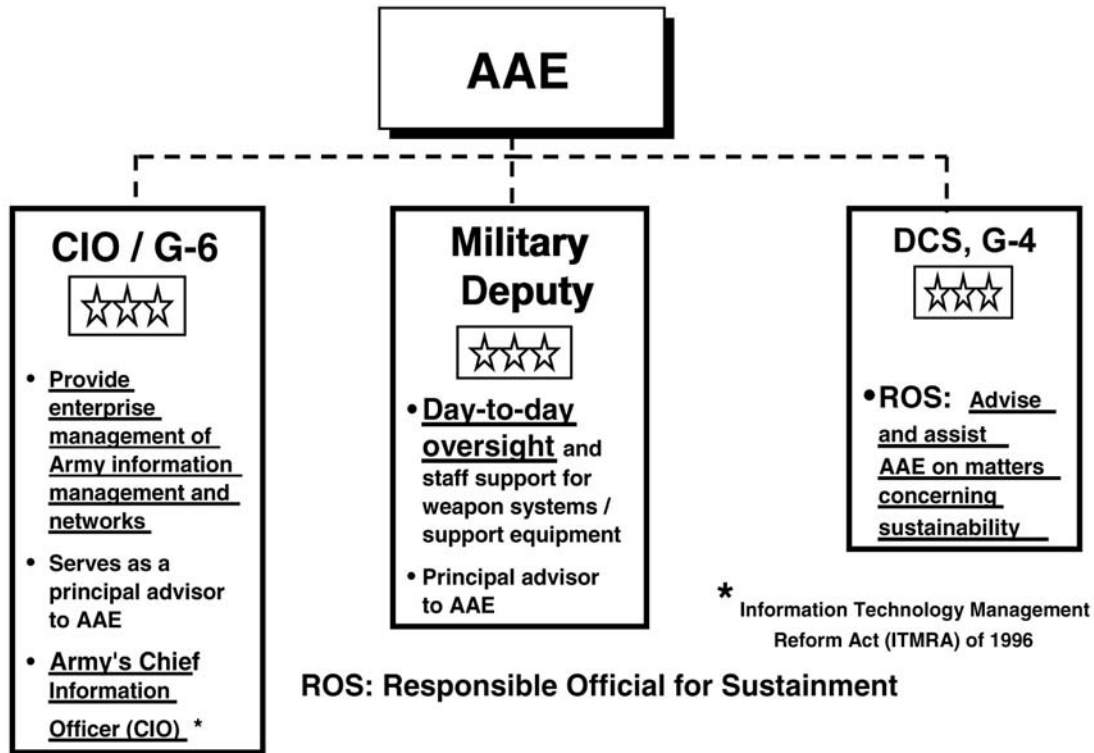


Figure 11–2. Army acquisition executive (AAE)

Major Defense Acquisition Programs (MDAPs)

<u>Program Category</u>	<u>Primary Criteria</u>	Title 10 Sect #2430
<u>ACAT I</u> *	\$ = FY00 Constant	
<u>ACAT ID</u>	RDTE > \$365M <u>or</u>	
<u>ACAT IC</u>	PROC > \$2.19B (PEO / PM Managed)	
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<u>ACAT IA</u> (12)	FY Program Costs > \$32M <u>or</u>	
<u>ACAT IAM</u>	Total Program Costs > \$126M <u>or</u>	
<u>ACAT IAC</u>	Total Life-Cycle Costs > \$378M (PEO / PM Managed)	
<hr/>		
Technology Transition Mechanisms to MS B		
<u>Pre ACAT Technology Projects</u>		
* Acquisition Information Management (AIM) Database		
• ACTDs: Advanced Concept Technology Demonstrations		C: Component
• ATDs: Advanced Technology Demonstrations		D: Defense Acquisition Board
• JWEs: Joint Warfighting Experiments		IAM: Major Automated Information System

Figure 11–3. Acquisition categories (ACATS)

Major Systems

<u>Program Category</u>	<u>Primary Criteria</u>
<u>ACAT II</u>	\$ = FY00 Constant
<u>ACAT II</u>	RDTE > \$140M <u>or</u> PROC > \$660M
<hr/>	
<u>Non - Major Systems</u>	
<u>ACAT III</u>	All acquisition programs that are not classified as an MDAP or Major System (ACAT I or II)
<u>ACAT III</u>	(Includes less than major AISs)
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Figure 11–3. Acquisition categories (ACATS)-continued

11–13. The program executive officer (PEO)

a. The PEO system structure was implemented by the Army in 1987 in response to requirements established by the *Goldwater-Nichols Reorganization Act of 1986*, and the recommendation of the Packard Commission that President Reagan approved and then ordered by *National Security Decision Directive (NSDD) 219* (figure 11–4).

b. The PEO, administering a defined number of AAE assigned MDAPs, major and/or non-major programs, is responsible for making programmatic (materiel acquisition cost, schedule, and total system performance) and for the planning, programming, budgeting, and execution necessary to guide assigned programs through each milestone. In addition, the PEO provides program information to the AAE, HQDA, DOD, and Congress; defends assigned programs to Congress through the Army Office of Legislative Liaison (OCLL); and participates in the development of data to support AAE programmatic decisions in the PPBE. Other PEO and direct-reporting PM responsibilities include assisting the combat developer (CBTDEV) and training developer (TNGDEV) in developing materiel capability documents (MCDs) by providing technical, availability, performance, anticipated materiel acquisition cost, and schedule type information as needed.

c. The AAE currently has twelve PEOs—Air, Space and Missile Defense; Aviation; Chemical and Biological Defense; Command, Control, Communications -Tactical; Intelligence, Electronic Warfare (EW) and Sensors; Ground Combat Systems; Combat Support/Combat Service Support Systems; Enterprise Information Systems; Simulation, Training, and Instrumentation; Tactical Missiles; Ammunition; Soldier—responsible for the intensive management of RDA weapon and information systems.

d. The Army's primary combat developer (CBTDEV), referred to above, is the U.S. Army Training and Doctrine Command (TRADOC). TRADOC formulates and documents operational concepts, doctrine, organizations, and/or materiel requirements for assigned mission areas and functions. The CBTDEV serves as the user representative during acquisitions for their approved materiel requirements as well as doctrine and organization developments.

e. A materiel developer (MATDEV) is the RDA command, agency, or office assigned responsibility for the system under development or being acquired. The term may be used generically to refer to the RDA community in the materiel acquisition process (counterpart to the generic use of CBTDEV).

f. A training developer (TNGDEV) is a command or agency that formulates, develops, and documents or produces training concepts, strategies, requirements (materiel and other), and programs for assigned mission areas and functions. TNGDEV serves as user (trainer and trainee) representative during acquisitions of their approved training materiel requirements and training program developments. TNGDEVs perform the following functions solely in support of training systems:

- (1) Fund and conduct concept formulations for all system training aids, devices, simulations and simulators (TADSS) in support of assigned system.

- (2) Embed system training capabilities into assigned materiel systems in accordance with the approved system requirements documents and in coordination with the CBTDEV.

- (3) Develop, acquire, and field the subsystem training package with the materiel system.

- (4) Plan and program resources for the execution of new equipment training (NET) using Distance Learning (DL) technology and/or contract NET as the desired training strategy in support of TRADOC developed/approved system training plans (STRAPs).

- (5) Program and budget resources for TADSS as specified in the training support requirements (TSR) annex of the capability development document (CDD).

- (6) Program and budget resources to support and ensure attention to and integration of MANPRINT in the research, development, and acquisition (RDA) processes.

- (7) Provide TNGDEV perspective through input to the Army RDA Plan and the Army Modernization Plan (AMP).

- (8) Conduct a crosswalk, with the CBTDEV (TNGDEV for TADSS), of the materiel capabilities document (MCD) to the request for proposal (RFP) to verify that the RFP, to include system specification or purchase description and the statement of work (SOW), accurately reflects the operational requirements stated in the capabilities document for all programs. The MATDEV and CBTDEV (MATDEV and TNGDEV for TADSS) must formally certify that the RFP has been crosswalked with the capabilities document and is in agreement prior to the Army Systems Acquisition Review Council (ASARC) or program review.

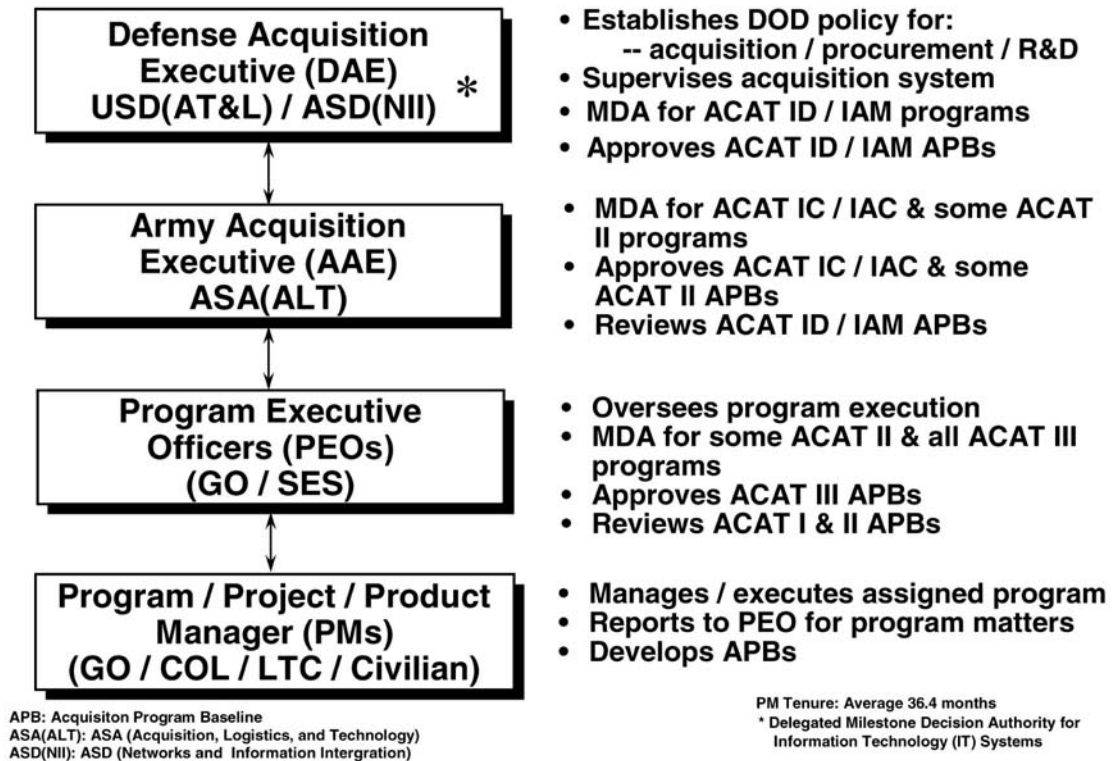


Figure 11–4. DoD Acquisition authority chart

11–14. The Program/Project/Product Manager (PM)

a. The program management approach to materiel acquisition management is a distinct departure from the Services' traditional practice of establishing functionally oriented organizations to carry out well defined, repetitive, and continuous long-term tasks. Organization for program management is a tailored, task-oriented process. This approach requires the program manager to establish management arrangements among the PM office (PMO), other military organizations, and various contractors to coordinate their efforts and to accomplish program objectives effectively, efficiently, and economically. A variety of PMO organizations have been established. They operate on the matrix management principle and must draw all functional support from a host command or installation. In addition to the formal PM organization, the PM directs the informal MATDEV/CBTDEV team to execute the assigned materiel acquisition program. MATDEV/CBTDEV team is the terminology used to describe the informal, but essential close working relationship among the MATDEV, CBTDEV, and other players in the RDA management process (figure 11–1).

b. The PM has authority and responsibility for all programmatic cost, schedule, and performance decisions to execute the assigned program within the approved acquisition program baseline (APB) and subject to functional standards established by regulation, Secretarial direction, or law. Generically, all PMs are program managers, but they are chartered as a program manager, a project manager, or product manager based on the value and importance of the program they manage. The criteria established for designation of a program manager are generally the same as those which cause a system acquisition to be designated as a MDAP, major, or non-major program—high Defense priority, high dollar value, or high Congressional or OSD interest. Since October 26, 2001, all Army acquisition programs, regardless of acquisition category (ACAT), are managed by a program/project/product manager (PM) either (1) overseen by a program executive officer (PEO) or (2) directly reporting to the Army Acquisition Executive (AAE). All PEOs report directly to the Defense Acquisition Executive (ACAT ID programs) or to the AAE (for ACAT IC and below). Project managers report to a PEO or the AAE. All product managers report to a project manager. As a general rule, a program manager is a general officer or Senior Executive Service (SES); a project manager is a colonel or GS

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15; a product manager is a lieutenant colonel or GS 14. This distinction between PMs is unique to the Army and does not apply to the other Services or within industry.

11–15. PEO Resource Control

The Army has revised its resource support system structure for the PEOs to improve their control over the funding and manpower resources they need to carry out their responsibilities. PEOs and subordinate PMs receive dollars and personnel authorization resources directly from HQDA rather than through the materiel commands. The materiel commands continue to provide a variety of support services without duplicating any of the PEOs or PMs management functions. This enhanced resource control system ensures PEO and PM-managed programs operate as centers of excellence, managed with modern efficient techniques, without administrative burdens or materiel command layers being inserted into the chain of command.

11–16. Acquisition Career Management

a. The MILDEP to the ASA(ALT) serves as the Army Director, Acquisition Career Management (DACM). The DACM is assisted by the Deputy Director, Acquisition Career Management (DDACM) and the Acquisition Support Center in OASA(ALT). The Deputy Assistant Secretary of the Army (Civilian Personnel Policy) and the Deputy Chief of Staff, G–1 work closely with the DACM in implementing the requirements and intent of *DAWIA* for the Army.

b. The Army Acquisition Corps (AAC) was established for both military and civilian personnel and is a subset of the entire Army acquisition and technology work force (A&TWF). The A&TWF consists of those personnel who work directly with acquisition in the various acquisition career fields at the CPT/GS–5 and above levels. The AAC consists of military and civilian personnel at the rank/grade of MAJ/GS–13 and above who have met the statutory requirements for experience, education and training. Current Army policy focuses on accessing individuals at the GS–14 and above level into the AAC. All A&TWF positions at rank/grade of LTC/GS–14 and above are designated critical acquisition positions (CAPs) and must be occupied by AAC members. For program management and contracting positions, statute or regulation further dictates education, training, and experience requirements that must be met prior to placement of an individual in these positions.

(1) *AAC vision.* The strategic vision for the AAC forms the foundation for all policies and initiatives impacting the A&TWF. This vision is to develop “*a corps of leaders willing to serve where needed and committed to providing Soldiers the systems critical to decisive victory now and in the future through development, integration, acquisition, fielding, and sustainment...one integrated corps ...It is these leaders the Army must develop early in their careers to ensure they possess the requisite experience and skills to successfully manage the acquisition challenges of the 21st century.*” The key to developing the best possible leaders for the Army lies in educating the workforce, particularly at the lower levels, as to the *DAWIA* requirements and the policies, procedures, and tools available to meet those requirements.

(2) *Career development as a mission.* The leader development career pattern for an AAC officer is clearly defined and highly rewarding. Military acquisition career development is covered under *DA Pamphlet 600–3, Commissioned Officer Professional Development and Utilization*. An officer should normally serve eight years in branch qualifying assignments prior to entering the AAC. Upon AAC selection, the officer attends functional area (FA) specific military training courses, and selected officers have the opportunity to attend advanced civil schooling (ACS). Attendance at ACS is contingent on the officer’s manner of performance, potential for academic success, and support of his/her career time line. Graduate level education opportunities are an important part of career development within the AAC. However, job experience and strong performance across a variety of acquisition positions remains the key indicator for success. Recent initiatives seek to increase developmental acquisition experience opportunities while providing improved support for alternative advanced degree schooling. AAC officers compete for product/project management or acquisition command positions in the same manner as field commands. AAC LTCs and COLs are ineligible for selection to non-acquisition command positions. For career development of civilians, IAW *Army Policy AAC–96–01*, the Army has developed a civilian acquisition career model as well as a matrix of quality achievement factors as a “roadmap for success.” The focus of the career model is to begin to develop acquisition leaders and managers early in their careers, giving them a broad-based knowledge of the various acquisition functions supported by leadership and management experience. The quality achievement factors are the combination of training, education, and experience at the higher grade.

11–17. Headquarters, Department of the Army (HQDA)

a. Chief of Staff of the Army (CSA). The CSA is responsible by law to the SA for the efficiency of the Army and its preparedness for military operations. The CSA acts as the agent of the SA in carrying out the plans or recommendations submitted by the Army staff (ARSTAF) and approved by the SA. The Vice Chief of Staff (VCSA) supports the CSA by managing the day-to-day operations of the Army. The VCSA chairs the Army Requirements Oversight Council (AROC) and in the area of RDA, the VCSA co-chairs the Army Systems Acquisition Review Council (ASARC).

b. Deputy Under Secretary of the Army (Operations Research). The DUSA (OR), designated Army Test and Evaluation (T&E) Executive, establishes, reviews, supervises and enforces Army T&E policy and procedures; oversees

all Army T&E associated with RDA, as well as combat development programs; provides staff management (policy formulation, program direction, and resource oversight) of all T&E programs of interest to OSA; approves all test and evaluation master plans (TEMPs) requiring HQDA approval; and is responsible for all software development for modeling and simulations and software T&E policy.

c. Assistant Secretary of the Army (Financial Management and Comptroller) (ASA[FM&C]). The ASA(FM&C) has secretariat responsibility for all financial management activities and operations for appropriated funds. While the budget is in preparation, the ASA(FM&C) receives and consolidates procurement and research, development, test and evaluation (RDTE) budget forms from major army commands (MACOMs) and PEOs. The ASA(FM&C) also:

- (1) Works with the AAE on all cost and economic analysis (EA) matters related to the acquisition process.
- (2) Carries out all financial management responsibilities assigned under Title 10.
- (3) Tasks the appropriate CBTDEV or MATDEV to conduct program office estimates (POE) and/or economic analyses (EA) to milestone decision review (MDR) and PPBE requirements.
- (4) Manages all budgeting activities in support of the Army materiel requirements processes and RDA modernization program, with the framework of PPBE.
- (5) Develops statutory independent life-cycle cost estimates (ICEs) and component cost analyses (CCAs) for weapon and information systems. Chairs and oversees the Army Cost Review Board (CRB) and approves the Army cost position (ACP) for all major acquisition programs. The ASA(FM&C) Deputy for Cost Analysis ensures that the ACP reflects the costs and risks associated with the program in concurrence with the cost as independent variable (CAIV) process.

d. Assistant Chief of Staff for Installation Management (ACSIM). The ACSIM is responsible for developing criteria for the mitigation of environmental impacts, and reviewing emerging Army RDA systems for environmental effects.

e. Army Chief Information Officer (CIO)/ Deputy Chief of Staff, G-6. The CIO/G-6 has ARSTAF responsibility for Army automated information systems (AIS) and information technology (IT) activities. These include establishing and approving policies, procedures, and standards for the planning, programming, life-cycle management, use of Army IT resources, and responding to and validating all warfighting requirements. The G-6 also serves as the Army Chief Information Officer (CIO) as directed in the *Clinger-Cohen Act (originally known as the Information Technology Management Reform Act (ITMRA) of 1996)*. The CIO primary responsibility, under *Clinger-Cohen Act*, is the management of resources for all Army information programs. The DCS, G-6 is a regular member of the Army Systems Acquisition Review Council (ASARC) and the Army Requirements Oversight Council (AROC).

f. Deputy Chief of Staff, G-1 (DCS, G-1). The DCS, G-1 has ARSTAF responsibility for personnel management. ODCS, G-1 monitors planning for the manpower and personnel aspects of new systems. Also, the ODCS, G-1 is the proponent and has primary ARSTAF responsibility for the DOD human systems integration (HSI) program (called MANPRINT program in the Army). The emphasis of the MANPRINT program is to enhance total system performance (Soldier in the loop) and to conserve the Army's manpower, personnel and training (MPT) resources. The DCS, G-1 is a regular member of the AROC.

(1) The HQDA personnel system staff officer (PERSSO) is the ARSTAF representative of the personnel community. The PERSSO provides for the continuous coordination necessary to ensure the smooth integration of new equipment, materiel systems, and new organizations. The PERSSO responsibilities include, but are not limited to: preparing and justifying force structure requests in conjunction with the OADCS, G-3/5/7 organization integrator (OI) and ODCS, G-8 synchronization staff officer (SSO); reviewing and coordinating the development of force structure changes; personnel supportability architecture, officer and enlisted issues related to new organizational concepts and doctrine; and ensuring programming and budgeting of manpower spaces. The PERSSO participates in all HQDA actions to develop the staff position on CBTDEV proposals for potential MDAPs (JCIDS functional need/solution analysis), the designation of a proposed system, the recommendations on the elements of system fielding including the proposed basis of issue plan (BOIP), the initial issue quantity (IIQ), and the Army acquisition objective (AAO).

(2) The PERSSO represents the DCS, G-1 at force modernization-related, HQDA-sponsored conferences, forums, and meetings on issues of supportability concerning the introduction of new and/or reorganized existing TOE/TDA units

g. Deputy Chief of Staff, G-2 (DCS, G-2). The DCS, G-2 provides scientific and technical intelligence and threat projections in support of all aspects of the Army RDA programs.

(1) In addition, a HQDA threat integration staff officer (TISO) is designated by the DCS, G-2 to function as the HQDA threat integration coordinator for designated mission areas, programs, and systems. The TISO represents the DCS, G-2 on all aspects of threat support throughout the system life-cycle or study process. The TISO system complements the DCS, G-3 requirements staff officer (RSO) and DCS, G-8 synchronization staff officer (SSO) and is designed to foster closer coordination among the intelligence community, MACOMs, and ARSTAF agencies to ensure the timely integration of the threat into the materiel acquisition process. The TISO system supplements existing management procedures but does not relieve ARSTAF agencies and MACOMs of established responsibilities.

(2) The DCS, G-2 is the approving authority for either establishing or ending TISO monitorship of systems. Generally, all programs designated as Army MDAP, major or non-major systems will be assigned to a TISO for

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monitorship on an as required basis with approval of the ODCS, G-2. The DCS, G-2 is a regular member of the AROC, and RRC.

h. Assistant Deputy Chief of Staff, G-3/5/7 (ADCS, G-3/5/7). As the Army's force manager, the ADCS, G-3/5/7 serves as the HQDA proponent for all Army force structure related policies, processes, and actions. The OADCS, G-3/5/7:

(1) Integrates Army doctrine, organization, training, materiel, leadership and education, personnel, and facility (DOTMLPF) capability-based requirements into structure.

(2) Recommends for DCS, G-3/5/7 approval operating and generating force requirements and allocates resources to accomplish DCS, G-3/5/7 prioritized Army missions and functions.

(3) Develops and maintains force planning guidance and active and reserve component force structure through the Total Army Analysis (TAA) force accounting, force documentation and other force management forums.

(4) Oversees the force management, training, battle command simulations and experimentation, prioritization, and requirements approval processes for the Army. The ADCS, G-3/5/7 is assisted by the Director, G-37 Capabilities Integration, Prioritization, and Analysis (DAMO-CI), who has supervisory responsibility for:

- Army Strategic Planning Board (DAMO-CIB) – Army's current warfighting operational requirements validation and approval process,
- Resource Analysis and Integration Division (DAMO-CIR) – Army's prioritization process,
- Future Warfighting Capabilities Division (DAMO-CIC). – JCIDS requirements validation and approval process.

(5) OADCS, G-3/5/7, Future Warfighting Capabilities Division (DAMO-CIC). Within the OADCS, G-3/5/7, DAMO-CIC is the single entry point for all Army and Joint DOTMLPF requirements. DAMO-CIC is the Army proponent for policy development and the Joint Capabilities Integration And Development System (JCIDS) process oversight. Within DAMO-CIC, the requirements staff officer (RSO) is directly responsible for leading HQDA staff integration and coordination efforts for all Army and Joint DOTMLPF requirements issues within the JCIDS. The RSO coordinates with his/her G-8 counterpart, the synchronization staff officer (SSO), to facilitate the transition from requirements development and approval to requirements solutions (execution and resourcing). Functions and responsibilities are:

(a) Interacts with the Joint Staff and other Services for all Joint, other Service, and Army DOTMLPF requirements issues.

(b) Provides ARSTAF lead for coordinating applicable Army requirements through the Deputy Director, J8 for Joint capabilities integration and development system (JCIDS) review.

(c) Maintains catalog of approved requirements documents (CARDs) files.

(d) Provides the Army position on other Service/Combatant Commanders DOTMLPF requirements.

(e) Staffs and coordinates Joint Warfighting Capabilities Assessment (JWCA) conceptual and doctrinal studies for the Army.

(f) Develops policy and procedures, and coordinates operational (urgent) need statements (ONS), directed requirements, and other immediate war on terrorism (WOT) operational requirements for approval.

(g) Participates in all combat development and acquisition associated initiatives that have a potential impact on the JCIDS process.

(h) Develops policy and procedures, in coordination with ASA (ALT) and ODCS, G-8 on the rapid acquisition prototyping for transformation (RAPT).

(i) Provides the Army's position for all science board (Army Science Board (ASB) or Defense Science Board (DSB)), General Accounting Office (GAO), Army Audit Agency (AAA), Inspector General (IG) or similar agency audits or special reviews that impact the JCIDS process.

(j) Develops policy and procedures for development and management of Congressionally directed manpower estimate reports (MERs).

(k) Utilizes RSOs to lead requirements analysis teams to analyze, coordinate, and provide recommendations on all DOTMLPF capabilities-based requirements.

(6) Requirements staff officers (RSOs). Within G-37 (DAMO-CIC), RSOs facilitate the staffing, validation, approval, and prioritization of all Army DOTML PF requirements. Primary functions and responsibilities are:

(a) Enable OADCS, G-3/5/7 to validate and prioritize requirements.

(b) Ensure DOTMLPF integration for all requirements.

(c) Establish a single ARSTAF focal point for Army requirements.

(d) Link requirements and resources to the Army Campaign Plan (ACP).

i. Deputy Chief of Staff, G-4 (DCS, G-4)). The DCS, G-4 assesses the logistical supportability of materiel systems during the system acquisition process. The DCS, G-4 participates in all phases of the RDA management process to ensure equipment is logistically reliable, supportable, and maintainable. ODCS, G-4 is also responsible for secondary item requirements including secondary item war reserve requirements. The DCS, G-4 is a regular member of the ASARC and AROC.

(1) The DCS, G-4 is the responsible official for sustainment (ROS) to the AAE. As the ROS, the DCS, G-4 is assisted by the Deputy ASA(ALT) for Integrated Logistics Support, who is the DA focal point for a system's integrated logistics support (ILS) program.

(2) The DA logistics support officer (DALSO) is the HQDA representative of the logistics community, providing logistics coordination. The DALSO monitors the progress of the assigned system and ensures that all elements of ILS, as outlined in AR 700-127, are satisfactorily completed. Because of the interrelationships of assigned responsibilities in materiel acquisition, close and continuous coordination and cooperation is essential between the DALSO and his counterparts at TRADOC, Army Materiel Command (AMC), and the HQDA Staff. In addition to new items of equipment, DALSOs also have responsibility for existing weapons and materiel systems in the Army force structure. This responsibility covers all phases of logistics support to include readiness, redistribution, and disposal.

(3) The DALSO's primary mission is to provide HQDA general staff supervision over the ILS management of assigned commodity materiel/weapons systems from concept to disposal. Other responsibilities include:

(a) ARSTAF responsibility for logistical acceptability, deployability, and supportability of materiel systems, interoperability, ILS, materiel release, and logistics R&D programs for the Army.

(b) Serving as the logistician in the materiel acquisition process for other than medical equipment, and conduct surveillance over logistics aspects of materiel acquisition and modification programs to ensure supportable systems.

(c) Providing policy guidance for logistics for medical and engineer materiel acquisition.

j. Deputy Chief of Staff, G-8 (DCS, G-8). The ODCS, G-8 prepares the Army program objective memorandum (POM). In this capacity the ODCS, G-8 integrates and synchronizes the POM process and provides analysis and evaluation of Army programs to senior Army leadership. The DCS, G-8 is a regular member of the ASARC and AROC. The ODCS, G-8 responsibilities include:

(1) Army program advocate to OSD, the Joint Staff, other military departments, government agencies and organizations.

(2) Overseeing materiel fielding across the Army and ensuring integration of doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) into materiel solutions in accordance with (IAW) approved Army requirements.

(3) Serving as principal advisor to the CSA on Joint materiel requirements representing the Army in the Joint Requirements Oversight Council (JROC), Joint Capabilities Board (JCB), and Functional Capabilities Board (FCB) process.

(4) Serving as the lead for all Quadrennial Defense Review (QDR) activities and in coordination with the DUSA(OR) oversees the Army Studies Program.

(5) G-8, Director of Program Analysis and Evaluation (DPAE). Within ODCS, G-8, the DPAE is responsible for reviewing and analyzing requirements and programs in force structure development, providing analytical support to the Army Resources Board (ARB) and subordinate committees, developing resource guidance, developing and compiling the POM, maintaining the Army portion of the DOD Future Years Defense Program (FYDP), and presenting an affordability analysis to the ASARC. Other responsibilities include conducting and presenting affordability assessments to support DOD and HQDA ACAT I programs and managing the programming phase of the PPBE process.

(6) G-8, Force Development Directorate (Dir, FD). Within ODCS G-8, the Director, FD translates approved Army DOTMLPF capabilities-based requirements into programs, within allocated resources, to accomplish Army missions and functions. In addition Dir, FD exercises life-cycle management of materiel programs. The Dir, FD is organized into a Directorate of Materiel (DOM), Directorate of Integration (DOI) and a Directorate of Resources (DOR).

(a) The Director of Materiel (DOM) is charged with the responsibility of managing all materiel programs. Synchronization staff officers (SSOs) shape these programs to ensure DOTMLPF integration – verifying installation, training, and sustainment enablers are properly resourced. Programs are fielded using the total package fielding (TPF) concept, which supports unit set fielding (USF) to designated units within the Army Campaign Plan (ACP).

(b) The Director of Integration (DOI) is charged with the responsibility to ensure programs and process integration for force development. Integration includes the coordination of: the S&T investment strategy; annual advanced concept technology demonstration (ACTD) plan, and procurement to support the Army ACP. DOI ensures USF plans and schedules properly reflect priorities set by the OADCS, G-3/5/7; that systems are packaged by capability and function in unit sets; that fieldings track with the Army ACP, and are executable by system SSOs.

(c) Synchronization staff officers (SSOs). Within G-8 DIR, FD, the SSOs focus on systems and fielding to deliver capabilities and functions to the warfighting force structure of the Army SSOs are the single ARSTAF POCs for integration and synchronization of all Army materiel programs to achieve Army Vision, ACP priorities, and modernization strategy. Generally, the SSO is responsible for the integration, synchronization, and coordination of hardware, software and associated equipment in support of the Army ACP. All equipment is fielded using the unit set fielding (USF) methodology managed by G-8 Dir, FD USF Operations Division (DAPR-FDU):

k. The Surgeon General (TSG). TSG has ARSTAF responsibility for medical research, development, test and evaluation, and is the Army medical MATDEV. The TSG is also responsible for the medical aspects of all other development and acquisition programs ensuring functional area interface with CBTDEVs. The TSG serves as a

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member of the ASARC for medical issues, including health hazard assessment, personnel safety, and hazards remediation. Other responsibilities include:

- (1) Developing policy, responsibilities, and procedures to ensure implementation of systems acquisition policy as it applies to combat medical systems, medical readiness and health care programs, and other assigned Army and Joint requirements.

- (2) Assigning support responsibilities for medical materiel development and acquisition to agencies and activities under TSG command and control.

- (3) Recommending to TRADOC materiel requirements and associated priorities for medical readiness and health care programs.

- (4) Establishing functional area interface with TRADOC for all medical programs, ensuring that requirements and interests of each participating service are provided full consideration in medical programs for which the Army has lead agency or executive agency responsibility.

- l.* Chief of Engineers (COE). The COE monitors requirements and research and development necessary to provide construction design criteria, construction techniques, and construction material for the Army, Air Force, and other government agencies. The COE provides fixed-facility concealment, camouflage, and deception; real estate management techniques; and engineering support for maintenance of installation and facilities. It is the COE's mission to preserve and improve environmental quality associated with construction and facilities and Army environmental quality and R&D activities covering atmospheric, terrestrial, and topographical sciences. The COE is also responsible, under the general direction of the AAE, for the RDTE of fixed and floating power systems, and high voltage generation applications (to include nuclear applications). The COE reviews all emerging Army systems for digital terrain data requirements and environmental effects such as climate, terrain, or weather. The review also includes minimization of toxic and hazardous wastes and those hazardous wastes associated with normal system test, operation, use, and maintenance.

- m.* The General Counsel (GC). The GC advises the AAE and the ASARC on any legal issue, which arises during the acquisition of a weapon or materiel system. The GC reviews all Army acquisition policy and supervises all attorneys providing legal advice relating to programs within the Army RDA management system. He is also responsible for all legal advice in the negotiation, oversight, and review of international cooperative RDA programs.

11–18. Major Army Commands (MACOMs)

- a.* U.S. Army Surface Deployment and Distribution Command (SDDC), the former U.S. Army Military Traffic Management Command (MTMC). SDDC provides transportability engineering advice and analyses to the MATDEV, CBTDEV and TNGDEV; provides item, unit, and system transportability assessments for milestone decision review (MDR); provides transportability approval or identify corrective actions required to obtain approval for all transportability problem items; and reviews all materiel capabilities documents (MCDs) to assess adequacy of transportability.

- b.* U.S. Army Medical Command (MEDCOM). MEDCOM is the medical CBTDEV, TNGDEV, trainer, and user representative. MEDCOM conducts medical combat and training development activities as assigned by CG, TRADOC and TSG; reviews and evaluates materiel and TADSS requirements documents to identify and assure that adequate consideration is given to the prevention of health hazards from operating or maintaining materiel systems, and conduct the health hazard assessment (HHA) program, as required; conducts and supports assigned operational tests (OTs); and forwards all medical warfighting concepts and requirements documents to TRADOC for review and appropriate action.

- c.* U.S. Army Intelligence and Security Command (INSCOM). INSCOM is the CBTDEV for strategic signals intelligence (SIGINT) systems and INSCOM sole-user intelligence, electronic warfare (EW) systems used for formulating doctrine, concepts, organization, materiel requirements, and objectives. INSCOM responsibilities include:

- (1) Preparing requirements documents and serving as the Army CBTDEV during development and fielding of new SIGINT and information security (INFOSEC) systems under the purview of the National Security Agency (NSA) and having sole application to U.S. SIGINT and INFOSEC systems. INSCOM forwards warfighting concepts and requirements documents to TRADOC for review and appropriate action.

- (2) Coordinating with the PEO or MATDEV on matters pertaining to acquisition of INSCOM sole-user SIGINT and intelligence, security and electronic warfare (ISEW) systems.

- (3) Coordinating with the CG, TRADOC, on requirements generation for other INSCOM sole user ISEW systems and conduct combat and training developments for these Army systems when directed by HQDA, and/or Director, Central Intelligence (DCI), or at the request of CG, TRADOC.

- (4) Ensuring documentation of requirements for training support products, system TADSS, and/or embedded training for INSCOM systems.

- (5) Providing threat documentation to TRADOC as validated and approved by HQDA DCS, G–2.

- (6) Recommending to CG, TRADOC materiel requirements and associated priorities for strategic intelligence and security readiness.

- d.* U.S. Army Materiel Command (AMC). AMC performs assigned materiel and related functions for logistics support of materiel systems, and other materiel acquisition management functions required by HQDA. The CG, AMC is a regular member of the ASARC. The AMC mission, in support of RDA, is to:

- (1) Equip and sustain a trained, ready Army.
- (2) Provide development and acquisition support to MATDEVs (PEOs and PMs).
- (3) Provide equipment and services to other nations through the Security Assistance Program.
- (4) Define, develop, and acquire superior technologies.
- (5) Maintain mobilization capabilities necessary to support the Army in emergencies.
- (6) Verify system safety; support developmental and operational tests; and participate in the continuous evaluation process.

(7) Exercise delegated authority, under ASA(ALT) oversight, in the following areas: metrication; design to cost; production readiness reviews; manufacturing technology, standardization; reliability, availability, and maintainability; quality; risk management; value engineering; parts control; and industrial modernization improvement.

(8) Provide survivability, vulnerability, or lethality assessments and survivability enhancement expertise for all Army materiel programs.

(9) Evaluate and recommend improvements to the industrial base.

(10) Responsible for the logistics support of assigned materiel in response to approved materiel requirements.

(11) Plan, coordinate, and provide functional support to PEOs and PMs. Support includes, but is not limited to, procurement and contracting, legal, managerial accounting, cost estimating, systems engineering, conducting system TADSS and embedded training concept formulation, developmental test, logistics support analyses, MANPRINT, environmental, intelligence and threat support, configuration management, and conducting various independent assessments and analyses.

(12) Provide overall management of the Army's technology base (less Class VIII), including identification of maturing technologies necessary to support acquisition of warfighting materiel systems.

(13) Provide RDA science and infrastructure information to HQDA for the Army RDA Plan.

(14) Provide initial and updated cost and system performance estimates for battlefield and peacetime operations as inputs to supporting analysis and program decisions.

e. U.S. Army Training and Doctrine Command (TRADOC). TRADOC is the Army's primary "user representative" in the materiel acquisition process. As the Army's principal CBTDEV, TRADOC guides, coordinates, and integrates the total combat development effort of the Army. Combat developments are a major component of force development and encompass the formulation of concepts, doctrine, organization, materiel objectives, requirements, and operational tests (OT) of products of the Joint Capabilities Integration and Development System (JCIDS).

(1) The CG, TRADOC is a regular member of the ASARC. As the Army's primary CBTDEV/TNGDEV, TRADOC is the Army's *architect for the future* and is charged to chart the course for the Army. In doing this, CG, TRADOC:

(a) Guides and disciplines the JCIDS by:

- providing capability-based requirements generation and documentation procedures and process guidance;
- establishing and implementing horizontal requirements integration (HRI) policy;
- generating all Army warfighting DOTMLPF requirements prior to their submission to HQDA for approval and resourcing;
- approving integrated concept team (ICT) minutes or reports containing proposing solution sets for force level force operating capabilities (FOCs); and,
- coordinating materiel capabilities documents (MCDs) produced by the Army community and forward to HQDA OADCS, G-3/5/7 Future Warfighting Capabilities Division (DAMO-CIC) for validation, approval, and prioritization.

(b) Assists HQDA to prioritize and justify warfighting requirements by:

- determining applicability of ONS to future Army-wide requirements and assign to a proponent for requirement documentation;
- providing insights and descriptive information for materiel programs; and
- supporting OADCS, G-37 (DAMO-CIC) by presenting capability documents and information to the JCIDS and Joint Capability Based Assessment (CBA) process and assisting in issue resolution.

(c) Coordinates and integrates the total combat/training developments efforts of the Army by:

- providing, with appropriate support from other MACOMs, the capstone warfighting concept and FOCs, the start point for JCIDS;
- developing and maintaining the C4I operational architecture;
- being the primary source for determining need for and preparing requirements and requirements documents for TADSS and embedded training; and
- determining need for and obtain CSA approval for conduct of advanced warfighting experiments (AWEs) and Army transformation experiments (ATEXs).

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(d) Conducts AoA for ACAT I, IA, and most II programs when required by HQDA. When required by the MDA, conduct AoA for all other ACAT programs.

(e) Serves as member of the Army S&T Advisory Group (ASTAG).

(f) Provides representative to Army S&T reviews and management teams.

(2) TRADOC is organized into integrating centers and functional area schools and centers. The principal integrating centers in the materiel acquisition process are the Futures Center, Fort Monroe, VA and the Combined Arms Center (CAC), Fort Leavenworth, KS. The functional area schools and centers are the branch schools and centers for Infantry, Armor, Field Artillery, Air Defense Artillery, Aviation, etc. The Directorates of Combat Developments (DCDs) at the TRADOC functional area school and centers work very closely with the PEO community in the RDA management process.

(3) The TRADOC counterpart to the PM, the TRADOC system manager (TSM), is a central figure in the RDA process and a key member of the MATDEV/CBTDEV team. The TSM is chartered by the CG, TRADOC to function as focal point for coordination of the CBTDEV/TNGDEV efforts in the development and acquisition of a materiel or automated information systems (AIS). The TSM is responsible to synchronize all doctrine, organization, training, leadership and education, personnel, and facilities (DOTLPF) domains that are impacted by the fielding of a MDAP, major or non-major materiel system. TSMs are appointed for selected acquisition programs. In some cases, a TRADOC program integration office (TPIO) may be chartered for a systems-of-systems such as Army Battle Command System (ABCS), Terrain Data, etc. A TSM/TPIO is appointed early in the development cycle, normally at the same time as the PM. He is usually located at the proponent school and center. For systems without an assigned TSM/TPIO, the DCD at the proponent school or center serves as the focal point.

f. U.S. Army Special Operations Command (USASOC). In support of materiel systems RDA management, USASOC establishes functional area interface with TRADOC for all programs, ensuring that requirements and interests of each participating agency are provided full consideration in programs for which the Army has lead agency or executive responsibility, and serves as the special operations trainer and user representative. In addition, USASOC:

(1) Forwards all non-SOC unique warfighting capability requirements and documents to CG, TRADOC for appropriate action.

(2) Forwards SOC unique requirements documents to CG, TRADOC for review and appropriate action.

(3) Monitors TRADOC projects and identifies needs affecting the USASOC mission and responsibility.

(4) Supports TRADOC field activities conducting and supporting testing, and monitoring RDA projects to include potential force standardization and interoperability.

(5) Participates in warfighting experiments, as appropriate.

g. U.S. Army Space and Missile Defense Command (USASMDC). USASMDC is the principal assistant and advisor to the SA and the CSA for all matters pertaining to space and strategic defense. The USASMDC is responsible for technology development programs related to strategic and tactical missile defense, space defense, and satellite technology. The command conducts missile defense technology base research and development activities in support of the Missile Defense Agency (MDA), assures transfer of technology between MDA and Army systems, and provides matrix support to PEO Air and Missile Defense. USASMDC is also chartered by CSA to be the operational advocate and focal point for theater missile defense (TMD) at Army level. The CG, USASMDC, assists in the development of Army TMD positions, reflective of work being done in TRADOC, and represents those positions at HQDA, OSD, MDA, Joint Staff, Congressional, and other high-level forums.

11–19. Other DA agencies

a. U. S. Army Test and Evaluation Command (ATEC). ATEC is a field operating agency (FOA) under the CSA. The CG, ATEC is responsible for management of the Army's operational testing, developmental testing, and system evaluation processes. Their evaluations of materiel and IT systems' operational effectiveness, suitability and survivability are independent of the CBTDEV/MATDEV and are reported directly to the MDR body. CG, ATEC is a member of the ASARC, advisor to the Army Requirements Oversight Council (AROC), and chairman of the Test Schedule and Review Committee (TSARC). The TSARC is the HQDA centralized management forum for user (operational) testing resources. ATEC provides advice and assistance to the CSA, the VCSA, other members of the ARSTAF, and other elements of DA in regard to Army test and evaluation. Other responsibilities include:

(1) Reviewing all draft materiel capabilities documents for T&E implications.

(2) Assisting TRADOC (CBTDEV/TNGDEV) in developing evaluable, operationally relevant, and totally system focused critical operational issues and criteria (COIC). Provide advice concerning methods and measures to evaluate the system against the COIC and advise on the resources and ability to test and evaluate the system.

(3) Supporting the TRADOC advance warfighting experiment (AWE) program and concept experimentation program (CEP).

b. U.S. Army Medical Research and Materiel Command (USAMRMC). USAMRMC is the medical MATDEV, logistician, and developmental tester and is responsible for RDA and logistic support of assigned materiel in response to approved materiel requirements. In addition, USAMRMC:

(1) Plans, programs, budgets, and executes medical RDTE tasks that support system RDA to include required system training support products, TADSS, and/or embedded training.

(2) Plans, coordinates, and provides functional support to USAMRMC organizations. Support includes, but is not limited to, procurement and contracting, legal, managerial accounting, cost estimating, systems engineering, conducting system TADSS and embedded training concept formulation, developmental testing, ILS, MANPRINT, environmental management, configuration management, and conducting various independent assessments and analyses.

(3) Assists the medical CBTDEV/TNGDEV in the JCIDS process.

(4) Reviews capabilities-based requirement documents to determine their adequacy and feasibility and for logistical support aspects of materiel systems to include ILS.

(5) Develops and maintains the physiological, psychological, and medical database to support the health hazard assessment (HHA), system safety assessments (SSA), and human factors engineering analysis (HFEA).

(6) Evaluates and manages the materiel readiness functions in the medical materiel acquisition process.

(7) Functions as TSG agency for the materiel acquisition of medical nondevelopmental items (NDI), commercial off-the-shelf (COTS) items, and sets, kits, and outfits.

c. U.S. Army Medical Department Center and School (AMEDDC&S). AMEDDC&S is the medical CBTDEV, TNGDEV, doctrine developer, and operational tester. In addition, AMEDDC&S develops doctrine, organizations, and systems requirements within the guidelines established by the CG, TRADOC and in accordance with Army health care standards established by TSG.

Section IV

Materiel requirements generation process

11–20. Policy

a. *DODD 5000.1* and *DODI 5000.2* provide mandatory DOD acquisition policy and procedures including materiel capabilities documentation and approval guidance for MDAPs for both materiel and automated information systems (AIS). *Chairman of the Joint Chiefs of Staff Instruction (CJCSI) 3170.01D* mandates policy and the *Chairman of the Joint Chiefs of Staff Manual (CJCSM) 3170.01A* mandates procedural guidance for the Joint Capabilities Integration and Development System (JCIDS) to include guidance on key performance parameters (KPPs), measures of effectiveness (MOEs), and the Joint Requirements Oversight Council (JROC). *AR 70–1* provides Army acquisition policy for materiel and information systems. *AR 71–9*, when updated, provides Army implementation of JCIDS and documentation policies and responsibilities implementing *DODD 5000.1*, *DODI 5000.2*, *CJCSI 3170.01D* and *CJCSM 3170.01A* supporting all Army ACAT I through III materiel and information systems. ACATs are shown in figures 11–3a and 3b. The terms materiel and materiel system in this chapter apply to materiel and information technology systems unless specifically identified otherwise.

b. The main governing policies are summarized below:

(1) The Army implementation of JCIDS provides a current and future Army capable of success in any contingency from humanitarian assistance to full tactical operations in Joint and combined environments. The process is responsive to the urgent materiel requirements of the deployed warfighter as well as project the full set of DOTMLPF capabilities-based requirements for the Army to be mission capable in near-, mid-, and far-term operations.

(2) Field commanders document and submit their urgent warfighting operational requirements and obtain support via the operational need statement (ONS) process discussed in *AR 71–9*.

(3) Commanders with combat developments missions conduct continuing capability based assessment (CBA) (JCIDS functional analyses) to identify and define near- through far-term capabilities-based DOTMLPF requirements.

(4) Force operating requirements for all DOTMLPF domains must be related to the CJCS and/or CSA approved capstone warfighting concept and associated lower level operational, functional, and integrating concepts. The current approved capstone warfighting concept for the Army (*TRADOC Pamphlet 525–3–0*) is *The Army in Joint Operations (Future Force)*. Requirements not related to these Joint and Army warfighting concepts are not provided resources. TRADOC's integrated and approved listing of force level force operating capabilities (FOCs) from these warfighting concepts serve as a process control mechanism; authority for supporting studies and experimentation; and a device for linkage between requirements documentation and the warfighting concepts. FOCs are listed biannually in *TRADOC Pamphlet 525–66*.

(5) TRADOC establishes desired FOCs as the foundation upon which to base the CBA process. These critical, force-level, measurable statements of operational capability frame how the Army will realize future force operations as stated in the approved capstone and subordinate warfighting concepts. The FOCs focus the *Army's Science and Technology Master Plan (ASTMP)* and warfighting experimentation. All warfighting requirements must have direct linkage through an FOC to an approved subordinate concept supporting the capstone concept and *The Army Vision*. As the process unfolds, these force-level future force concepts give rise to functional area operational and organizational (O&O) concepts and subordinate functional and integrating concepts.

(6) A materiel capabilities-based requirement is developed for an approved FOC only after all other possible DOTMLPF solutions are deemed unable to solve the FOC. The priority order of consideration is doctrine, organizational

design, training, leadership and education, and finally materiel. When materiel is selected as the best solution, it must be documented. The initial capabilities document (ICD) is the document that initiates the acquisition system management process. ICDs are a non-system specific statement of operational capability need. The capability development document (CDD) is the document that defines the system capabilities needed to satisfy an approved increment of materiel need, and is developed during acquisition Phase A, Technology Development. The capability production document (CPD) provides the operational performance characteristics necessary for the acquisition community to produce and field a single increment of a specific system and is finalized after completion of the Design Readiness Review (DRR) in acquisition Phase B. ICDs, CDDs, and CPDs are prepared in accordance with *CJCSM 3170.01A* format guidance.

(7) All ACAT I, IA, II, and III materiel proposals must have materiel capabilities documents (MCDs), except base operations materiel that are not warfighting requirements. They can be procured following MACOM standard procurement (contracting) procedures.

(8) The Joint Staff, J-6, conducts a command, control, communications, and computers (C4) interoperability and supportability certification of all ACAT I, IA, II, and III MCDs designated JROC Interest, and Joint Integration. Threat validation and intelligence certification are granted by the Joint Staff, J-2 and the Defense Intelligence Agency (DIA). Munitions certifications (for munitions only) is granted by Joint Staff, J-4. (*CJCSI 3170.01D*).

(9) All IT products must comply with the Joint Staff and Army's integrated architectures. MACOM information management offices (IMOs) review and ensure compliance with these integrated architectures.

(10) Close coordination is maintained between CBTDEVs/TNGDEVs and the S&T community to ensure that technology investments are appropriately focusing on identified FOCs. Periodic reviews are conducted with program offices, laboratories, users, and maintainers to assess the technical status, emerging performance, affordability, and remaining technology shortfalls. Modeling and simulation (M&S) is used to preclude unnecessary and impractical development.

(11) All system developments have many operational performance and support characteristics that are defined in requirements documentation. Key performance parameters (KPPs) are those system characteristics that define whether or not a system will be capable of mission accomplishment. KPPs are, by definition, characteristics that can cause a concept or system to be reevaluated and a program to be reassessed for restructuring or termination. All CDDs contain KPPs, which in turn are documented in the system acquisition program baseline (APB). A KPP addressing interoperability is required (*CJCSM 3170.01A*). For ACAT I systems, KPPs are validated and approved by the JROC even if the authority for MCDs has been delegated to the Component. The Deputy Chief of Staff, G-3/5/7 validates and the CSA approves other KPPs for MCDs delegated to the Army.

(12) When developing system characteristics and performance parameters, cost must be considered on an equal level. In other words, cost is treated as an independent variable along with others used to define a system. This concept – cost as an independent variable (CAIV) - does not preclude consideration and evaluation of a new high potential, leap-ahead but expensive DOTMLPF technology.

11–21. Joint Capabilities Integration and Development System (JCIDS)

JCIDS is the Joint capabilities-based requirements generation process. The objective is to develop a balanced and synchronized DOTMLPF solution proposal that is affordable, militarily useful, supportable by outside agencies, and based on mature technology that is demonstrated in a relevant operational or laboratory environment. JCIDS implements an integrated, collaborative process, based on top-level strategic direction, to guide development of new capabilities through changes in DOTMLPF. Change recommendations are developed and evaluated in consideration of how to optimize the Joint force's ability to operate as an integrated force.

a. DOD continually upgrades and changes the way it fights so it can maintain battlefield superiority over all adversaries and can achieve complementary capabilities with other nations. Force requirements are generated holistically, driven by warfighting concepts focused on the future and experimentation in battle labs to provide insights to discern viable DOTMLPF requirements. The process begins with a concept and ends with the proposed solution to a functional need.

b. Joint /Army concept development, capabilities development, JCIDS functional analysis process, and functional area integrated architectures were discussed in detail in chapter 5.

11–22. Concept development and experimentation (CD&E)

Warfighting experiments are the heart of Joint Capabilities Integration and Development System (JCIDS). Progressive and iterative mixes of high fidelity constructive, virtual and live simulations using real Soldiers and units in relevant, tactically competitive scenarios provide Army leaders with force operating capabilities (FOCs) insights. Warfighting experiments are conducted to gain understanding about some aspect of future warfighting. Capability insights from warfighting experiments are “way points” used by the Army to plot its future course to the future force. There are four categories of experiments: Developmental, Integrating, Capstone, and Exploratory. These reflect both different levels of anticipated and unanticipated results and differing levels of scope from single functional area/operational theme, to integrating across multiple functional areas and operational themes.

a. Developmental Experiment. An experiment designed to address the uncertainties that must be resolved to support

future force milestones. These are experiments, or a series of experiments, that focus on specific study areas and issues to directly support concept refinement and development of required capabilities based on future force concepts. These efforts, while constrained to meet milestones and Army Campaign Plan (ACP) objectives/decision points, are structured to ensure aggressive, innovative approaches as concepts are matured to capabilities. Developmental experiments typically address multiple functional areas under a single operational theme.

b. Integrating Experiments. Experiments that ensure the complex family of systems that comprise the future force are fully integrated – across proponents, across DOTMLPF domains, and within service/Joint contexts. These experiments are operationally focused and in a Joint context, integrating with service and Joint experiments where appropriate. Integrating experiments pull together results from developmental experimentation, integrating one or more operational themes and multiple functional areas.

c. Capstone Experiment. An experiment designed to demonstrate the employment of future force capabilities to realize future force concepts. Conducted near the end of a major phase, these events integrate prior supporting experimental results across multiple operational themes to clearly demonstrate the realistic integration of total warfighting capability for the future force.

d. Exploratory Experiments. Experiments that provide the widest possible latitude for innovation and transformation. These experiments harvest ideas from a broad spectrum, including agencies outside TRADOC and the Army and operational lessons learned, and support execution of experimentation free from rigorous schedule constraints. The intent is to maximize opportunities for learning by providing sufficient latitude for all experimental outcomes; to learn from failure and success. Exploratory experiments also provide the widest latitude to transition promising concepts and capabilities to the current force.

e. All experiments are executed within a joint context and are conducted using approved scenarios and validated environmental, behavioral, and performance data. Consistent performance from experimental forces is attained via the world-class blue force and world-class opposing force, in one of three experiment environments: virtual (simulated forces in a simulated environment with human-in-the-loop interactive real-time participation), constructive (simulated forces in a simulated environment conducted with force-on-force modeling), or live (real forces in an operational field exercise).

11–23. Army science and technology

*a. The ultimate goal of the Army's S&T program is to provide the Soldier with a winning edge on the battlefield. The accelerating pace of technological change continues to offer significant opportunities to enhance the survivability, lethality, deployability, and versatility of Army forces. High technology research and development is, and will remain, a central feature of the Army Campaign Plan (ACP). Key to the ACP is the planned transition of promising technology developments into tomorrow's operational capabilities. Technology demonstrations (TDs), discussed later, which evolve into systems and system upgrades incorporated in the *Army Modernization Plan (AMP)* accomplish this transition.*

b. The Army's S&T program is an integral part of materiel acquisition. The S&T program consists of three stages - basic research (6.1), applied research (6.2), and advanced technology development (6.3). The identifiers—6.1, 6.2, etc.—are commonly used for identifying funds; but they are also used as a shorthand technique by members of the R&D community to identify levels of research development. For example, instead of referring to some project as being “in applied research,” it is often referred to as being “6.2”. The 6.1, 6.2, and 6.3 categories are known as the “tech base”. Basic research (6.1) includes all efforts of scientific study and experimentation directed toward increasing knowledge and understanding in those fields related to long-term national security needs. Applied research (6.2) includes all efforts directed to the solution of specific military problems, short of major development projects. Advanced technology development (6.3) includes all efforts directed toward projects, which have moved into the development of hardware for testing of operational feasibility. Initiatives, such as the DOD advanced concept technology demonstrations (ACTDs), (discussed later in the chapter) obscure the distinction between S&T and development — pre-and post-Milestone B activities.

*c. The *Army Science and Technology Master Plan (ASTMP)* is the strategic plan for the Army's S&T program. The SA and the CSA approve it. It is the Army's S&T roadmap for achieving Army transformation. This plan is provided to government, industry, and academia to convey the Army's S&T vision, objectives, priorities, and corresponding strategy. This document is explicit, resource-constrained DA guidance to drive funding priorities and the S&T program as a whole. The *ASTMP* provides “top down” guidance from HQDA to all S&T organizations. It also provides a vital link between DOD technology planning and the Army's MACOMs and laboratories. The core of DOD's S&T strategy is to fuel and exploit the information technology explosion; conduct extensive and realistic demonstrations of new technology applications; and provide for early, extensive and continued involvement of warfighters in S&T demonstration programs. S&T programs must be responsive to numerous national security considerations.*

d. A mainstay of the Army strategy for military technology is a viable in-house research capability. Laboratories and research, development, engineering centers (RDECs) are the key organizations responsible for technical leadership, scientific advancements and support for the acquisition process. Activities of these organizations range from basic research to the correction of deficiencies in field systems. Academia and industry as well as hands-on bench work

contribute to the S&T mission. Technology insertion into systems is accomplished via the flow of patents, data, design criteria, and other information into TDs, ATDs, ACTDs, new designs, and fielded systems.

e. Overall, the Army's S&T strategy and programs are committed to the maintenance of technological superiority, while preserving the flexibility to cope with a wide array of possible threat, technology, and budget environments. The Army's investment in S&T is paramount and is playing a greater role in acquisition than ever, particularly since the advent of DOD ACTDs.

f. A series of reviews of current and proposed S&T activities guide focused research. The first is an annual assessment of all proposed Army funded S&T projects. It is conducted based on an appreciation of current capabilities, ongoing S&T activities and their applicability to the force operating capability (FOC) described earlier in the chapter in *TRADOC Pamphlet 525–66*. Building from the S&T project review, a list of the top 200 Army science and technology objectives (STOs) candidates—the Army's most important S&T projects—is generated. Based on formal developmental milestones and achievement measures, the Army Science and Technology Working Group (ASTWG) approve each STO, which is then listed in *ASTMP*. The *ASTMP* and the *AMP* provide the basis for ATDs, which showcase a variety of advanced technologies and their potential military merit. In addition to advancing the technology, these S&T activities aid the ICTs to better understand the “art of the possible” and refine the many requirements associated with them.

g. *TRADOC Pamphlet 525–66* also guides independent research & development (IR&D) efforts. By providing the private sector an unclassified, descriptive list of desired FOCs, the Army is able to tap into a wealth of information and new ideas on different means to achieve those capabilities. The Army encourages industry to share these ideas with appropriate CBTDEV and TNGDEV organizations.

h. As with some concepts, S&T research occasionally produces an item that is recognizable as a defined requirement that should be documented and resourced. Most S&T products must be evaluated in warfighting experiments before a decision is made to document them as materiel requirements.

i. Oversight of the S&T program is provided by the Army Science and Technology Advisory Group (ASTAG), which is co-chaired by the AAE and the VCSA (figure 11–5). The Army Science and Technology Working Group (ASTWG), is co-chaired by the Army S&T executive (the Deputy Assistant Secretary of the Army for Research and Technology) and the G–8 Director, Force Development. The ASTWG provides general officer level resolution of pressing S&T issues prior to meetings of the ASTAG; recommends to the ASTAG revisions to the Army's S&T vision, strategy, principles, and priorities; and reviews and approves ATDs and STOs.

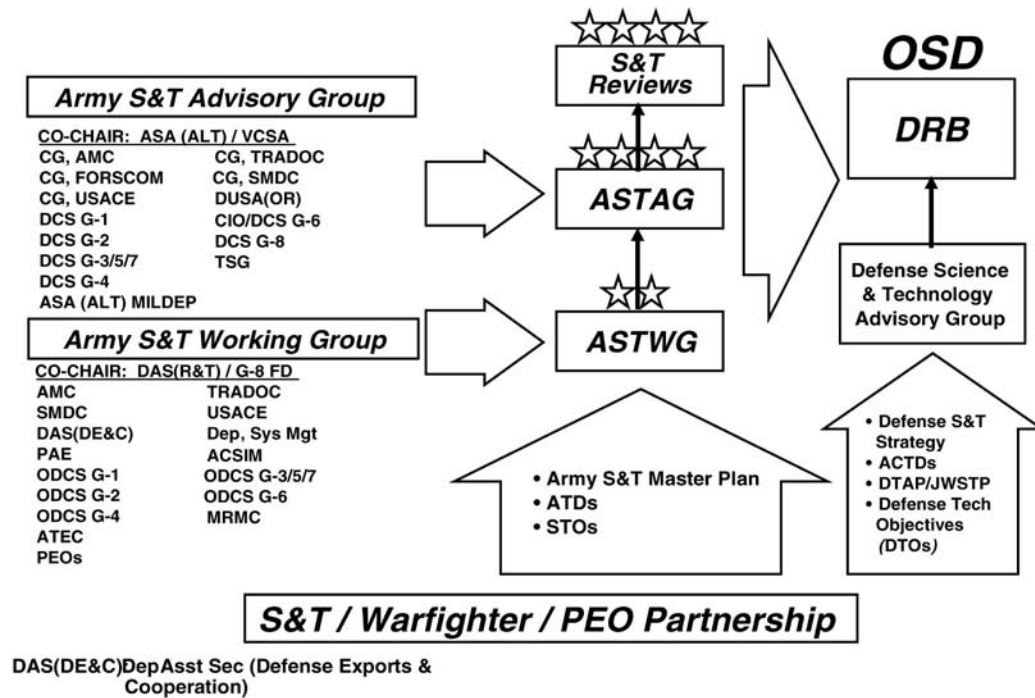


Figure 11-5. Army S&T Oversight

11-24. Technology transition strategy

The basic strategy of the S&T program is to transition mature technologies into operational systems that satisfy approved warfighting materiel requirements. Key to this strategy are demonstrations. TDs, ATDs, ACTDs exploit technologies derived from applied research (6.2), which in turn build on new knowledge derived from basic research (6.1) programs. These TDs, ATDs, and ACTDs provide the basis for new systems, system upgrades, or advance concepts, which are further out in time. The critical challenge is to tie these programs together in an efficient and effective way. TDs are not new. What is new is the scope and depth of the TDs, the increased importance of their role in the acquisition process, and the increased emphasis on user involvement to permit an early and meaningful evaluation of overall military capability. The following sections provide an explanation of technology maturity, TDs, ATDs, ACTDs, as well as systems/system upgrades.

a. Technology maturity. Technology maturity measures the degree to which proposed critical technologies meet program objectives. Technology maturity is a principal element of program risk. A technology readiness assessment (TRA) examines program concepts, technology requirements, and demonstrated technology capabilities to determine technological maturity.

(1) TRAs for critical technologies occur sufficiently prior to milestone decision review (MDR) points B and C to provide useful technology maturity information to the acquisition review process.

(2) The Deputy Assistant Secretary of the Army (Research and Technology) DASA(R&T) directs the TRAs and, for ACAT ID and ACAT IAM programs, submits the findings to the AAE who submits the report to the Deputy Under Secretary of Defense for Science and Technology DUSD(S&T) with a recommended technology readiness level (TRL) for each critical technology. TRLs are depicted in figure 11-6. In cooperation with the DASA(R&T) and the program office, the DUSD(S&T) evaluates the TRAs and, if he/she concurs, forward findings to the DOD Overarching Integrated Product Team (OIPT) leader and Defense Acquisition Board (DAB) or the Information Technology Acquisition Board (ITAB). If the DUSD(S&T) does not concur with the TRA findings, an independent TRA, under the direction of the DUSD(S&T), is required.

(3) TRLs are a measure of technical maturity that enable consistent, uniform, discussions of technical maturity,

across different types of technologies. Decision authorities must consider the recommended TRLs when assessing program risk. TRL descriptions appear in the *Defense Acquisition Guidebook*.

b. Technology demonstrations (TDs). The primary focus of TDs is to demonstrate the feasibility and practicality of a technology for solving specific military requirements. They are incorporated during the various stages of the 6.2 and 6.3 development process and encourage technical competition. They are most often conducted in a non-operational (lab or field) environment. These demonstrations provide information that reduces uncertainties and subsequent engineering cost, while simultaneously providing valuable development and requirements data.

c. Advanced technology demonstrations (ATDs). Within the *Defense Technology Area Plan (DTAP)*, previously discussed, specific ATDs are structured to meet established goals. Detailed roadmaps to guide their progress are developed, as well as exit criteria to define their goals. ATDs are risk reducing, integrated, “proof of principle” demonstrations designed to assist near-term system developments in satisfying specific operational capability needs. The ATD approach has been promoted by the Defense Science Board (DSB) and the Army Science Board (ASB) as a means of accelerating the introduction of new technologies into operational systems. They are principally funded with advanced technology development (6.3) funds. ATDs facilitate the integration of proposed technologies into full system integration (6.4) or system demonstration (6.5) prototype systems. As such, they provide the link between the technology developer, PEO, PM, and the Army user. The criteria for establishing an ATD are:

- (1) Execution at the system or major subsystem level in an operational rather than a laboratory environment.
- (2) Potential for new or enhanced military operational capability or cost effectiveness.
- (3) Duration of three to five years.
- (4) Transition plan in place for known and/or potential applications.
- (5) Active participation by TRADOC battle Lab and user proponents.
- (6) Participation by the MATDEVs.
- (7) Use of modeling and simulation (M&S) to assess doctrine/tactical payoffs.
- (8) Exit criteria established with user interaction/concurrence. More detailed information including exit criteria for each ATD can be found in the *ASTMP* previously discussed.

d. Advanced concept technology demonstrations (ACTDs). The DOD ACTD initiative grew from the 1986 Packard Commission recommendation for rapid prototyping. ACTDs are Joint Service in nature, featuring combatant commander’s sponsorship and provide as much as two years of leave-behind (residual) capability in the field. ACTDs apply advanced technologies to Joint warfighting requirements to provide an advanced capability in limited time frames. The ACTD is an integrated effort to assemble and demonstrate a significant new military capability, based upon maturing advanced technology(s), in a real-time operation at a scale adequate to clearly establish operational utility and system integrity. ACTDs are Jointly sponsored and implemented by the operational user, and MATDEV communities, with approval and oversight guidance from the Deputy Under Secretary of Defense for Advanced Systems and Concepts (DUSD[AS&C]).

(1) The ACTD concept is a cornerstone in the new acquisition strategy that relies on prototyping and demonstration programs to maintain the U.S. military technological edge in the face of declining procurement budgets. ACTDs are a more mature phase of the ATDs. They are two to four year efforts in which new weapons and technologies are developed, prototyped, and then tested by the Soldiers in the field for up to two years before being procured.

(2) ACTDs are not new programs, but tend to be a combination of previously identified ATDs, TDs, or concepts already begun. They include high level management and oversight to transform disparate technology development efforts conducted by the various military services into prototype systems that can be tested and eventually fielded. The ACTD becomes the last step in determining whether the military needs and can afford the new technology.

e. Systems and system upgrades.

(1) The development of the next set of materiel systems requires prior demonstration of the feasibility of employing new technologies. “New-start” systems are those next in line after the ones currently fielded or in production. For these systems, most technical barriers to the new capability have been overcome. Generally, these systems can enter System Development and Demonstration (Acquisition System Management Process Phase B) relatively quickly as a result of the successful demonstration of enabling technologies. Based on current funding guidance, the number of “new-start” systems is in a sharp decline.

(2) In the absence of “new-start” systems, the Army is pursuing incremental improvements to existing systems to maintain its technological edge, and capabilities. As defined in the *ASTMP*, these improvements are designated as systems modifications. System modifications are brought about through technology insertion programs service life extension programs (SLEPs), preplanned product improvements (P3I), and block improvement programs. These modifications are based primarily on the success of funded 6.3 ATDs/TDs. The 6.3 ATDs/TDs either are the basis for the system modification or have a high probability of forming the basis for the system modification.

• **Defines Technology Maturity** in S&T, at Transition, and in Acquisition

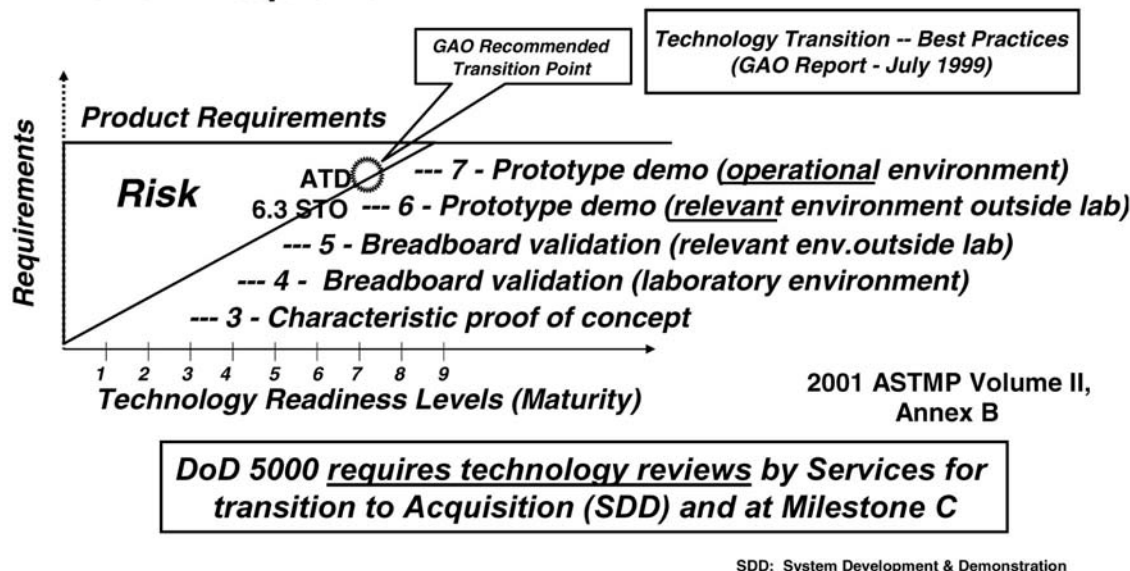


Figure 11–6. Technology Readiness Levels (TRLs)

Section V

Matériel capabilities documents (MCD)

11–25. Generating and documenting capabilities-based matériel requirements

MCDs establish the need for a matériel acquisition program, how the matériel will be employed, and what the matériel must be capable of doing. As the acquisition program progresses, statements of required performance and design specifications become more and more specific. The functional area focused initial capabilities document (ICD) is the document that initiates the acquisition system management process. The capability development document (CDD) and the capability production document (CPD) are the documents that define the system capabilities needed to satisfy an approved matériel need (capability gap).

a. Initial capabilities document (ICD). The ICD is a non-system specific statement of functional required matériel capability (need). It documents the need for a matériel solution to resolve a specific capability gap derived from the JCIDS analysis process (previously discussed in chapter 5). It describes capability gaps that exist in warfighting functions as described in the applicable warfighting concepts and integrated architectures. The capability gap is defined in terms of the functional area, the relevant range of military operations, and timeframe under consideration. In addition, the ICD replaces the mission needs statement (MNS) format, guides the Acquisition Concept Refinement Phase, supports the follow-on analysis of alternatives (AoA) if required, the technology development strategy (TDS), the Milestone A acquisition decision, and subsequent Technology Development Phase activities.

(1) The ICD summarizes the results of the DOTMLPF analysis and identifies any changes in U.S. or allied doctrine, operational concepts, tactics, organization, and training that were considered in satisfying the deficiency. The ICD also describes why such nonmatériel changes have been judged to be inadequate in addressing the complete capability.

(2) The ICD documents the evaluation of balanced and synchronized DOTMLPF approaches that are proposed to provide the required capability. The ICD further proposes a recommended matériel approach based on analysis of the different matériel approaches and describes how the recommended approach best satisfies the desired capability.

(3) Once approved, an ICD is not normally updated, but is archived to the J8 Knowledge Management/Decision Support (KM/DS) Tool database, so that all approved MCDs are maintained in a single location. When approved, capability development documents (CDDs) (described below) bring the desired capability specified in the ICD into the

acquisition system Development and Demonstration Phase B. The CDD then serves as the living document to carry the program and its increments through the acquisition process.

(4) The ICD format and detailed content instructions are provided in *CJCSM 3170.01A Appendix A, Enclosure D*.

b. Capability development document (CDD). The CDD is the warfighter's primary means of defining authoritative, measurable and testable capabilities for the System Development and Demonstration (SDD) Phase of an acquisition program. The CDD is guided by the ICD, the AoA, the TDS, and captures the information necessary to deliver an affordable and supportable capability using mature technology within a specific increment of an acquisition strategy (AS).

(1) The CDD is generated during the Technology Development Phase of the acquisition process prior to Milestone B (program initiation). The CDD describes a technically mature and affordable increment of militarily useful capability that was demonstrated in a relevant environment. The CDD supports entry into System Development and Demonstration Phase and refinement of the integrated architecture.

(2) In an evolutionary acquisition program, the capabilities delivered by a specific increment may provide only a partial solution of the ultimate desired capability; therefore, the first increment's CDD must provide information regarding the strategy to achieve the full capability. Subsequent increments, leading to the full capability, are also described to give an overall understanding of the program strategy. This strategy is updated with each subsequent increment to reflect lessons learned from previous increments, changes in the warfighting concepts or changes in the integrated architecture.

(3) The CDD describes the operational capability; threat; integrated architectures; required capabilities; program support; supportability; force structure, DOTLPF impact and constraints; and schedule and program affordability for the system.

(4) The CDD identifies the operational performance attributes (testable or measurable characteristics), in threshold-objective format, necessary for the acquisition community to design a proposed system and establish an acquisition program baseline (APB). The CDD states performance attributes, including key performance parameters (KPPs) that guide the development, demonstration, and testing of the current increment. The performance attributes and KPPs apply only to the current increment. Each increment must provide an operationally effective and useful capability in the intended mission environment that is commensurate with the investment and independent of any subsequent increment.

(5) The CDD articulates the attributes and KPPs that are further refined in the capabilities production document (CPD). The CDD is updated or appended for each Milestone B decision.

(6) The CDD format and detailed content instructions are provided in *CJCSM 3170.01A Appendix A, Enclosure E*.

c. Capability production document (CPD). The CPD is the warfighter's primary means of providing authoritative and testable capabilities for the Production/Deployment Phase of an acquisition program. A CPD is finalized after design readiness review (DRR) and is validated and approved prior to the Milestone C (Low-Rate Initial Production (LRIP) approval) decision. The CPD development is guided by the ICD, the CDD, developmental and operational testing results, and the DRR. It captures the information necessary to support production, testing, and deployment of an affordable and supportable increment within an acquisition strategy (AS).

(1) The CPD provides the operational performance characteristics necessary for the acquisition community to produce and field a single increment of a specific system. The CPD presents performance characteristics, including KPPs, to guide the production and deployment of the current increment. Since a CPD applies to only a single increment of a program's development, the performance attributes and KPPs apply only to the increment described in the CPD. Each increment must provide an operationally effective and useful capability in the intended environment, commensurate with the investment.

(2) The CPD refines the threshold and objective values for performance attributes and KPPs that were validated in the CDD for the production increment. Each production threshold listed in the CPD depicts the minimum performance that the PM is expected to deliver for the increment based on the post design readiness review system design. The refinement of performance attributes and KPPs is the most significant difference between the CDD and the CPD.

(3) The CPD includes a description of the operational capability; threat; command, control, communications, computers, and intelligence (C4I) supportability; integrated architectures (when available); required capabilities; program support; force structure; DOTLPF impact and constraints; and schedule and program affordability for the system (revised from the CDD).

(4) The CPD is finalized after completion of the design readiness review (DRR) in acquisition Phase B. The CPD is an entrance criteria item that is necessary to proceed to each Milestone C (LRIP approval) decision.

(5) The CPD format and detailed content instructions are provided in *CJCSM 3170.01A Appendix A, Enclosure F*.

d. MCD performance characteristics and key performance parameters (KPPs). The CDD and CPD state the operational and support-related performance attributes of a system that provides the capabilities required by the warfighter – attributes so significant they must be verified by testing or analysis. The CDD and CPD identify, in threshold-objective format, the attributes that contribute most significantly to the desired operational capability. Whenever possible, attributes are stated in terms that reflect the operational capabilities necessary to operate in the full range of military operations and the environment intended for the system, family of systems (FoS), or system of systems (SoS). These statements guide the acquisition community in making tradeoff decisions between the threshold and objective values of

the stated attributes. Operational testing assesses the ability of the system to meet the production threshold and objective values.

(1) Each attribute is supported by an operationally oriented rationale. Below the threshold value, the military utility of the system becomes questionable. The objective value for an attribute is the desired operational goal, beyond which any gain in military utility does not, according to the warfighter, warrant additional expenditure.

(2) KPPs are those system attributes considered most essential for an effective military capability. The CDD and the CPD contain only those few KPPs (generally eight or fewer) that capture the minimum operational effectiveness and suitability attributes (testable or measurable characteristics) needed to achieve the overall desired capabilities for the system during the applicable increment. Failure to meet a CDD or CPD KPP threshold can result in the reevaluation of the selected system, the program's reassessment or termination, or the modification of the content of production increments.

(3) Command, control, communications, and computers (C4) interoperability is a required KPP in every increment in which there are top-level information exchange requirements (IER).

11-26. Capstone requirements documents (CRDs)

Capstone requirements documents (CRDs). A CRD contains capabilities-based requirements that facilitate the development of CDDs and CPDs by providing a common framework and operational concept to guide their development. The JROC approves the development of a new CRD when existing concepts and integrated architectures are not sufficient to support development of capabilities.

a. Until Joint concepts and integrated architectures are adequately developed, CRDs continue to support the development of interoperable capabilities by describing overarching standards in functional areas. The intent, as of this update, is for a mission area ICD to replace the role of the CRD in JCIDS. New CRDs will be developed only as the result of specific JROC direction.

b. The CRD format and detailed content instructions are provided in *CJCSM 3170.01A Appendix A, Enclosure G*.

Section VI

Material requirements approval process

On January 15, 2002, the Army revised its warfighting requirements approval process to adjust for rapidly changing technology, constraints on the Army budget, increased sustainment costs, the need to provide a concrete linkage between requirements and resources, and increasing emphasis on Joint interoperability. Establishment of the requirements staff officer (RSO) in the OADCS, G-3/5/7 is clearly intended to support the need for a concrete linkage between requirements and resources. Within the Army, the VCSA approves and CSA retains veto authority for all warfighting materiel requirements. Major warfighting concepts designed to guide force modernization, (e.g., Unit of Action (UA) or higher level operational and organizational (O&O) concepts) are approved by the CSA. Requirements meeting specific threshold criteria may be approved by the DCS, G-3/5/7, in order to facilitate timely processing, if delegated by the VCSA. The Joint Staff recently revised the Joint materiel documentation staffing, validation, and approval process in support of the JCIDS. This revision (discussed below) is articulated in *CJCSM 3170.01A*.

11-27. Joint requirements approval

a. The process of obtaining validation and approval of JCIDS documents begins with the submission of a materiel proposal document to the J-8 Knowledge Management/Decision Support (KM/DS) tool database and continues until the document is validated and approved by the appropriate validation authority. The details of the process are presented below.

b. Services and other organizations conducting JCIDS functional analyses may generate ideas and concepts leading to draft initial capabilities documents (ICD), capability development documents (CDD), capability production documents (CPD), capstone requirements documents (CRD) (if directed by the Joint Requirements Oversight Council [JROC]), and joint doctrine, organization, training, leadership & education, personnel, and facilities (DOTLPF) change recommendations (DCRs). JCIDS initiatives may also be generated within a Functional Capabilities Board (FCB) as a result of analyses conducted by, or in support of, the FCB. As the initiative develops into proposed DOTLPF or materiel solutions to provide the desired capabilities, an FCB may task a lead Service or component with sponsoring the initiative. Further development of the proposal would then become the responsibility of the sponsor. The FCB is responsible for the organization, analysis, and prioritization of Joint warfighting capability needs within assigned functional areas. The FCB is an advisory body to the Joint Capabilities Board (JCB) and JROC for JCIDS initiatives assigned with Joint Potential Designators (JPDs) of JROC Interest. The FCB Chairman advises the JCB or JROC when required JCIDS decisions lay outside the scope of FCB decision authority.

c. All JCIDS documents (ICDs, CDDs, CPDs, and CRDs) are submitted to the J8 KM/DS tool database by the sponsoring component. The web site for KM/DS can be found at <https://siprweb1.js.smil.mil/pls/jrcz>. Submission of the document to the KM/DS database triggers the Deputy Director, J-8 and the "gatekeeper" process to determine whether the document has Joint implications or is component unique. Normally the document has undergone an appropriate component staffing process before submission to the J-8 KM/DS tool database.

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d. The Gatekeeper. The Joint Staff, Deputy Director J-8, serves as the gatekeeper of the JCIDS process. The gatekeeper, with the assistance of the J-8 Requirements and Acquisition Division (RAD), and J-6 Requirements and Assessments Division, evaluate all JCIDS documents submitted through the J-8 KM/DS tool database.

(1) JCIDS documents are submitted for gatekeeper review to determine whether the proposal affects the Joint force. The gatekeeper review is conducted for each document regardless of potential acquisition category (ACAT), previous delegation decisions, or previous JPD decisions.

(2) Based on the content of the submission, the gatekeeper assigns a JPD of “JROC Interest,” “Joint Integration,” or “Independent” to the ICD, CDD, CPD or CRD.

(a) The “JROC Interest” designation applies to all potential ACAT I/IA programs and programs designated as JROC Interest. All JROC Interest documents receive threat validation, command, control, communications, and computers (C4) interoperability and supportability, intelligence, or munitions certifications as required. These documents are staffed through the JROC for validation and approval. All CRDs automatically receive the designation of JROC Interest.

(b) The “Joint Integration” designation applies to potential ACAT II and below programs in which the concepts and/or systems associated with the document do not significantly affect the Joint force, for which an expanded review is not required; but for which threat validation, C4 interoperability and supportability, intelligence, or munitions certifications are required. Once the required certifications are completed, Joint Integration proposals are validated and approved by the sponsoring component.

(c) The “Independent” designation applies to potential ACAT II and below programs in which the concepts and/or systems associated with the document do not significantly affect the Joint force, an expanded review is not required, and no certifications are required. Once designated, these documents are returned to the sponsoring component for validation and approval.

(3) The J-8, using the KM/DS tool, maintains a database of JCIDS documents processed through the gatekeeper function. The database includes the JPD as defined above; which FCBs have equity in the proposal (if any); and the lead FCB for the proposal (if any). The database helps the Deputy Director, J-8 ensure consistency of staffing as JCIDS proposals progress through the JCIDS process. Non-materiel DOTMLPF change proposals are processed in accordance with *CJCSI 3180.01*.

(4) Once the JPD has been assigned, the document moves into the staffing and approval process.

e. Certifications. As part of the staffing process for each JCIDS document, required certifications must be processed.

(1) Threat validation and intelligence certification – (Defense Intelligence Agency (DIA)/J-2).

(a) Threat validation. For all JROC Interest and Joint Integration ICDs, CDDs, CPDs, and CRDs, the DIA/J-2 must provide validation of threat information appropriate to the proposal.

(b) Intelligence certification. DIA/J-2 provide intelligence certification as part of the JCIDS staffing of ICDs, CDDs, CPDs, and CRDs regardless of ACAT level, for those proposed programs that either consume, produce, process, or handle intelligence data. DIA/J-2 assesses intelligence support needs for completeness, supportability, and impact on Joint intelligence strategy, policy, and architecture planning. The DIA/J-2 certification also evaluates intelligence handling and intelligence-related information systems with respect to open systems architecture, interoperability, and compatibility standards.

(2) Munitions certifications. J-4 must certify all JCIDS documents for munitions to ensure cross-Service interoperability.

(3) C4 interoperability requirements certification. J-6 certifies CRDs, CDDs, and CPDs designated as JROC Interest or Joint Integration for conformance with joint C4 policy and doctrine, technical architectural integrity, and interoperability standards.

f. Staffing process. The J-8 RAD staffs all JROC Interest proposals before FCB review. During the review process, the FCB evaluates how well the proposed solution documented in a CRD, ICD, CDD, or CPD addressed the capability needs identified in the JCIDS analyses.

11-28. Army requirements approval

In order to provide more effective management of the total requirements process for all aspects of Army needs, the requirements process was modified to consolidate all DOTMLPF requirements at HQDA for staffing, validation, and approval. This process ensures that the Army pursues requirements that can compete for and retain resources that are tied to the future Army and Joint visions and goals. The changes to the current JCIDS are evolutionary. The new process places increased emphasis on analysis of the requirement, potential alternatives, affordability and Joint interoperability. The goal is to evaluate all DOTMLPF requirements, regardless of origin, against the goals, vision and needs of the current and future force. The lead Army organization for the implementation of the JCIDS process is HQDA OADCS, G-3/5/7. Within the OADCS, G37, the Future Warfighting Capabilities Division (DAMO-CIC) is the single entry point for all Army and Joint DOTMLPF requirements. DAMO-CIC is the proponent for policy development and Army interface with the JCIDS process (previously discussed). Within DAMO-CIC, the requirements staff officer (RSO) is directly responsible for leading HQDA staff integration and coordination efforts for all Army and Joint DOTMLPF requirements issues within the JCIDS process. The RSO coordinates with his/her ODCS, G-8 counterpart,

the synchronization staff officer (SSO), to facilitate the transition from requirements development and approval to requirements solutions (execution and resourcing).

11–29. Army requirements oversight council (AROC)

a. The AROC, coordinated by OADCS, G–3/5/7 Future Warfighting Capabilities Division (DAMO–CIC), is assigned responsibility for advising and making recommendations on the disposition of materiel capabilities documents (MCDs) to the VCSA. DAMO–CIC schedules and executes the AROC forum. TRADOC’s Futures Center continues to be responsible for balanced development of concepts, requirements, and products in doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF). The TRADOC commander’s evaluation and recommendation must accompany all materiel capabilities documents (MCDs) submitted to HQDA for AROC approval.

b. The AROC reviews MCDs for military need and risk; synchronization with *Army Modernization Plan (AMP)* and *Army Campaign Plan (ACP)*; program affordability; program supportability; and program definition and interoperability. In reviewing for military need and risk, the AROC seeks to validate that:

- (1) Deficiencies cannot be corrected by nonmateriel means, such as changes to doctrine, organizations, training, leadership and education, personnel, or facilities (DOTLPF);
- (2) Suitable, lesser cost, materiel alternatives do not exist; and
- (3) Failure to pursue the program will result in an unacceptable risk to the Army’s warfighting capabilities.

c. The AROC also considers the execution risk to ensure capabilities can be available to the field in the timeframe required. The AROC review validates the recommended strategy for MCDs is consistent with Army modernization plans, and contributes to a balanced, synchronized modernization program. The AROC reviews cost and affordability of concepts and programs to ensure that they are within budgeting and programming limits for short and long term. This includes potential supportability requirements for the concept or system. The AROC ensures that the operational and organizational (O&O) definition of the system CDD is clear, and consistent with Joint and Army warfighting concepts. The AROC reviews, in the CDD, the KPPs for the system and ensures the proposed system meets Army and Joint interoperability requirements.

d. The AROC may not review all Army requirements. Approval of selected documentation may be delegated to the DCS, G–3/5/7 by the VCSA. Disapproval authority remains at the CSA level. In addition a “paper AROC” may be used, at the discretion of the AROC chair, to staff noncontentious issues. An information copy of all issues approved by the DCS, G–3/5/7 is provided to the VCSA/CSA.

e. The AROC consists of the following permanent members:

- (1) Vice, Chief of Staff, Army (Chair),
- (2) Military Deputy, Office of the Assistant Secretary of Army (Acquisition, Logistics, and Technology,
- (3) Chief Information Officer (CIO)/Deputy Chief of Staff, G–6,
- (4) Deputy Under Secretary of the Army (Operations Research),
- (5) Deputy Chief of Staff, G–1,
- (6) Deputy Chief of Staff, G–2,
- (7) Deputy Chief of Staff, G–3/5/7,
- (8) Deputy Chief of Staff, G–4,
- (9) Deputy Chief of Staff, G–8, and
- (10) TRADOC Futures Center representative.

11–30. Army approval process procedures

a. All Army and Joint DOTMLPF requirements (including ONS, priority changes, and accelerations), regardless of origin, are submitted to OADCS, G–3/5/7, DAMO–CIC, Policy and Procedures Branch.

b. DAMO–CIC reviews the capabilities document for appropriate content, completeness, and determines the correct staffing channel.

c. DAMO–CIC staffs and forwards the MCDs to the appropriate RSO team.

d. The RSO convenes the requirements team from across the ARSTAF to analyze, coordinate, refine and develop recommendations for the requirement. The requirements team facilitates changes to the MCD as appropriate. The RSO convenes subsequent requirements team meetings as necessary.

e. The RSO consolidates requirements team comments, develops a recommendation package and returns recommendation to the DAMO–CIC who ensures completeness of the packet, formulates the recommendation, and forwards the requirements packet thru the Director, Capabilities Integration, Prioritization, and Analysis (DAMO–CI) to the ADCS, G–3/5/7.

f. The ADCS, G–3/5/7 approves the recommendation or directs further development.

g. The ADCS, G–3/5/7 determines the approval channel. DAMO–CIC submits requirements to the ARSTAF for the 3–Star review at the direction of the ADCS, G–3/5/7.

h. The 3–Star review provides the final formal ARSTAF recommendation on the requirement.

i. Upon completion of the 3-Star review, the requirements packet is returned to the ADCS, G-3/5/7 for final coordination with the G-37, Resource Analysis and Integration Division (DAMO-CIR) regarding 1-N list priority. DAMO-CIC routes the packet to the appropriate approval authority or venue depending upon threshold decision.

j. All approved requirements are forwarded to the Deputy Director, J-8 through the J-8 KM/DS tool database for JCIDS analysis and staffing.

k. Once MCD has been staffed, validated, approved, and prioritized, DAMO-CIC issues VCSA tasking to ODCS, G-8 Dir, FD for programming and fielding solutions across DOTMLPF.

l. If the requirement cannot be met for specific issues, the requirement is returned to the ADCS, G-3/5/7 for reconsideration by the VCSA.

m. Over time, changes to a requirement or the inability to sustain an approved requirement results in a notification by the solution proponent through the ODCS, G-8 to the OADCS, G-3/5/7. Resulting actions include: restaffing, reprioritizing, modifying, or killing the requirement.

Note. VCSA approves any modification to approved requirements.

n. The materiel requirements generation / approval / program initiation process is shown in figure 11-7.

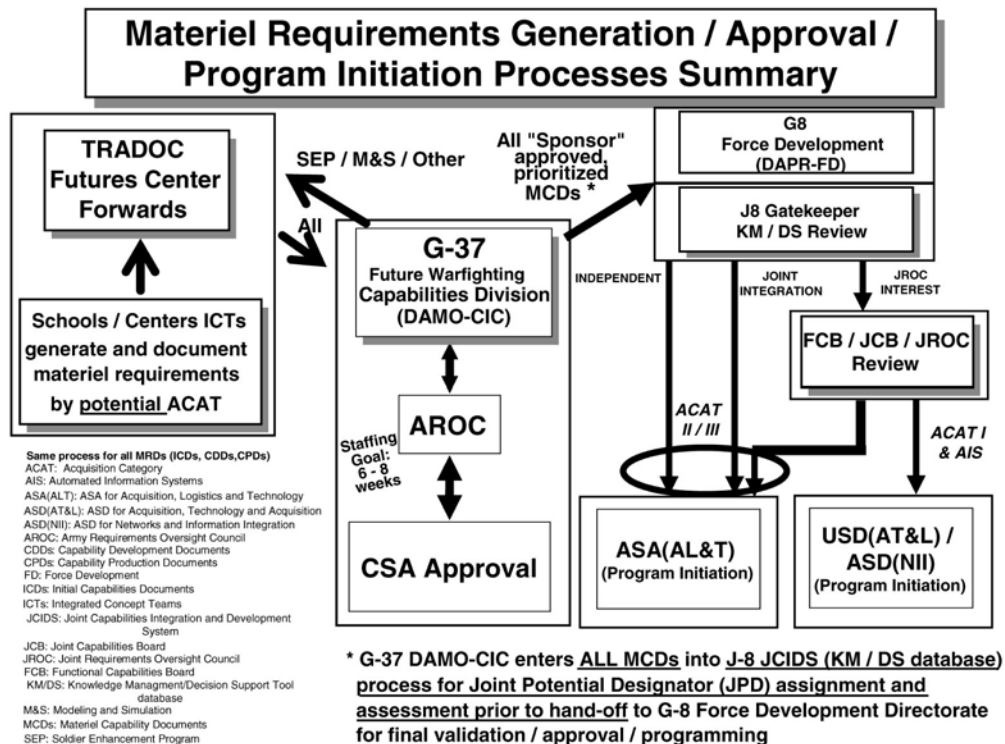


Figure 11-7. Materiel requirements approval/Program initiation proces

Section VII

Materiel systems acquisition management process

The Defense acquisition system establishes a management process to translate user needs (broadly stated functional capability gaps developed in the JCIDS or business needs responding to new ways of doing business) and technological opportunities (developed or identified in the S&T program based on user needs) into reliable and sustainable systems that provide capability to the user.

11-31. Materiel systems acquisition management

a. The materiel systems acquisition management process is a continuum composed of three activities with multiple paths into and out of each activity. Technologies are researched, developed, and demonstrated in pre-system acquisition (science and technology, concept refinement, and technology development). Systems are developed, demonstrated,

produced or procured, and deployed in systems acquisition. The outcome of systems acquisition is a system that represents a judicious balance of cost, schedule, and performance in response to the user's expressed materiel need; that is interoperable with other systems (U.S., Coalition, and Allied systems, as specified in the MCD); that uses proven technology, open systems design, available manufacturing capabilities or services, and smart competition; that is affordable; and that is supportable. Once deployed, the system is supported throughout its operational life and eventual disposal in post-systems acquisition using prudent combinations of organic and contractor service providers, in accordance with statutes.

b. Key policies and principles governing the operation of the Defense acquisition system are (*DODD 5000.1*):

(1) Flexibility. There is no *one* best way to structure an acquisition program to accomplish the objective of the Defense Acquisition System. Milestone decision authorities (MDAs) and PMs tailor program strategies and oversight, including documentation of program information, acquisition phases, the timing and scope of decision reviews, and decision levels, to fit the particular conditions of that program, consistent with applicable laws and regulations and the time-sensitivity of the capability need.

(2) Responsiveness. Advanced technology is integrated into producible systems and deployed in the shortest time practicable. Approved, time-phased capability needs matched with available technology and resources enable evolutionary acquisition strategies. Evolutionary acquisition strategies are the preferred approach to satisfying operational needs. Spiral development is the preferred process for executing such strategies.

(3) Innovation. Throughout DOD, acquisition professionals continuously develop and implement initiatives to streamline and improve the Defense Acquisition System. MDAs and PMs examine and, as appropriate, adopt innovative practices (including best commercial practices) that reduce cycle time and cost, and encourage teamwork.

(4) Discipline. PMs manage programs consistent with statute and regulatory requirements. Every PM establishes program goals for the minimum number of cost, schedule, and performance parameters that describe the program over its life-cycle. Approved program baseline parameters serve as program control objectives. PMs identify deviations from approved acquisition program baseline parameters and exit criteria.

(5) Streamlined and effective management. Responsibility for the acquisition of systems is decentralized to the maximum extent practicable. The MDA provides a single individual with sufficient authority to accomplish MDA approved program objectives for development, production, and sustainment. The MDA ensures accountability and maximize credibility in cost, schedule, and performance reporting.

c. Technology projects (e.g., ATDs, ACTDs, JWEs and concepts exploration) are efforts that occur prior to acquisition program initiation. These are referred to as pre-acquisition category (ACAT) technology projects. The MDA for projects which will likely result in a major defense acquisition program (MDAP), if successful, is the USD(AT&L). Those projects likely to result in a major automated information system (MAIS), if successful, the MDA is the Assistant Secretary of Defense (Networks and Information Integration (ASD(NII))).

d. The materiel acquisition (RDA) process is initiated as a result of output—approved warfighting materiel requirements—from the JCIDS (previously discussed). Identified warfighting requirements are first assessed to determine if they can be satisfied by non-materiel solutions. Non-materiel solutions include changes in doctrine, organization, training, leadership and education, and personnel (DOTLP). Only if these non-materiel solutions will not satisfactorily overcome the deficiency is a new materiel development program initiated. A hierarchy of potential materiel alternatives (strategies) must be considered before committing to a new start acquisition program. In order of preference, the DOD directed materiel alternatives are:

- Procurement/modification of commercially available products, services, and technologies, from domestic or international sources, or the development of dual-use technologies;
- Additional production/modification of previously developed U.S. and/or Allied military systems or equipment;
- A cooperative development program with one or more Allied nations;
- A new joint component or government agency development program; and
- A new component-unique development program.

e. In the broad sense, the acquisition process consists of a series of management decisions made in DOD or the Army as the development of a materiel system progresses from a stated materiel requirement to a fielded system. Product improvements (PIs) to existing systems or acquisition of nondevelopmental items (NDI) usually occurs through acquisition streamlining. The framework that is used in the materiel acquisition process is shown in figure 11–8. A key aspect of the materiel acquisition process is that it is divided into three distinct activities (pre-systems acquisition, systems acquisition, sustainment); five phases (concept refinement, technology development, system development and demonstration, production and deployment, and operations and support); and six work efforts (system integration, system demonstration, low-rate initial production (LRIP), full-rate production (FRP) and deployment, sustainment, and disposal). Entry into the acquisition process is at one of the formal decision points, called Milestones (MS), dependent on the demonstrated technological maturity of the alternative selected.

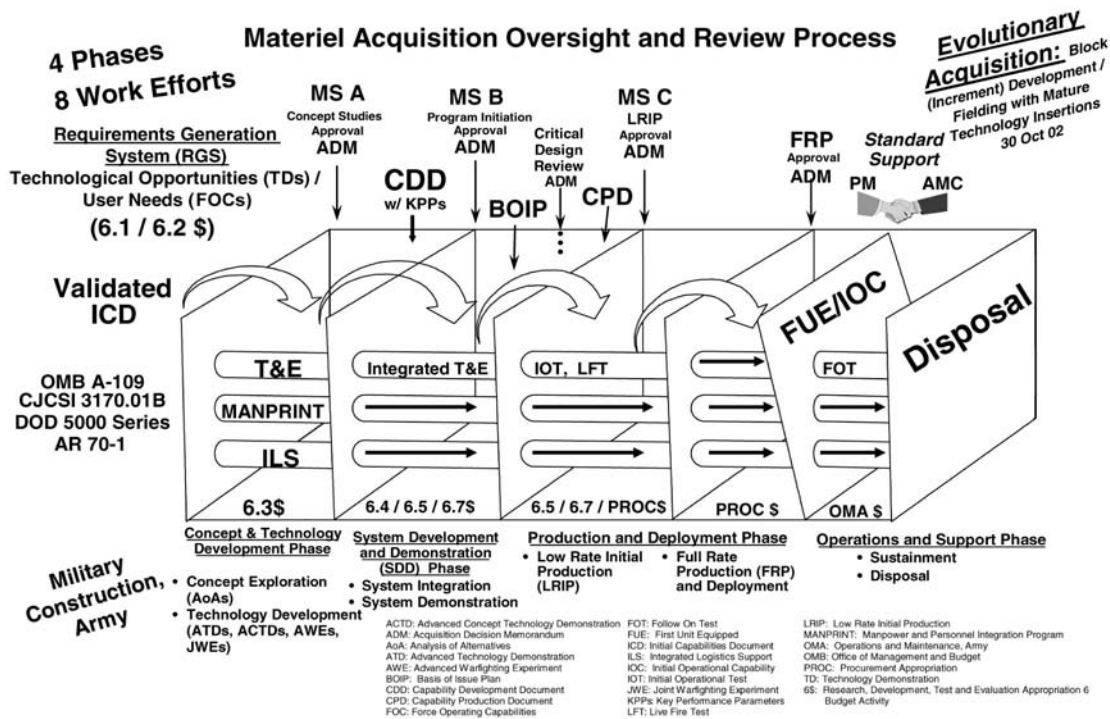


Figure 11–8. System acquisition management process

11–32. Acquisition categories

When the materiel requirement and manner of acquisition have been identified, the acquisition is designated as ACAT I, II, or III. This category determines the level of review, and who will make the milestone decisions. Dollar criteria and visibility of the potential program determine the ACAT. The three acquisition categories are shown in figure 11-3.

11–33. Acquisition strategies and program plans

a. The acquisition strategy (AS) is the framework (roadmap) for planning, directing, and managing an acquisition program to satisfy an approved materiel requirement. Acquisition strategies and their supporting program plans are tailored to accomplish established program objectives and to control risk. They must also provide the information essential for milestone decisions. In this regard, acquisition strategies are event-driven and explicitly link major contractual commitments and milestone decisions to demonstrated accomplishments in development and testing.

b. Evolutionary acquisition. Evolutionary acquisition is DOD's preferred strategy for rapid acquisition of mature technology for the user. An evolutionary approach delivers capability in increments recognizing, up front, the need for future capability improvements. The success of the strategy depends on the consistent and continuous definition of requirements and the maturation of technologies that lead to disciplined development and production of systems that provide increasing capability towards a materiel concept. The approaches to achieve evolutionary acquisition require collaboration between the user, tester, and developer. They include the following:

(1) *Spiral development.* In this process, a desired capability is identified, but the end-state requirements are not known at program initiation. Those requirements are refined through demonstration and risk management. There is continuous user feedback and each increment provides the user the best possible capability. The requirements for future increments depend on feedback from users and technology maturation.

(2) *Incremental development.* In this process, a desired capability is identified, an end-state requirement is known, and that requirement is met over time by development of several increments, each dependent on available mature technology.

c. Program plans provide for a systems engineering approach to the simultaneous design of the product and its

associated manufacturing, test, and support processes. This concurrent engineering approach is essential to achieving a careful balance among system design requirements (for example, operational performance, producibility, reliability, maintainability, logistics and human factors engineering, safety, survivability, interoperability, and standardization). Maximum practicable use is made of commercial and other NDI. The Army's first preference is to use performance specifications, the next is to use non-government standards (NGS), and as a last resort military specifications and standards (MILSPECs/STDs) may be used. Use of MILSPECs/STDs requires a waiver from the MDA. Additionally, changes to *DODI 5000.2* resulting from the *Federal Acquisition Streamlining Act (FASTA) of 1994* state the AS should be tailored to the extent feasible to employ commercial practices when purchasing commercial products or other NDI.

d. Cost as an independent variable (CAIV). CAIV is the DOD cost reduction methodology utilized throughout the entire life-cycle of a programs acquisition process to ensure operational capability of the total force is maximized for the given modernization investment. In other words, cost is treated as an independent variable along with others used to define a system. Cost performance analysis is conducted on a continuous basis throughout the life-cycle. CAIV directly impacts the preparation of a program's materiel capabilities documents (ICDs/CDDs/CPDs), as well as acquisition documents (AS and APB).

11-34. Environmental considerations

Environmental impact is always considered in Defense acquisitions. *The National Environmental Policy Act (NEPA) of 1969* mandates analysis of potential environmental effects of proposed federal actions. For materiel acquisitions, *NEPA* applies to all "new starts", SLEP, P3I, and block modifications in all ACATs. *NEPA* analysis begins during the Technology Development Phase and continues through the system demonstration and low-rate initial production work efforts, accounting for all direct, indirect, and cumulative environmental impacts. *NEPA* compliance is key to support production, testing, and fielding of the system as well as to ensuring the system can be operated, maintained and sustained throughout the remainder of its life-cycle. The *NEPA* documentation process can be lengthy and costly, but environmental issues and concerns represent a risk to the program that must be managed. Inadequate environmental analyses can lead to dramatic increases to overall program costs, can delay testing and fielding schedules, and may produce a system that cannot be operated or maintained at the location where Soldiers need it most. Early consideration of environmental impacts and *NEPA* requirements help protect not only the environment, but helps ensure a well trained Soldier.

11-35. Risk assessments and management

Program risks and risk management plans are explicitly assessed at each milestone decision point prior to granting approval to proceed into the next acquisition phase. Risks must be well understood, and risk management approaches developed, before MDAs can authorize a program to proceed into the next phase of the acquisition process. To assess and manage risk, MATDEVs use a variety of techniques. They include TDs, prototyping, and T&E. Risk management encompasses identification, mitigation, and continuous tracking and control procedures that feed back through the program assessment process to decision authorities. PMs, and other MATDEVs develop a contracting approach appropriate to the type system being developed and acquired.

Section VIII

Acquisition activities, phases and milestones

11-36. Pre-systems acquisition activity

Pre-system acquisition is composed of on-going activities in development of user needs, in S&T, and in concept refinement and technology development work specific to the development of a materiel solution to an identified, validated materiel requirement.

11-37. Concept refinement phase

One path into systems acquisition begins with examining alternative concepts to meet a stated functional need. This path begins with a decision to enter the Concept Refinement Phase. The purpose of this phase is to refine the initial concept and develop a technology development strategy (TDS). Entrance into this phase depends upon a validated ICD resulting from the analysis of potential concepts across the Services, international systems from Allies, and cooperative opportunities; and an approved plan for conducting an analysis of alternatives (AoA) for the selected concept, documented in the approved ICD.

a. Concept refinement begins when the milestone decision authority (MDA) designates the lead agency to refine the initial concept selected, approves the AoA plan, and establishes a date for a Milestone A review. The MDA decisions are documented in an acquisition decision memorandum (ADM). This effort normally is funded only for the concept refinement work. The MDA decision to begin concept refinement **DOES NOT** yet mean that a new acquisition program has been initiated.

b. The ICD and the AoA plan guide concept refinement efforts. The focus of the AoA is to refine the selected concept documented in the validated ICD. The AoA assesses the critical technologies associated with these concepts, including technology maturity, technology risk, and, if necessary, technology maturation and demonstration needs. In

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order to achieve the best possible system solution, emphasis is placed on innovation and competition. To this end, participation by a diversified range of large and small businesses is encouraged. Existing commercial-off-the-shelf (COTS) functionality and solutions are considered.

c. The results of the AoA provide the basis for the TDS, to be approved by the MDA at Milestone A. The TDS documents the following:

(1) The rationale for adopting either an evolutionary strategy or a single-step-to-full-capability strategy. For an evolutionary acquisition, either spiral or incremental, the TDS includes a preliminary description of how the program will be divided into technology spirals and development increments, an appropriate limitation on the number of prototype units that may be produced and deployed during technology development, how these units will be supported, and specific performance goals and exit criteria that must be met before exceeding the number of prototypes that may be produced under the research and development (R&D) program.

(2) A program strategy, including overall cost, schedule, and performance goals for the total R&D program.

(3) Specific cost, schedule, and performance goals, including exit criteria, for the first technology spiral demonstration.

(4) A test plan to ensure that the goals and exit criteria for the first technology spiral demonstration are met.

d. Concept refinement ends when the MDA selects the preferred solution resulting from the AoA and approves the associated TD strategy.

11-38. Milestone A

At Milestone A, the MDA designates a lead agency, approves Technology Development Phase exit criteria, and issues the ADM. The leader of the CBTDEV-led ICT, working with the integrated test team, develops an evaluation strategy that describes how the capabilities in the MCD will be evaluated once the system is developed. For potential ACAT I programs, the integrated evaluation strategy is approved by the DOD Director, Operational Test and Evaluation (DOT&E) and the cognizant OIPT. A favorable Milestone A decision **DOES NOT** yet mean that a new acquisition program has been initiated.

11-39. Technology development phase

The project enters technology development when the MDA has approved the TDS and the ICT leader has a concept for the needed capability, but does not yet know the system architecture. Unless otherwise determined by the MDA, the component technology to be developed has been proven in concept. The project shall exit technology development when an integrated architecture has been developed, when an affordable increment of militarily-useful capability has been identified, the technology for that increment has been demonstrated in the relevant environment, and a system can be developed for production within a short timeframe (normally less than five years); or when the MDA decides to end this effort. This effort is intended to reduce risk on components and subsystems that have only been demonstrated in a laboratory environment and to determine the appropriate set of subsystems to be integrated into a full system. This work effort normally is funded only for the advanced development work. The work effort is guided by the approved ICD and TDS, but during this activity, a CDD is developed by the CBTDEV-led ICT to support program initiation and refine the integrated architecture. Also, acquisition information necessary for a milestone decision (e.g., the acquisition strategy, program protection plan, etc.) is developed. This effort is normally followed by entry into the System Development and Demonstration (SDD) Phase after a Milestone B decision by the MDA.

11-40. Systems acquisition activity

Systems acquisition is the process of developing concepts into producible and deployable products that provide capability to the user. The concept to exploit in systems acquisition is based on the AoA conducted in the Concept Refinement Phase to meet the military need, including commercial and non-developmental technologies and products and services determined through market analysis. The CBTDEV responsible for the functional area in which a deficiency or opportunity has been identified, but not the MATDEV, normally prepares the AoA. The goal is to develop the best overall value solution over the system's life cycle that meets the user's operational requirements. If existing systems cannot be economically used or modified to meet the operational requirement, an acquisition program may be justified and decision-makers follow the following hierarchy of alternatives: the procurement (including modification) of commercially available domestic or international technologies, systems or equipment, or the additional production (including modification) of previously-developed U.S. military systems or equipment, or Allied systems or equipment; cooperative development program with one or more Allies; new Joint or Government Agency development program; and new Service-unique development program.

11-41. Milestone B

Milestone B is normally the initiation of an acquisition program. The purpose of Milestone B is to authorize entry into the System Development and Demonstration (SDD) Phase.

a. Milestone B approval can lead to system integration or system demonstration. Regardless of the approach recommended, PMs and other acquisition managers continually assess program risks. Risks must be well understood, and risk management approaches developed, before decision authorities can authorize a program to proceed into the

next phase of the acquisition process. Risk management is an organized method of identifying and measuring risk and developing, selecting, and managing options for handling these risks. The types of risk include, but are not limited to, schedule, cost, technical feasibility, risk of technical obsolescence, software management, dependencies between a new program and other programs, and risk of creating a monopoly for future procurements.

b. There is only one Milestone B per program or evolutionary increment. Each increment of an evolutionary acquisition must have its own Milestone B.

11–42. System development and demonstration (SDD) phase

a. The purpose of the SDD phase is to develop a system; reduce integration and manufacturing risk (technology risk reduction occurs during technology development); ensure operational supportability with particular attention to reducing the logistics footprint; MANPRINT; design for producibility; ensure affordability and the protection of critical program information (CPI); and demonstrate system integration, interoperability, safety, and utility. Development and demonstration are aided by the use of simulation-based acquisition and test and evaluation integrated into an efficient continuum and guided by a system acquisition strategy (AS) and test and evaluation master plan (TEMP).

b. The independent planning of a dedicated initial operational test (IOT), as required by law, and Follow-on operational test (FOT), if required, is the responsibility of the Army's Test and Evaluation Command (ATEC).

11–43. Entrance criteria

a. Entrance into the SDD phase depends on demonstrated technology maturity (including software), validated requirements, and funding. Unless some other factor is overriding in its impact, the maturity of the technology determines the path to be followed. Programs that enter the acquisition process at Milestone B must have an approved ICD that provides the context in which the capability was determined and validated.

b. The management and mitigation of technology risk, which allows less costly and less time-consuming systems development, is a crucial part of overall program management and is especially relevant to meeting cost and schedule goals. Objective assessment of technology maturity and risk is a continuous aspect of system acquisition. Technology developed in S&T or procured from industry or other sources must be demonstrated in a relevant environment or, preferably, in an operational environment to be considered mature enough to use for product development in systems integration. Technology readiness assessments (TRAs), and where necessary, independent assessments, are also conducted. If technology is not mature, the MATDEV uses alternative technology that is mature and that can meet the user's needs.

c. Prior to beginning SDD, users identify and the requirements authority validates a minimum set of key performance parameters (KPPs), included in the CDD, that guide the efforts of this phase. Each set of KPPs only apply to the current increment of capability in SDD (or to the entire system in a single step to full capability). At Milestone B, the PM prepares and the MDA approves an acquisition strategy (AS) that guides activity during SDD. In an evolutionary acquisition program, each increment begins with a Milestone B, and production resulting from that increment begins with a Milestone C.

d. Each program must have an acquisition program baseline (APB) establishing program goals—thresholds and objectives—for the minimum number of cost, schedule, and performance parameters that describe the program over its life-cycle.

e. The affordability determination is made in the process of addressing cost in the JCIDS process (previously discussed) and included in each CDD, using life-cycle cost or, if available, total ownership cost. Transition into SDD also requires full funding – e.g., inclusion of the dollars and manpower needed for all current and future efforts to carry out the acquisition strategy in the budget and out-year program. In no case can full funding be done later than Milestone B, unless a program first enters the acquisition process at Milestone C.

11–44. System integration work effort

This effort is intended to integrate subsystems and reduce system-level risk. The program enters system integration when the PM has a technical solution for the system, but has not yet integrated the subsystems into a complete system. The CDD guides this effort. This effort typically includes the demonstration of prototype articles or engineering development models (EDMs).

11–45. Design readiness review (DRR)

The DRR during SDD provides an opportunity for mid-phase assessment of design maturity as evidenced by such measures as, for example, the number of completed subsystem and system design reviews successfully completed; the percentage of drawings completed; planned corrective actions to hardware/software deficiencies; adequate developmental testing; an assessment of environmental, safety and health risks; a completed failure modes and effects analysis; the identification of key system characteristics and critical manufacturing processes; and the availability of reliability targets and a growth plan; etc. Successful completion of the DRR ends system integration and continues the SDD phase into the system demonstration work effort. MDAs determine the form and content of the review.

11–46. System demonstration work effort

This effort is intended to demonstrate the ability of the system to operate in a useful way consistent with the validated KPPs. The program enters system demonstration when the PM has demonstrated the system in prototypes or EDMs. This effort ends when a system is demonstrated in its intended environment, using the selected prototype; meets validated requirements; industrial capabilities are reasonably available; and the system meets or exceeds exit criteria and Milestone C entrance requirements. Successful developmental testing, early operational assessments, and, where proven capabilities exist, the use of modeling and simulation (M&S) to demonstrate system integration are critical during this effort. The completion of this work effort is dependent on a decision by the MDA to commit to the program at Milestone C or a decision to end this effort.

11–47. Production and deployment phase

The purpose of the Production and Deployment Phase is to achieve an operational capability that satisfies functional needs. Operational testing determines the operational effectiveness, suitability, and survivability of the system. The MDA makes the decision to commit to production at Milestone C.

a. Milestone C authorizes entry into low-rate initial production (LRIP) (for MDAPs and major systems), into production or procurement (for non-major systems that do not require LRIP) or into limited deployment in support of operational testing for MAIS programs or software-intensive systems with no production components.

b. This phase has two major work efforts - LRIP and full-rate production and deployment - and includes a full-rate production decision review. Milestone C can be reached directly from pre-systems acquisition (e.g., a commercial product) or from System Development and Demonstration Phase. For DOT&E oversight programs, a system can not be produced at full-rate until a Beyond Low-Rate Initial Production Report has been completed and sent to Congress.

11–48. Entrance criteria

Regardless of the entry point, approval at milestone C is dependent on the following criteria being met (or a decision by the MDA to proceed):

- a. Acceptable performance in development, test and evaluation, and operational assessment; mature software capability; and no significant manufacturing risks.
- b. Mature software capability.
- c. Manufacturing processes under control (if Milestone C is full-rate production).
- d. An approved capability production document (CPD). The CPD reflects the operational requirements resulting from SDD and details the performance expected of the production system.
- e. Acceptable interoperability.
- f. Acceptable operational supportability.
- g. Demonstration that the system is affordable throughout the life cycle, optimally funded, and properly phased for rapid acquisition.
- h. Compliance with the DOD Strategic Plan.
- i. Acceptable information assurance to include information assurance detection and recovery.
- j. Acceptable anti-tamper provisions.

11–49. Milestone C

Milestone approval considerations:

a. Prior to making the milestone decision, the MDA considers the component cost analysis (CCA), and, for MAISs, the CCA and economic analysis, the manpower estimate, the program protection for critical program information including anti-tamper recommendations, and an established completion schedule for *National Environmental Policy Act (NEPA)* compliance covering testing, training, basing, and operational support.

b. At this Milestone, the MDA approves an updated AS prior to the release of the final RFP and approves an updated development APB, exit criteria for LRIP (if needed) or limited deployment, and the ADM.

c. The DOD DOT&E and cognizant OIPT Leader approve the TEMP for all OSD T&E oversight programs. IT acquisition programs (regardless of ACAT) that entered system acquisition at Milestone C are registered with the DOD CIO before milestone C approval.

d. A favorable Milestone C decision authorizes the PM to commence LRIP or limited deployment for MDAPs and major systems. The PM is only authorized to commence full-rate production with further approval of the MDA.

11–50. Low-rate initial production (LRIP) work effort

a. This work effort is intended to result in completion of manufacturing development in order to ensure adequate and efficient manufacturing capability and to produce the minimum quantity necessary to provide production configured or representative articles for IOT, establish an initial production base for the system; and permit an orderly increase in the production rate for the system, sufficient to lead to full-rate production upon successful completion of operational (and live-fire, where applicable) testing.

b. Deficiencies encountered in testing prior to Milestone C are resolved prior to proceeding beyond LRIP (at the

Full-Rate Production (FRP) decision review) and any fixes verified in IOT. Outline test plans (OTPs) are provided to the DOT&E for oversight programs in advance of the start of operational testing.

c. LRIP may be funded by RDTE appropriation or by procurement appropriations, depending on the intended usage of the LRIP systems.

d. LRIP quantities are minimized. The MDA determines the LRIP quantity for MDAPs and major systems at Milestone B, and provides rationale for quantities exceeding 10 percent of the total production quantity documented in the AS. Any increase in quantity after the initial determination is approved by the MDA. When approved LRIP quantities are expected to be exceeded because the program has not yet demonstrated readiness to proceed to full-rate production, the MDA assesses the cost and benefits of a break in production versus continuing annual buys.

e. The DOT&E determines the number of LRIP articles required for LFT and IOT of DOT&E oversight programs. For a system that is not a DOT&E oversight program, ATEC determines the number of LRIP articles required for IOT. LRIP is not applicable to AISs or software intensive systems with no developmental hardware. However, a limited deployment phase may be applicable.

11-51. Full-rate production (FRP) decision review

a. An acquisition program may not proceed beyond LRIP without approval of the MDA at the FRP decision review. Before making the full-rate production and deployment decision, the MDA considers:

- The CCA, and for MAISs, the CCA and economic analysis.
- The manpower estimate (if applicable).
- The results of operational and live fire test (if applicable).
- CCA compliance certification and certification for MAISs .
- C4I supportability certification.
- Interoperability certification.

b. The MDA approves the AS prior to the release of the final RFP, the production APB, and the ADM. The decision to continue beyond low-rate to full-rate production, or beyond limited deployment of AISs or software-intensive systems with no developmental hardware, requires completion of IOT, submission of the Beyond LRIP Report for DOT&E Oversight Programs, and submission of the LFT&E Report (where applicable) to Congress, to the SECDEF, and to the USD(AT&L).

11-52. Full-rate production and deployment work effort

This effort delivers the fully funded quantity of systems and supporting materiel and services to the users. During this work effort, units attain Initial Operational Capability (IOC). The IOC is the first attainment of the capability by a modified table of organization and equipment (MTOE) unit and supporting elements to operate and maintain effectively a production item or system provided the following:

- a. The item or system has been type classified as standard or approved for limited production.
- b. The unit and support personnel have been trained to operate and maintain the item or system in an operational environment.
- c. The unit can be supported in an operational environment in such areas as special tools, test equipment, repair parts, documentation, and training devices.

11-53. Sustainment activity/operations and support phase

The objective of this activity/phase is the execution of a support program that meets operational support performance requirements and sustains the system in the most cost-effective manner over its total life-cycle. When the system has reached the end of its useful life, it must be disposed of in an appropriate manner. The Operations and Support Phase has two major work efforts: sustainment and disposal.

11-54. Sustainment work effort

a. The sustainment program includes all elements necessary to maintain the readiness and operational capability of deployed systems. The scope of support varies among programs but generally includes supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel, training, habitability, survivability, safety (including explosives safety), occupational health, protection of critical program information (CPI), anti-tamper provisions, IT (including national security system (NSS)) supportability and interoperability, and environmental management functions. This activity also includes the execution of operational support plans in peacetime, crises, and wartime. Programs with software components must be capable of responding to emerging requirements that will require software modification or periodic enhancements after a system is deployed. A follow-on operational test (FOT) program that evaluates operational effectiveness, survivability, suitability, supportability, and interoperability, and that identifies deficiencies is conducted, as appropriate.

b. Evolutionary sustainment. Supporting the tenets of evolutionary acquisition, sustainment strategies must evolve and be refined throughout the life cycle, particularly during development of subsequent blocks of an evolutionary

strategy, modifications, upgrades, and reprocurement. The PM ensures that a flexible, performance-oriented strategy to sustain systems is developed and executed. This strategy includes consideration of the full scope of operational support, such as maintenance, supply, transportation, sustaining engineering, spectrum supportability, configuration and data management, manpower, training, environmental, health, safety, disposal and security factors. The use of performance requirements or conversion to performance requirements are emphasized during reprocurement of systems, subsystems, components, spares, and services after the initial production contract.

11–55. Disposal work effort

At the end of its useful life, a system must be demilitarized and disposed in accordance with all legal and regulatory requirements and policy relating to safety (including explosives safety), security, and the environment. During the design process, PMs document hazardous materials contained in the system, and estimate and plan for demilitarization and safe disposal.

11–56. Total package fielding (TPF) process

a. TPF is currently the Army's standard fielding process. In 1984 the Army began using TPF on a test basis and made it the standard fielding process in 1987. It is designed to ensure thorough planning and coordination between CBTDEVs/TNGDEVs, MATDEVs/fielding commands, and the gaining MACOMs and using units involved in the fielding of new materiel systems. At the same time, it is designed to ease the logistics burden of the using and supporting Army troop units. Regulatory and instructional guidance for materiel release, fielding, and transfer is contained in *AR 700–142*, and *DA Pamphlet 700–142* respectively. TPF Process is shown in figure 11–9.

b. Identification of the TPF package contents for a particular fielding is known as establishment of the materiel requirements list (MRL). It is the responsibility of the MATDEV/fielding command to identify everything that is needed to use and support the new system and coordinate these requirements with the CBTDEVs/TNGDEVs and the gaining MACOMs. The total fielding requirements are documented, coordinated, and agreed on through the materiel fielding plan (MFP) and/or memorandum of notification (MON), the mission support plan (MSP) and the materiel fielding agreement (MFA).

c. The Defense Logistics Agency (DLA) operates unit materiel fielding points (UMFPs) in Pennsylvania, Texas, and California that support the Army. These three DLA UMFPs are sites where initial issue items are consolidated to support TPF worldwide. The staging site is the facility or location where the total package comes together. It is usually here that all end items, support equipment, initial issue spare and repair parts are prepared for handoff to the gaining units. To support TPF outside the Continental United States (OCONUS), the AMC operates a number of central staging sites in Europe, and two sites in Korea.

d. A Joint supportability assessment takes place about 90 days before the projected first unit equipped date (FUED) and 60 days before fielding to a unit in CONUS. The fielding command assures that those items requiring deprocessing are inspected and made fully operational-ready before handoff to the gaining units. A Joint inventory is conducted by the fielding and gaining commands to ensure all needed items are received, or placed on a shortage list for later delivery.

e. The fielding command provides, at the time of handoff, a tailored customer documentation package for each gaining unit that allows the unit to establish property accountability and post a receipt for TPF materiel. The transactions in the package are tailored to the specific supply system in use at the unit. Logistics changes are helping the Army transform to the future force. Many of these changes apply directly to TPF.

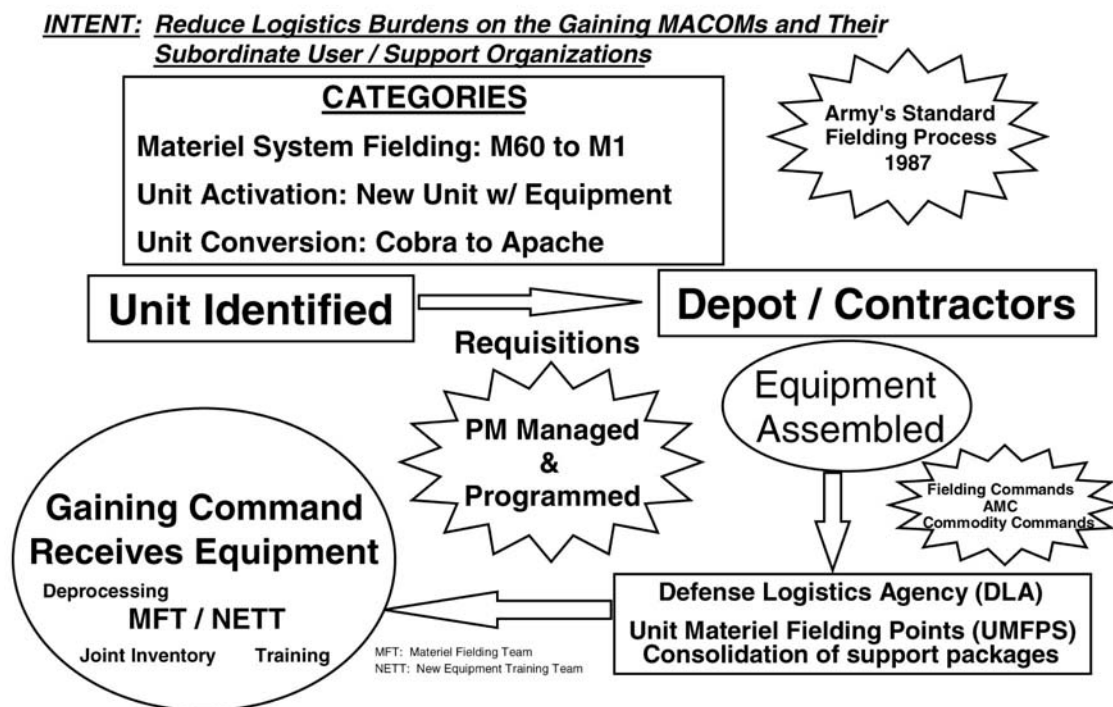


Figure 11–9. Total package fielding concept

11–57. Army system of systems (SoS)/unit set fielding (USF)

a. Introduction.

(1) Background. In the past Army units often experienced the issuance of 35–90 unsynchronized and non-integrated systems fieldings or software changes for major systems in a single year. This was very disruptive to the unit's training program and readiness posture and rarely provided to the unit a complete and fully integrated capability. A disciplined, integrated approach that focuses on the fieldings of systems and software into a single window designated specifically for modernization and training is crucial to reducing the disruptive impacts upon gaining units. This modernization approach is USF. USF was established by the Army in May 2001 with the issuance of the first Army SoS/USF Directive. The current USF Directive was issued 6 July 2004.

(2) USF is the management process for modernizing units by fielding fully integrated unit sets of equipment in support of the *Army Campaign Plan (ACP)*. This process expands on the current single system fielding process – total package fielding (TPF). TPF is a subset of USF. The concepts are currently being applied or scheduled to be applied to the current (Stryker Brigade) and future force.

b. Army SoS management process. Under the current modernization/fielding process, units may receive multiple, separate, and unsynchronized issues of individual systems throughout the year. These TPF fieldings are generally sequenced according to the Army order of precedence (AOP) prioritization memoranda. Each fielding has an impact upon the unit's readiness. With these multiple fieldings in a year, units have a difficult time maintaining unit readiness and achieving optimum effectiveness of the newly issued systems. Additionally, equipment is often fielded without the appropriate corresponding training modernization and training and installation/infrastructure items. As the Army moves forward with modernization and transformation efforts, the environment is shifting from a focus on fielding "stand alone" systems to fielding "systems-of-systems" to maximize each unit's capabilities. The Army is developing a schedule for modernization, which forces synchronization of: requirements generation, materiel development, manpower and personnel considerations, funding, testing, training, fielding, and sustainment. The Army SoS management process synchronizes planning and execution of the activities required to field interrelated and interdependent systems

to include training devices. It provides a basis for POM input focused on enhancing unit warfighting capabilities and better enable HQDA to develop an effective force and defend the POM and budget.

c. USF Process. For a unit to realize the full capability of new weapons, sensors, digital command and control systems, and training devices, equipment must be integrated, issued, and upgraded as a unit set. The Army requires a plan that packages these required items and identifies windows for fielding new capabilities by unit sets.

(1) Individual components or systems may provide significant stand alone improvements in capability, but they do not achieve their full potential until they are integrated with the other systems comprising the unit configured set. System integration plays a key role in prioritization of program adjustments at both technical and programmatic levels. The SoS management process provides a disciplined approach that identifies and synchronizes system fieldings and maximizes unit operational readiness. The disciplined approach to achieve this goal is USF.

(2) The key to USF is ensuring that all the components and associated support items of equipment (ASIOE) for a required capability are present and integrated during the fielding process. Unit sets of hardware and software are identified and interoperability certified to establish a configuration baseline prior to fielding. That baseline must be maintained after fielding.

(3) USF serves as the synchronizing process to ensure that system fieldings are implemented in an integrated and complimentary fashion that supports a unit's modernization with the minimum disruption to unit readiness. Because of the challenges in supporting the war on terrorism (WOT), USF is only being applied to the Stryker Brigades.

d. USF cycle. The USF process is a cycle that begins five to seven years prior to the beginning of the unit's USF window and ends approximately two years after the window closes. A USF cycle consists of five steps: preparation, reorganization, equipping, training, and validation. The cycle may restart two years after step four is completed.

(1) Step 1 (Preparation): This step covers actions from about five to seven years (lead-time for Military Construction, Army appropriation (MCA projects)) to six months before a unit enters its USF window. The Army modernization fielding plan (AMFP) defines USF windows and drives the development of the POM. MATDEVs estimate resource and transportation requirements in support of the AMFP to assist HQDA with the POM build process. MATDEVs also conduct surveys of installation facilities, ranges, motor pools, warehouses, training infrastructure, information infrastructure requirements, etc. These requirements are then submitted to OADCS, G-3/5/7 and MACOMs for inclusion in the POM build. Unit force modernization staffing is increased to support USF planning and execution. MACOMs and units receive the critical mission equipment list and schedule the USF windows on their long range training calendars. Other key actions include: identification of the unit to be modernized (HQDA unit identification code (UIC)); operational architecture finalization; systems architecture finalization; support strategy development; POM adjustments; development of the systems list comprising the unit set; development of training and sustaining documentation; integration testing to validate the unit's hardware/software configuration baseline; and identification of all changes for manning the units as well as any special personnel requirements for Soldiers and leaders. During this phase the MATDEV prepares to execute the USF mission. The MACOM and unit will receive a detailed materiel fielding schedule (MFS) two years out. Notification memoranda are provided to the gaining MACOM and unit three years prior to fielding. The timing of this notification coincides with development of MACOM POM submissions. HQDA generates disposition instructions eighteen months out for the excess/displaced equipment that triggers planning and resourcing to dispose of this equipment. New materiel introductory briefings (NMIB) and reorganization planning begin one year out. Six months prior to a unit entering a window, the system-of-system manager (SOSM) chairs a review of the status of all preparations to determine whether or not to proceed with the USF process.

(2) Step 2 (Reorganization): Unit reorganization begins about six months prior to the USF window and concludes at E-date. This reorganization includes actions and activities required to transition from the unit's current MTOE to a new MTOE, which reflects the new equipment in the unit. Facilities are completed, training devices, training support infrastructure, and tactics, techniques, and procedures (TTPs) are in place, personnel are assigned, and equipment turn-ins are completed.

(3) Step 3 (Fielding): Systems in the unit set are fielded during the window. The PM for each system conducts NET. Completion of NET for all systems in the unit set closes the window and the unit is taken off C-5 status. The C-5 status indicates that the unit is undergoing a HQDA directed activation, inactivation, or conversion and is not prepared, at this time, to undertake its wartime missions.

(4) Step 4 (Training): The unit is responsible for conducting collective and sustainment training. This training starts after completion of NET and normally is completed within 18 months after the unit's E-date.

(5) Step 5 (Validation): The MACOM is responsible for validating the operational readiness of the unit to execute its assigned mission. Validation is the final activity conducted during the training step. MACOM validation completes the USF cycle.

11-58. Software blocking (SWB)

a. SWB is an acquisition policy and disciplined process through which the Army achieves and sustains an integrated systems-of-systems (SoS) warfighting capability. SWB is a critical enabler of USF. Software blocking as an acquisition process improvement is consistent with the current *DODD 5000.1* and *DODI 5000.2*. The framework embodied in the SWB policy harmonizes and synchronizes system software developments and upgrades. It is designed to focus the

acquisition process on a disciplined approach for achieving interoperability, commonality, and synergistic functionality. In conjunction with USF, SWB is a conduit for executing Army transformation.

b. Under SWB, the Army is making a commitment to divest itself of its traditional systems-centric approach to embrace a SoS capability that supports each element of DOTMLPF. This allows the Army to make smart decisions based on the impact to warfighting capability vice systems. Under the policy, systems include new/upgraded core battlefield systems, trainers, stimulators, test & instrumentation, and simulators needed to achieve an integrated capability across all elements of DOTMLPF. Software blocking applies to all Army systems except those business systems that do not exchange information with tactical command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) systems and weapons systems. SWB represents a necessary evolution along the path of acquisition reform. SWB lowers the artificial barrier between elements within the acquisition process that inhibit the Army's ability to develop, test, train, and sustain a synergistic warfighting capability. Through SWB the acquisition process focuses on a total warfighting capability rather than individual systems. SWB is a future force process that is being implemented to enhance current operational capability. What this means is that it will take a few iterations before SWB is fully matured. Thus, SWB provides the paradigm through which current force systems transition from their stovepipe implementations in support of Joint and Army transformation objectives.

11–59. Simulation and modeling for acquisition, requirements, and training (SMART)

a. SMART is an initiative to integrate modeling and simulation (M&S) into Army business processes. Army SMART goals are to reduce the time required to field systems, reduce total ownership costs, and increase the military utility of fielded systems.

b. The SMART concept, first adopted by the Army in 1997, capitalizes on M&S tools and technologies to address system development, operational readiness, and life-cycle cost. This is accomplished through the collaborative efforts of the requirements, training and operations, and acquisition communities. Army Leadership has stated that the SMART initiative is a key mechanism to achieving the *Army Vision* and building the future force.

c. SMART is a framework to accomplish the vision of a disciplined, collaborative environment to reduce costs and time of providing solutions for Army needs. Early and persistent simulation support planning in an advanced collaborative environment (ACE) is a key means of inculcating SMART into acquisition processes. Using M&S is one means of providing analytical agility in identifying operational concepts and architectures for time-phased requirements. Concurrently, using M&S in the acquisition management system can reduce costs, accelerate schedules, lower risk and improve quality of products. When the use of M&S in JCIDS and acquisition management system is integrated through early and persistent M&S support planning, the capabilities set in place accelerate the translation of time-phased requirements into evolutionary acquisition strategies. SMART yields four significant benefits that are key to Army transformation:

- (1) Reduced total ownership costs and sustainment burden for fielded systems throughout their service lives;
- (2) Reduced time required for concept exploration, concept development, and fielding new or upgraded systems;
- (3) Increased military worth of fielded systems while simultaneously optimizing force structure, doctrine, tactics, techniques and procedures (TTPs); and
- (4) Concurrent fielding of systems with their system and non-system training devices.

d. Concept. SMART leverages information technology to improve the processes that will lead to Army modernization and a fully mission ready future force. The ultimate end state is to enable advanced collaboration leading to more rapid fielding of the future force by conducting these activities almost entirely in a digital environment. For example, picture the traditional “clay model” as a digital model. Instead of using “clay” to enable collaboration and “what if” analysis by all stakeholders “in the room”, we now use “electrons” to enable collaboration by a universe of stakeholders — limited only by their ability to gain access to the Internet. The most effective “what if” analysis is done while the model is still in the computer. M&S is used to discover “the better mousetrap” before “bending metal.” That’s how the Army gets a better product, at lower cost, and in less time by being SMART about how they do business. M&S is key to making SMART work, but the value of SMART increases exponentially as existing information technologies are leveraged to provide ALL stakeholders with early opportunities to collaborate.

e. SMART does not eliminate all live activities associated with system development, testing, and operation. SMART gains the maximum effectiveness and efficiency in system design, development, fielding, maintenance, and testing through efficient human interface with information technology across the domains of training, analysis and acquisition. To accomplish all of the system development life-cycle solely with computer-based models requires significant maturation of the mathematics and statistics that apply to the use of models, as well as considerable advancement in our ability to describe and reason about nonlinear systems. Gaining such technological ability does not imply an abandonment of contact with reality. Real systems continue to be tested and Soldiers continue to train live. Such live activities, however, are conducted, having benefited from the insights, efficiencies, and cost effectiveness of advanced computer based activities. Likewise, computer based activities continue to leverage the realism and insight that comes from live activities. This constantly improves the fidelity of computer based models and algorithms.

f. Enablers. SMART is enabled by more than just M&S. Successful execution of SMART requires many different enablers such as:

How the Army Runs

- (1) Supportive processes, policies, and laws.
- (2) Means to identify, obtain, and protect reusable resources.
- (3) Data interchange standards to foster consistent understanding of shared information.
- (4) Standards for software interoperability.
- (5) Standards for credible verification and validation of M&S. M&S that validly represents the relevant entities, attributes and interactions, including performance of human decision makers and operators.
- (6) Tools and methods based on emerging information and other technologies to support and better manage cross-domain collaboration.
- (7) Competent and motivated professionals.
- (8) Leadership commitment and support at all levels.
- (9) Data management.

g. SMART is not just for the acquisition community. SMART is just as relevant for the Soldier in the field, as it is for the PM. Addressing system development, ownership costs, and training to modernize more quickly, effectively, and affordably, is not possible through the efforts of the acquisition workforce alone. It requires the up-front and continued collaboration among the combat, materiel, and training development communities. Those who generate the requirements, those who write the doctrine, those who will train on embedded training systems, those who will then be relied upon to operate and fight with the new systems of the future force, those who must sustain these systems after they are fielded; all are stakeholders who will benefit by making SMART a part of the way the Army does business.

h. SMART is the process that the Army uses to harness the power of the digital information age. Through M&S, combined with emerging information and other technologies, the Army gains the electronic agility that has never been available. The Army can now visualize the effectiveness of a system as it develops its requirements. SMART offers the Army an effective means of engaging the Soldier directly in the acquisition process. The Army can now develop insights into whether equipment designs need to be modified or changes in tactics are necessary, or both. The application of SMART is having a major impact on future Army capabilities and will indeed enable more rapid fielding of the future force.

11–60. Additional considerations

The above discussion examined the activities performed in each phase of the nominal life-cycle of an acquisition system according to the current *DODD 5000.1*, *DODI 5000.2*, and *AR 70–1*. This is not to imply that all system developments must follow this exact sequencing of life-cycle phases and activities. On the contrary, *DODI 5000.2* specifically authorizes and encourages a PEO/PM to devise program structures and acquisition strategies to fit the particulars of a program - an approach called “tailoring.” Other aspects of acquisition planning and strategy (e.g., P3I and technology insertion) can also be accommodated under the broad guidance and direction contained in *DODD 5000.1* and *DODI 5000.2*. What remains constant is the task to develop and deliver combat-capable, cost-effective, and supportable systems to our Armed Forces.

Section IX

Acquisition documentation

Acquisition management documentation is designed to support the management process as the life-cycle development of a materiel system progresses.

11–61. Materiel requirements documents (MRDs)

MCDs establish the need for a materiel acquisition program, how the materiel will be employed, and what the materiel must be capable of doing. As the acquisition program progresses, statements of required performance and design specifications become more and more specific. The functional area initial capabilities document (ICD) is the document that initiates the acquisition system management process. MCDs were discussed in detail in section V.

11–62. Other service requirements

The CBTDEV/TNGDEV reviews other Service warfighting capability requirements documents for potential Army interest. When the Army chooses to participate in the RDA of another Service program, HQDA initiates action to validate and approve the documentation. When another Service capability document, to include an approved production request for proposal (RFP), adequately describes an Army requirement, the document may be approved as the Army requirement. The Army may also acquire other Service equipment with a national stock number (NSN) that has been identified through the MATDEV market investigation and meets an approved Army need. For Joint programs, capabilities documents are prepared and processed in accordance with the lead services procedures. Service peculiar requirements may be documented in the other Service’s capabilities documents.

11–63. Catalog of approved requirements documents (CARDS)

CARDS is an unclassified OADCS, G–3/5/7 publication that provides information on the status of all approved MCDs.

It includes both active and inactive documents. An active document or assignment of a CARDS reference number does not automatically authorize the expenditure of funds. Each program must compete for funds in the Army prioritization and programming process. OADCS, G-3/5/7 Futures Warfighting Capabilities Division (DAMO-CIC) assigns a CARDS reference number to each MCD after approval and prior to publication and distribution.

11-64. Program review documentation and program plans

The MDA is responsible for identifying the minimum amount of documentation necessary for milestone review purposes. Only those mandatory formats called for by statute or *DODI 5000.2* are required. All other formats are used as guidance only. Program plans are a description of the detailed activities necessary for executing the AS. Program plans belong to the PM and are used by the PM to manage program execution throughout the life-cycle of the program. The PM, in coordination with the PEO, determines the type and number of program plans, except those required by statute or DOD policy. Some of the typical program plans used to support the execution of a program are:

a. System threat assessment report (STAR). The STAR is the basic authoritative threat assessment that supports the development and acquisition of a particular ACAT I or II system. The STAR contains an integrated assessment of projected enemy capabilities (doctrine, tactics, hardware, organization and forces) at initial operational capability (IOC) and IOC plus 10 years, to limit, neutralize or destroy the system. It explicitly identifies critical intelligence categories (CICs) which are a series of threat capabilities that could critically impact the effectiveness and survivability of the program. The STAR is a dynamic document that is continually updated and refined as a program develops. It is approved and validated in support of ASARC/DAB/ITAB reviews. This report is the primary threat reference for the CDD, the modified integrated program summary (MIPS), the AoA, and the TEMP developed in support of a MDR. The STAR is approved by ODCS, G-2 and validated by the Defense Intelligence Agency (DIA) for all ACAT I and II programs at MS B and updated at MS C. The STAR is called the system threat assessment (STA) and approved by HQ, TRADOC (ODCSINT) for ACAT III programs.

b. Modified integrated program summary (MIPS). The MIPS, with its annexes, is the primary Army decision document used to facilitate top-level acquisition milestone decision making. It provides a comprehensive summary of program structure, status, assessment, plans, and recommendations by the PM and the PEO. The primary functions of the MIPS include a summary of where the program is versus where it should be; a description of where the program is going and how it will get there; an identification of program risk areas and plans for closing risks; and a basis for establishing explicit program cost, schedule, and performance objectives. It also includes thresholds in the stand-alone APB and program-specific exit criteria for the next acquisition phase. The MIPS provides answers to the following five key MDR core issues:

- (1) Is the system still needed?
- (2) Does the system work (from the viewpoints of the user, functional staffs, and the PM)?
- (3) Are major risks identified and manageable?
- (4) Is the program affordable (is adequate programming in the POM)?
- (5) Has the system been subjected to CAIV analysis?

c. Acquisition strategy (AS). The AS is the framework (roadmap) for planning, directing, and managing a materiel acquisition program. It states the concepts and objectives that direct and control overall program execution from program initiation through post-production support. An AS is required for all Army acquisition programs. The AS documents how the acquisition program will be tailored and identifies risks and plans to reduce or eliminate risks. The AS, prepared by the PM-led integrated product team (IPT), is a living document that matures throughout the program. It provides fundamental guidance to the functional elements of the MATDEV/CBTDEV organizations. Individual functional strategies leading to the preparation of detailed program plans are required to implement the AS as depicted in figure 11-10.

d. Environmental analysis. This is a Congressionally mandated analysis of the potential environmental impacts of weapons systems. It identifies land, sea or air space requirements of the most promising alternatives and describes the potential effects on the land, sea, and air environment. It also describes the potential impacts on public health and safety by the development, test manufacturing, basing operation, and support of the proposed system. The environmental impact data is weighed against system cost, schedule, and performance in deciding how to best minimize environmental harm.

e. Program office life-cycle cost estimate (POE) and component cost analysis (CCA). These documents are prepared in support of MS B and all subsequent MS reviews. The cost estimates are explicitly based on the program objectives, operational requirements, and contract specifications for the system, including plans for such matters as peacetime utilization rates and the maintenance concept. The estimates identify all elements of additional cost that would be entailed by a decision to proceed with development, production, and operation of the system. They are based on a careful assessment of risks and reflect a realistic appraisal of the level of cost most likely to be realized. Two cost estimates are prepared. The CBTDEV-led integrated concept team (ICT) in support of MS B, and the program office in support of MS C and all subsequent decision reviews prepare the POE. The other estimate is prepared by an organization that does not report through the acquisition chain. In the Army, this independent cost analysis, entitled

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CCA, is prepared by the Deputy Assistant Secretary of the Army, Cost and Economics (DASA–CE) for MDAP systems.

f. Army cost position (ACP). The ACP is the Army's approved life-cycle cost estimate for the materiel system. It is used for DOD milestone reviews and is the basis for Army planning, programming and budgeting. For all MDAP programs, the Cost Review Board (CRB) develops the proposed ACP after an intensive review of both the POE and CCA. This proposal becomes the ACP when it is approved by the ASA(FM&C) and then is provided to the AAE. *DODI 5000.2* requires the component's cost position.

g. Analysis of alternatives.

(1) The independent AoA provides information to the decision authority at the MS A review to assist in determining whether any of proposed alternatives to an existing system offer sufficient military and/or economic benefit. AoA findings provide the analytical underpinning to support the recommendation to initiate, modify, or terminate a program. An AoA is required for potential ACAT I and most ACAT II programs and is typically conducted by TRADOC Analysis Center (TRAC) during the concept refinement acquisition phase (previously discussed).

(2) The AoA focuses on broad operational capabilities, potential technology concepts, and materiel solutions that could satisfy the MCD. It examines the full range of materiel alternatives (including those identified in the concept decision review ADM). AoAs illuminate the relative advantages and disadvantages of alternatives being considered by identifying sensitivities of each alternative to possible changes in key assumptions (e.g., threat) or variables (e.g., selected performance capabilities). The AoA provides insights regarding KPPs for preferred alternatives and indicates how these parameters contribute to increases in operational capability. It identifies opportunities for trade-offs among performance, cost, and schedule; and determines operational effectiveness and costs (including estimates of training and logistics impacts) for all alternatives.

(3) If a new program is approved (MS B), the AoA may be useful for identifying alternatives that will be refined by cost performance trade-off studies during SDD phase B. It should be useful for limiting the number of alternatives to be considered during phase B. The MDA may direct updates to the AoA for subsequent decision points, if conditions warrant (e.g., AoA may be useful for examining cost-performance trade-offs at MS C).

h. Acquisition program baseline (APB). APBs consist of the concept baseline, the development baseline, and the production baseline approved at MS B, C, and FRP, respectively. The purpose of the baselines is to enhance program stability and to provide a critical reference point for measuring and reporting the status of program implementation. Each baseline contains objectives for key cost, schedule, and performance parameters. Key parameters must meet minimum acceptable requirements, known as thresholds, at each milestone decision point. The thresholds establish deviation limits from which a PM may not trade-off cost or performance without authorization from the MDA. The APB must cross-walk to the program CDD or CPD for performance parameters. Failure to meet the threshold requires a reevaluation of alternative concepts or design approaches. APBs and deviation reporting are required for all acquisition categories.

i. Test and evaluation master plan (TEMP). The TEMP is the executive level planning document required for a system that focuses on the overall structure, major elements, and objectives of the T&E program. The TEMP is consistent with the AS as well as the approved CDD/CPD and C4I Support Plan (C4ISP). It is a reference document used by the T&E community to generate detailed T&E plans and to ascertain schedule and resource requirements associated with a given system. The TEMP provides a road map for integrated simulation, test, and evaluation plans, schedules, and resource requirements necessary to accomplish the T&E program. The TEMP describes what testing (e.g., developmental test and operational test) is required, who will perform the testing, what resources will be needed, and what are the requirements for evaluation. It relates program schedule, test management strategy and structure, and required resources to critical operational issues; critical technical parameters; measures of effectiveness and suitability; and milestone decisions points. While the MATDEV has the overall responsibility, each T&E WIPT member contributes to the TEMP development and maintenance. The TEMP is initially developed at a system's first milestone review and is updated before each MS, when the CDD/CPD/C4ISP has changed significantly, or when the acquisition program baseline (APB) has been breached. Upon approval, the TEMP serves as a contract between the CBTDEV, MATDEV and T&E community for executing the system's T&E program. The TEMP provides key management controls for T&E in support of the acquisition process. Detailed TEMP procedures and format are in *DA Pamphlet 73–1*.

j. Manpower estimate report (MER). This Congressionally directed report documents the total number of personnel (military, civilian, and contractor) that are or will be needed to operate, maintain, support, and train for a ACAT I program upon full operational deployment. The validity of the MER is dependent upon force structure, personnel management, and readiness requirements, as well as on the acquisition decision on the size of the buy.

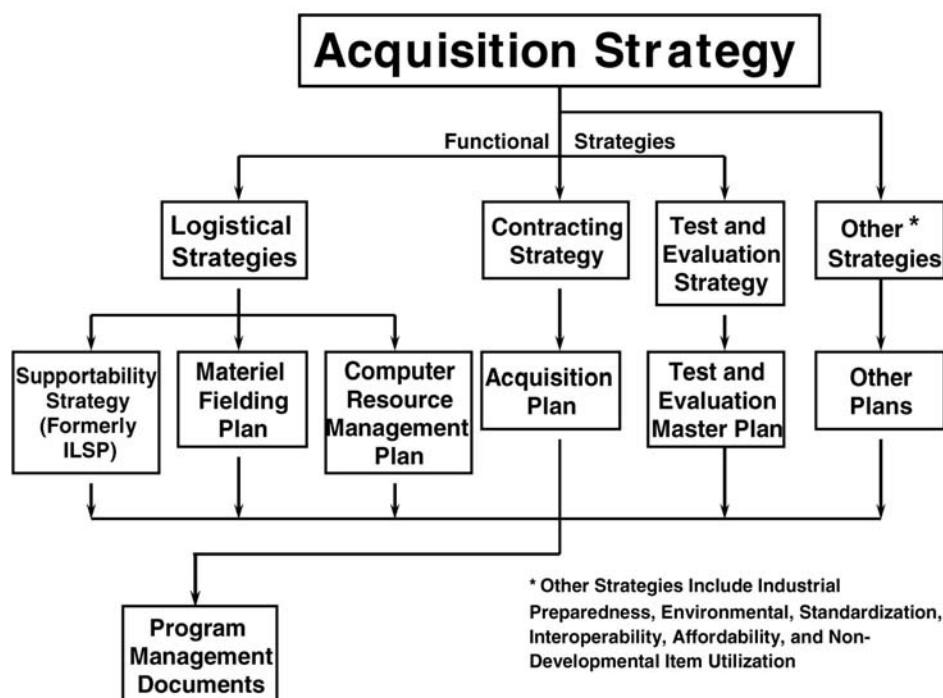


Figure 11–10. Acquisition strategy

11–65. Typical waivers and reports

a. Live-fire test and evaluation report. Independent OSD report to Congress that provides test results and assessment of realistic survivability testing on a covered major system, and realistic lethality testing on a major munition or missile program. Congress mandates this report.

b. Live-fire test and evaluation waiver. This certifies to Congress when live-fire survivability testing of a covered major system would be unreasonably expensive and impractical. However, some testing must still be accomplished at the subsystem level as described in the alternate LFT&E plan.

c. Developmental test report. This provides the results of developmental tests to include live-fire test results and reports.

d. System evaluation report (SER). This provides demonstrated system operational effectiveness, suitability, and survivability information at each formal milestone decision. The Army's independent system evaluator – Army Evaluation Center (AEC), produces the report.

e. System assessment (SA). This provides potential system operational effectiveness, suitability, and survivability information at key points before and after each milestone decision. The Army's independent system evaluator – AEC, produces the report.

f. Beyond low-rate initial production report. This provides Congress with an assessment of the adequacy of initial operational testing (IOT) and whether the test results confirm the items are effective, suitable, and survivable for combat prior to the full-rate production (FRP) decision to proceed beyond low-rate initial production (LRIP). Congress mandates this report.

g. Defense acquisition executive summary (DAES). The DAES is a multi-part document, reporting program information and assessments; PM, PEO, AAE comments; and cost and funding data. The DAES is a early-warning report to USD(AT&L) and ASD(NII). The DAES describes actual program problems, warns of potential program problems, and describes mitigating actions taken. The PM may obtain permission from USD(AT&L) or ASD(NII), as appropriate, to tailor DAES content. At a minimum, the DAES reports program assessments (including interoperability), unit costs, current estimates, exit criteria status and vulnerability assessments.

h. Selected acquisition report (SAR). The SAR reports the status of total program cost, schedule, and performance; as well as program unit cost and unit cost breach information. For Joint programs, the SAR reports the information by

participant. Each SAR includes a full, life-cycle cost analysis for the reporting program. The SAR is provided to Congress.

11–66. Other documentation.

a. *Acquisition decision memorandum (ADM)*. The ADM documents the MDA's decision on the program's AS goals, thresholds, and the exit criteria for the next phase of the program. The ADM is used to document the decision for all ACAT I, II, and III programs.

b. *Integrated program assessment (IPA)*. Information derived from the PM's MIPS allows the DOD overarching integrated product team (OIPT) to develop the IPA for program MDR. The IPA summarizes the DOD independent assessment of the PM's program. It identifies critical areas, issues, and recommendations for the MDA. For ACAT ID and IAM programs the IPA is prepared by the OIPT, approved by the OIPT leader, and submitted to the USD(AT&L) or ASD(NII), as appropriate.

Section X

Acquisition oversight and review (O&R) process

The materiel acquisition process is controlled by decisions made as the result of various acquisition programs MDRs conducted by appropriate management levels at program milestones. The reviews are the mechanism for checking program progress against approved plans and for developing revised APBs. Approval of APBs and plans in these reviews does not constitute program funding approval; allocation of funds in the PPBE process is required.

11–67. Integrated product teams (IPTs)

DODD 5000.1 directs the DOD acquisition community to utilize IPTs to facilitate the management and exchange of program information. IPTs are a management technique that integrates all acquisition activities starting with capabilities development through production, fielding/deployment and operational support in order to optimize the design, manufacturing, business, and supportability processes. The IPT is composed of representatives from all appropriate functional disciplines working together with a team leader to build successful and balanced programs, identify and resolve issues, and make sound and timely recommendations to facilitate decision making. There are three general levels of IPTs: overarching integrated product teams (OIPTs) focus on strategic guidance, program executability (cost, schedule, risk), and issue resolution; working-level integrated product teams (WIPTs) identify and resolve program issues, determine program status, and seek opportunities for acquisition reform; and integrating level integrated product teams (IIPTs), when necessary, are initiated by the PM to coordinate all WIPT efforts and cover all topics not otherwise assigned to another WIPT.

a. *Overarching integrated product teams (OIPTs)*. In support of all ACAT ID and IAM programs, an OIPT is formed to provide assistance, oversight, and review as that program proceeds through its acquisition life-cycle. The OIPT for ACAT ID programs is led by the appropriate OSD principal staff assistant (PSA). The DASD(C3ISR, Space, IT Programs) is the OIPT Leader for ACAT IAM programs. Program OIPTs are composed of the PM, PEO, Component staff, Joint staff, USD(AT&L) staff, and the OSD staff principals or their representatives, involved in oversight and review of a particular ACAT ID or IAM program.

(1) In the Army, an ASARC OIPT is established at the direction of the MDA for ACAT IC, IAC, and most II programs. The OIPT is a team of HQDA staff action officers and the PEO/PM/TSM responsible for integration of oversight issues to be raised to the DAB/ITAB/ASARC/IPR review forums.

(2) The secretary/facilitator of the OIPT for Army ACAT I and II programs is the OASA (ALT) system coordinator (DASC) for that specific program. OIPT membership consists of empowered individuals appointed by ASARC members (ACAT IC, IAC, or selected II programs), and the MDA for ACAT III programs. Team membership is tailored based on the needs and level of oversight for the individual program. Typical ASARC OIPT responsibilities include:

(a) Meeting together and individually with the PEO/PM throughout the program development to raise and resolve issues early, providing recommendations for tailoring and streamlining the program.

(b) Linking vertically with the PM's WIPTs.

(c) Helping the PM successfully achieve a milestone decision.

(d) Providing an independent assessment for the MDA in preparation for the MDR.

(e) Developing a memorandum documenting the issues/risks to be raised to the MDA with a recommendation to the MDA.

(3) The OIPT, at all levels, generally follow the general procedures that are described below for a typical ACAT ID and IAM program. Initially the OIPT meets to determine the extent of WIPT support needed for the potential program, who shall be members of the WIPTs, the appropriate MS for program initiation, and the minimum information needed for the program initiation review. The OIPT leader is responsible for taking action to resolve issues when requested by any member of the OIPT or when directed by MDA. The goal is to resolve as many issues and concerns at the lowest level possible, and to expeditiously escalate issues that need resolution at a higher level, bringing only the highest-level issues to the MDA for decision. The OIPT meets as necessary over the life of a program.

(4) The OIPT leader provides an IPA, previously discussed, at major program reviews or MDRs using data gathered through the IPT process. The OIPT leader's assessment focuses on core acquisition management issues and takes account of independent assessments that are normally prepared by OIPT members.

b. Working-level integrated product teams (WIPTs). WIPTs are established for all acquisition programs. The number and membership of the WIPTs are tailored to each acquisition phase based on the level of oversight and the program needs. They are comprised of HQDA and/or Service/functional action officers and normally chaired by the PM or designee. WIPTs provide advice to the PM and help prepare program strategies and plans. Each WIPT focuses on a particular topic(s), such as T&E, cost/performance, risk management (both programmatic and safety), etc.

c. Integrating level integrated product teams (IIPs). When necessary, an IIP, a type of WIPT, is initiated by the PM to coordinate all WIPT efforts and cover all topics not otherwise assigned to another WIPT.

11-68. The Defense Acquisition Board (DAB)

a. The function of the DAB is to review DOD ACAT ID programs to ensure that they are ready for transition from one program phase to the next. The DAB is the DOD senior level forum for advising the USD(AT&L), as the DAE, on critical decisions concerning ACAT ID programs. DAB reviews focus on key principles to include interoperability, time-phased requirements related to an evolutionary approach, and demonstrated technical maturity. The DAB is composed of DOD senior acquisition officials. The board is chaired by the USD(AT&L). The Vice Chairman of the Joint Chiefs of Staff (VCJCS) serves as the co-chairman. Other principal members include the Under Secretary of Defense (Comptroller); Under Secretary of Defense (Policy); Under Secretary of Defense (Personnel & Readiness); Assistant Secretary of Defense (Networks and Information Integration)/Department of Defense Chief Information Officer; Director, Operational Test and Evaluation; and the Secretaries of the Army, Navy, and the Air Force. United States Joint Forces Command (USJFCOM) is available to comment on interoperability and integration issues that the JROC forwards to the DAB. The DAE may ask other department officials to participate in reviews, as required.

b. Approximately one week prior to the DAB review, the OIPT meets to pre-brief the OIPT leader. The purpose of the meeting is to update the OIPT leader on the latest status of the program and to inform the senior acquisition officials of any outstanding issues and to insure program is ready for a formal DAB review.

c. The JROC reviews all deficiencies that may necessitate development of ACAT I and ACAT IA systems prior to any consideration by the DAB or, as appropriate, ITAB at MS B. The JROC validates an identified materiel need and forwards the MCD with JROC recommendations to the USD(AT&L) or ASD(NII), as appropriate. In addition, the JROC continues a role in validation of KPPs in program baselines prior to scheduled reviews for ACAT I and ACAT IA programs prior to all successive MDRs.

d. The OSD Cost Analysis Improvement Group (CAIG) reviews the component (Army) cost position (ACP), prior to the scheduled MDR and determines if additional analysis is required. The product is an independent cost position assessment and recommendations based on its independent review of the life-cycle cost estimate(s), validation of the methodology used to make the cost estimate(s), and determination if additional analysis or studies is required.

e. A formal DAB review is the last step of the DAB review process. The PM briefs the acquisition program to the DAB and specifically emphasizes technology maturity, risk management, affordability, critical program information, technology protection, and rapid delivery to the user. The PM addresses any interoperability and supportability requirements linked to other systems, and indicates whether those requirements will be satisfied by the acquisition strategy under review. If the program is part of a system-of-systems architecture, the PM briefs the DAB in that context. If the architecture includes less than ACAT I programs that are key to achieving the expected operational capability, the PM also discusses the status of and dependence on those programs.

f. Following presentations by the PM and a full discussion, the USD(AT&L), as DAE, decides to continue, alter, or terminate the program. This decision is published as an ADM. With the approval of the DAE, other committee reviews may be held for special purposes, such as to develop recommendations for the DAE on decisions other than milestone or program reviews (e.g., release of "withhold funds," baseline changes, AS changes).

11-69. DOD Information Technology Acquisition Board (ITAB)

a. DOD ITAB provide the forum for ACAT IAM milestones, for deciding critical ACAT IAM issues when they cannot be resolved at the OIPT level, and for enabling the execution of the DOD ITAB's acquisition-related responsibilities for IT, including National Security System (NSS), under the Clinger-Cohen Act and Title 10. Wherever possible, these reviews take place in the context of the existing IPT and acquisition milestone review process. Where appropriate, an ADM documents the decision(s) resulting from the review.

b. Principal participants at DOD ITAB reviews include the following department officials: the Deputy DOD CIO; IT OIPT leader; ACAT ID OIPT leaders; cognizant PEO(s) and PM(s); CAEs and CIOs of the Army, Navy, and Air Force. Participants also include (as appropriate to the issue being examined) executive-level representatives from the following organizations: Office of USD(AT&L); Office of the Under Secretary of Defense (Comptroller); Office of the Joint Chiefs of Staff; Office of DOT&E; Office of the Director, PA&E; and Defense Information Systems Agency.

11-70. The Army Systems Acquisitions Review Council (ASARC)

a. The ASARC is the Army's senior-level advisory body for ACAT IC, IAC, and selected II programs, ACAT ID

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programs (DAB managed) prior to a DAB, and ACAT IAM programs prior to a ITAB. The ASARC convenes at formal milestones to determine a program or system's readiness to enter the next phase of the materiel acquisition cycle, and makes recommendations to the AAE on those programs for which the AAE is the MDA. An ASARC may also be convened at any time to review the status of a program. The ASARC is chaired by the AAE.

b. ASARC membership includes the VCSA, DUSA(OR); ASA(FM&C); CG, TRADOC; CG, AMC; OGC; CIO/G-6; DCS, G-3/5/7; DCS, G-4; DCS, G-8; MILDEP to the ASA(ALT); CG, ATEC and the Deputy Assistant Secretary of the Army, Cost and Economics. Other organizations are invited to attend if a significant issue is identified within their area of responsibility. The AAE makes the final decision as to attendance at the ASARC.

c. The effectiveness of the ASARC review process results from presentation of thorough analysis of all relevant issues and face-to-face discussion among the principals from the Army Secretariat, ARSTAF, and MACOMs (AMC and TRADOC).

11-71. In-process review (IPR)

a. The IPR is a formal review forum for ACAT III programs. General policies for reviews for IPR programs are the same as for ACAT I and II programs. Reviews are conducted at milestones and at other times deemed necessary by the MDA. The MDA, usually the PEO, chairs the IPR.

b. The IPR brings together representatives of the MATDEV, the CBTDEV, the trainer, the logistician, and the independent evaluators for a joint review and decision on proceeding to the next phase of development. Their purpose is to provide recommendations, with supporting rationale, as a basis for system concept, system development, type classification, and production decisions by the appropriate level of authority. They are the forums where agencies responsible for participating in the materiel acquisition process can present their views and ensure that those views are considered during development, test, evaluation, and production. Participation is extended to the appropriate testing agencies, HQDA representatives, and to such others as the IPR chairman designates.

11-72. Other program reviews.

a. *Army capabilities review (ACR).*

(1) The ACR is the highest-level system review conducted by the Army Chief of Staff. It allows the CSA to review key acquisition systems supporting the ACP, Transformation and *Joint Vision* concepts (e.g., dominant maneuver, precision engagement, information superiority, joint command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR), full dimensional protection, and focused logistics) permitting informed decisions on prioritization and resourcing. The ACR is a DOTMLPF oriented systems-of-systems review that provides the HQDA senior leaders with system programmatic information; involves them in weapons systems development; and provides them an opportunity to impact a system's life-cycle. For each system, the program/project/product manager (PM), and G-8 synchronization staff officer (SSO) are present to brief the system from the materiel developer and warfighter perspective. The OASA(ALT) is solely responsible for the materiel section of these reviews. The ARSTAF is present to address any DOTMLPF/resource issues raised.

(2) Following the ACR, an executive session is provided to the SECARMY with the purpose of providing him an executive summary of the ACR and addresses any questions/concerns he may have. This executive summary starts with the requirement establishing the system, shows the "system-of-systems" approach used in the actual ACR, and walks the SECARMY through the programmatic including funding, schedule, program status, risk, and probability of success. The executive session is conducted within 10 working days of the ACR.

b. *System program review (SPR).* The SPR is the primary HQDA (2 star) review of acquisition systems prior to the POM build. The SPR is co-chaired by the G-8 Director, Force Development and the ASA(ALT) Deputy for Acquisition and Systems Management. a. PEOs brief the SPR on selected programs. Specifically they brief, in coordination with TRADOC Futures Center:

- (1) System characteristics;
- (2) Compliance with system operational requirements;
- (3) Acquisition strategy (AS);
- (4) Program funding and unfunded requirements; and
- (5) POM issues.

Section XI

Testing and evaluation

There are three major sub-processes that support the overall management process of system acquisition. The first major sub-process is T&E.

11-73. T&E strategy

a. All Army acquisition programs must be supported by an integrated T&E strategy that reflects an adequate and efficient T&E program. T&E is the principal tool with which progress in system development and acquisition is measured. T&E is structured to support the defense acquisition process and user by providing essential information to

decision-makers, assessing attainment of technical performance parameters, and determining whether systems are operationally effective, suitable, and survivable for intended use. Primary reasons for conducting T&E is to facilitate learning, assess technical maturity and interoperability, facilitate integration into fielded forces, and confirm performance. T&E can also assess and reduce program risk (e.g., schedule, cost, technical feasibility, technical obsolescence, and software management). The primary product of the T&E sub-process is information (hard facts) plus an independent evaluation of all credible data on a system so that the MDA can make informed decisions.

b. The planning, programming, and budgeting for T&E begins early in the acquisition process, concurrent with coordination of the validated initial capabilities document (ICD). Early T&E integration is accomplished through the independent evaluator's involvement in the ICT and the planning of the acquisition team within the T&E WIPT. The primary purpose of the T&E WIPT is to optimize the use of the appropriate T&E expertise, instrumentation, targets, facilities, simulations, and models to implement test integration, thereby reducing costs and decision risk to the Army. The primary product of the T&E WIPT is a TEMP, previously discussed. The DUSA(OR) is the TEMP approval authority for all ACAT I and any II on the OSD T&E Oversight List prior to final OSD approval. The DUSA(OR) approves TEMPs for ACAT II and III programs not on the oversight list.

c. Continuous evaluation (CE) is used to provide a continuous flow of information and data to decision-makers, MATDEV, and CBTDEV. The data generated in early development phases is visible and maintained as the system moves into the formal testing, thereby avoiding duplication of testing. Continuous evaluation continues through a system's post-deployment so as to verify whether the fielded system meets or exceeds demonstrated performance and support parameters.

11-74. Developmental testing (DT) and operational testing (OT)

a. DT encompasses models, simulation, and engineering type tests that are used to verify that design risks are minimized, system safety is certified, achievement of system technical performance is substantiated, and to certify readiness for OT. DT generally requires instrumentation and measurements, is accomplished by engineers and technicians, is repeatable, may be environmentally controlled, and covers the complete spectrum of system capabilities. The PM designs DT objectives appropriate to each phase and milestone. Key DTs are the LFT that is mandated for covered systems, and the production qualification test (PQT) that is the system-level test ensures design integrity over the specified operational and environmental range.

b. OT is a field test of a system (or item) under realistic operational conditions with users who represent those expected to operate and maintain the system (or item) when fielded or deployed. Key OTs are:

(1) Initial operational test (IOT). It is conducted before the full-rate production (FRP) decision and is structured to provide data to determine the operational effectiveness, suitability, and survivability of a system operated by typical users under realistic conditions (e.g., combat and representative threat). Before an IOT commences for all programs on the OSD T&E Oversight List, OSD (DOT&E) must approve the OT plan.

(2) Follow-on operational test (FOT). FOT may be necessary during (or after) production to refine the estimates made during the IOT, provide data to examine changes, and verify that deficiencies in materiel, training, or concepts have been corrected. A FOT provides data to ensure that the system continues to meet operational needs and that it retains its effectiveness in a new environment or against a new threat.

c. The Army's Test Schedule and Review Committee (TSARC) is a HQDA GO/SES centralize management forum that meets semi-annually to review and coordinate the resources required to support the tests to be included in the Army's Five-Year Test Program (FYTP). The TSARC is chaired by CG, ATEC and operates under AR 73-1. When approved for inclusion in the FYTP, a program's outline test plan (OTP) becomes authority for tasking in the current and budget years. The OTP is the acquisition system's formal T&E resource planning and tasking document.

Section XII

Integrated logistics support (ILS)

The second major sub-process in support of acquisition system management is integrated logistics support (ILS). ILS is a disciplined, unified, and interactive approach to the management and technical activities necessary to integrate logistics support into system and equipment design.

11-75. ILS requirements and procedures

This section outlines requirements and procedures used to plan, program, develop, acquire, test, evaluate/assess, train, and deploy (concurrent with fielding of a new/modified weapon system) all the necessary support resources to ensure the supportability and readiness of the system when fielded. The ILS process ensures the support resources required to keep a system and supporting training devices in an operational ready status throughout its operational life are identified and developed in a timely and cost effective manner. In March 2004, the VCSA established a policy that reliability will be assessed as a potential KPP during the JCIDS process insuring that ILS requirements of a system were emphasized. When the CBTDEV selects the best support concept during the acquisition process, he establishes and chairs the supportability integrated product team (SIPT), formerly known as the ILS management team (ILSMT), to provide detailed implementation of the support concept and develop the supportability strategy (SS). The MATDEV assumes the chair of the SIPT after being identified. The SIPT considers numerous alternatives and trade-offs. This

supportability analysis (SA) is required to identify the optimum support system requirements. Both the MATDEV and CBTDEV perform SA tasks (either in-house or through contractors) applicable to their respective mission responsibilities as defined in *AR 700-127*. Life-cycle software engineering centers (LCSECs) serve as members of the SIPT and provide support for the supportability analysis of software dependent systems, regardless of whether the LCSEC will perform software maintenance and support or only have a coordination role. A new effort has been established to insure the consideration of Performance Based Logistics (PBL) during system acquisition, a strategy for weapon system product support that employs the purchase of support as an integrated performance package designed to optimize system readiness. It meets performance goals for a weapon system through a support structure based on performance agreements with clear lines of authority and responsibility.

11-76. ILS process

a. The ILS process pursues three thrusts simultaneously. The first is design influence in order to reduce O&S costs and simplify equipment operation and maintenance. The second concerns the design of support, identification of resources, development and acquisition of the necessary support resources, and fielding of support to assure satisfactory operation and readiness of the system. The third addresses supporting the design throughout the life of the system. The effectiveness of the first thrust reduces demands on the second. In the case of COTS/NDI acquisitions, the ILS thrust is attained by focusing on the source selection process.

b. Logistics support is a programmatic concern being an integral part of system performance including operational and performance characteristics of the system (*DODI 5000.2*). Thus, the effectiveness of an ILS program requires strong management, involvement, a tailored SIPT, and close coordination among SIPT members so that ILS is integrated throughout the materiel acquisition process. The integrated logistics support manager (ILSM) as the chairman of the SIPT works in conjunction with other members of the SIPT and the PM IIPT. ILS strategies and requirements are developed IAW the strategies and requirements of the PM IIPT. Continued coordination and cooperation between the CBTDEV and MATDEV ILS organizational elements and the PM IIPT is essential.

c. In an effort to operate within resource constraints, the CBTDEV and MATDEV ILS communities generate improvements in readiness support and supportability related system design through:

- (1) Jointly developing necessary MANPRINT plans and strategies.
- (2) Jointly developing an early-on ILS program and SS (formerly known as the integrated logistical support plan (ILSP)).
- (3) Use of SA and MANPRINT/HSI analytical techniques for the performance of ILS program objectives.
- (4) Development and/or change of doctrine, policy and procedure.
- (5) Investigation of MANPRINT/HSI, SA and other analytical techniques for deriving manpower, personnel, training and logistics impacts from the mission needs/solutions and other CBTDEV and MATDEV analyses.
- (6) Identification of —
 - contract incentives,
 - system readiness objectives (SROs),
 - modification candidates,
 - embedded training capability/options.

(7) Emphasis on commercial, other Service and Allies technical advances in supportability characteristics and techniques.

d. The CBTDEV and MATDEV in coordination with the HQDA ODCS, G-4, jointly establish an ILS program. The CBTDEV is principally responsible for identifying and documenting general ILS requirements and constraints through studies and analysis and for developing the SA strategy during the acquisition Technology Development Phase A. Generally, lead responsibility for ILS transfers to the MATDEV upon entry into System Development and Demonstration Phase B.

Section XIII

Manpower and personnel integration (MANPRINT) program

The third major sub-process in support of acquisition system management is the MANPRINT program. MANPRINT is the Army's application of the DOD Human Systems Integration (HSI) requirements in systems acquisition (*DODD 5000.1 and DODI 5000.2*), in compliance with *Title 10*. MANPRINT, described in detail in *AR 602-2*, is the Army's program to ensure that the Soldier and human needs are considered throughout the entire system acquisition process and life-cycle, and that human performance is always considered as part of "total" system performance.

11-77. Seven MANPRINT domains

MANPRINT integrates and facilitates trade-offs among the following domains but does not replace individual domain activities, responsibilities, or reporting channels:

a. *Manpower*. Manpower is the personnel strength (military and civilian) available to the Army. It refers to the consideration of the net effect of Army systems on overall human resource requirements and authorizations (spaces), to

ensure that each system is affordable from the standpoint of manpower. It includes analysis of the number of people needed to operate, maintain, and support each new system being acquired, including maintenance and supply personnel, and personnel to support and conduct training. It requires a determination of the Army manpower requirements generated by the system, comparing the new manpower needs with those of the old system(s) being replaced. If an increase in personnel is required to support a new (or modified) system, “bill payers” must be identified from existing personnel accounts.

b. Personnel capabilities. Military and civilians possessing the aptitudes, characteristics, and grades required to operate, maintain, and support a system in peacetime and war. Personnel refers to the ability of the Army to provide qualified people in terms of specific aptitudes, experiences, and other human characteristics needed to operate, maintain, and support Army systems. It requires a detailed assessment of the aptitudes that personnel must possess in order to complete training successfully as well as operate, maintain, and support the system to the required standard. Iterative analyses must be accomplished for the system being acquired, comparing projected quantities of qualified personnel with the requirements of the new system, any system(s) being replaced, and overall Army needs for similarly qualified people. Personnel analyses and projections are needed in time to allow orderly recruitment, training, and assignment of personnel in conjunction with system fielding.

c. Training. Considerations of the necessary time and resources required to impart the requisite knowledge, skills, and abilities to qualify Army personnel for the operation, maintenance, and support of Army systems. It involves:

- (1) Formulating and selecting engineering design alternatives that are supportable from a training perspective
- (2) Documenting training strategies, and
- (3) Determining resource requirements to enable the Army training system to support system fielding. It includes analyses of the tasks that must be performed by the operator, maintainer, and supporter; the conditions under which the tasks must be performed; and the performance standards that must be met. Training is linked with personnel analyses and actions because availability of qualified personnel is a direct function of the training process.

d. Human factors engineering. Human factors engineering is the technical effort to integrate design criteria, psychological principles, and human capabilities as they relate to the design, development, test, and evaluation of systems. The human factors engineering goals are:

- (1) To maximize the ability of the soldier to perform at required levels by eliminating design-induced error.
- (2) To ensure materiel maintenance, support, and transport are compatible with the capabilities and limitations of the range of fully equipped Soldiers who would be using such materiel. Human factors engineering provides an interface between the MANPRINT domains and system engineers. Human factors engineering supports the MANPRINT goal of developing equipment that will permit effective Soldier-machine interaction within the allowable, established limits of training time, Soldier aptitudes and skill, physical endurance, physiological tolerance limits, and Soldier physical standards. Human factors engineering provides this support by determining the Soldier’s role in the materiel system, and by defining and developing Soldier-materiel interface characteristics, workplace layout, and work environment.

e. System safety. The application of engineering and management principles, criteria, and techniques to optimize safety within the constraints of operational effectiveness, time, and cost throughout all phases of the system or facility life-cycle.

f. Health hazards. Health hazards are the inherent conditions in the use, operation, maintenance, support and disposal of a system (e.g., acoustical energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes, trauma, and vibration) that can cause death, injury, illness, disability, or reduce job performance of personnel.

g. Soldier survivability. A soldier within the context of MANPRINT may refer to a military or a civilian.

(1) *System.* The characteristics of a system that can reduce fratricide, reduce detectability of the Soldier, prevent attack if detected, prevent damage if attacked, minimize medical injury if wounded or otherwise injured, and reduce physical and mental fatigue.

(2) *Soldier.* Those characteristics of Soldiers that enable them to withstand (or avoid) adverse military action or the effects of natural phenomena that would result in the loss of capability to continue effective performance of the prescribed mission.

11–78. MANPRINT objectives and concept

a. MANPRINT is intended to influence the design of developmental systems and the selection of NDI systems with the primary objective of achieving maximum total system effectiveness at a reasonable and affordable life-cycle cost of ownership. The implementation of MANPRINT impacts total system performance (both effectiveness and availability) by making explicit the role that Soldier performance plays and is shaped by design factors. MANPRINT also addresses the manpower, personnel, and training (MPT) resources needed to achieve the required performance and, where possible, indicates more affordable configuration of MPT resources.

b. The engineering design philosophy of MANPRINT is focused on optimum system performance on the battlefield, which includes consideration of both Soldier and equipment capabilities and survivability. MANPRINT is an option-oriented process as opposed to an objective-oriented process. The MANPRINT process provides decision makers information upon which to make trade-offs in areas such as quality and numbers of people, training times, technology,

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conditions, standards, costs, survivability, safety, health hazard risks, design and interface features, and personnel assignment policy.

c. The body of MANPRINT expertise, formerly known as the MANPRINT joint working group, continues to function through the ICT and IPT process. The MANPRINT members of the ICT transition to the MANPRINT WIPT when applicable. The purpose of this body is to:

(1) Assist the CBTDEV (or functional proponent) and PM to ensure MANPRINT principles are applied to the system,

(2) Provide MANPRINT input to the MCDs, and

(3) Provide a tracking system and historical database of MANPRINT issues.

d. The Army Research Laboratory's Human Research & Engineering Directorate serves as the MANPRINT focal point for coordinating domain support for ICTs and IPTs. Additional MANPRINT information and references are available online at <http://www.manprint.army.mil>.

Section IVX

Acquisition resources management

11–79. Appropriations

The “color of money,” or kind of appropriation, is an important factor in acquisition management. In general, a particular appropriation can be expended only for specified activities, and money cannot be changed from one appropriation to another. Acquisition management involves at least two appropriations, and may involve four. The two-year RDTE appropriation provides funds for research, design engineering, prototype production, LRIP for OT, and T&E activities in the course of developing a materiel system. The three-year procurement appropriation provides funds for procuring materiel that has been fully tested and type classified. Procurement funds are also used to procure LRIP systems initial spares, support and training equipment. The Operations and Maintenance, Army (OMA) appropriation provides funds for retiring and retrograding the old equipment being replaced; for repairing systems after fielding; for fuel and ammunition for training and operations; for periodic system rebuild; for training both system operators and maintainers, except new equipment training; and, in general, anything else to keep a system in the field and operating. Some systems may require Military Construction, Army (MCA) appropriated funds for the construction of special facilities required for fielding that system.

11–80. Program and budget process

Funds of the correct amount and appropriation must be planned and programmed into the Army budget, in general, two years before they are needed. In the program and budget process, funding requests are initiated or reviewed annually. Congress appropriates funds for RDTE (Title IV) and Procurement (Title III) as part of the “Defense Appropriation Act.” The RDTE and procurement budget requests must first be approved by DOD, submitted to Congress by the President, and then be authorized and appropriated in two separate Congressional actions before any money can be spent. In the year of budget execution, the Army may reprogram funds, except for Congressional interest items, within an appropriation subject to limits, or with prior Congressional approval. Up to \$10 million of RDTE and \$20 million of procurement may be reprogrammed from a lower priority program to a higher priority program without prior Congressional approval (see Table 11–2). The PM is responsible for planning and programming the RDTE and procurement funds to cover a program, and the MCA, when needed. The PM also is responsible for programming all life-cycle system costs for the system while the system remains under his management control. This includes programming for outyear sustaining resources as well as RDTE and procurement. Once the management responsibility transitions to the managing AMC “commodity command”, it then becomes that command’s responsibility to continue the depot-level sustaining program. The field user MACOM is responsible to program day-to-day system below-depot operational support. The field user MACOM is responsible for planning and programming the OMA funds needed to ensure continued readiness of the fielded system. Responsibility for planning and programming funds for product improvements and sustaining supply spare parts is complex and divided between the MATDEV and the field MACOM.

Table 11–2
Below Threshold Reprogramming Levels

APPN	MAX IN	MAX OUT	Level of Control	OBL AVAIL
RDTE	< \$ 4M	Greater of \$ 4M or 20% of Program Element	¹ Program Element	2 Years + 5 Years (Execution)
PROC	< \$ 10M	Greater of \$ 10M or 20% of Line Item	Line Item	3 Years + 5 Years (Execution)
OMA	< \$ 15M	No Congressional Restriction	Budget Activity	1 Year + 5 Years (Execution)
MILCON	Lessor of +\$ 2M or 25% of Project	Lessor of + \$ 2M or 25% of Project	Project	5 Years + 5 Years (Execution)

11–81. RDTE appropriation activities

To assist in the overall planning, programming, budgeting, and managing of the various R&D activities, the RDTE appropriation is divided into seven R&D budget activities. These categories are used throughout DOD. The current RDTE budget activities are as follows.

a. Budget Activity 1–Basic Research. Basic research efforts provide fundamental knowledge for the solution of identified military problems. It includes all efforts of scientific study and experimentation directed toward increasing knowledge and understanding in those fields of the physical, engineering, environmental, and life sciences related to long-term national security needs. It provides farsighted, high payoff research, including critical enabling technologies that provide the basis for technological progress. It forms a part of the base for (a) subsequent applied and advanced developments in Defense-related technologies, and (b) new and improved military functional capabilities in areas such as communications, detection, tracking, surveillance, propulsion, mobility, guidance and control, navigation, energy conversion, materials and structures, and personnel support. Basic research efforts precede the system specific research described in the *Army Science and Technology Master Plan (ASTMP)*.

b. Budget Activity 2–Applied Research. This activity translates promising basic research into solutions for broadly defined military needs, short of major development projects, with a view to developing and evaluating technical feasibility. This type of effort may vary from fairly fundamental applied research to sophisticated breadboard hardware, study, programming and planning efforts that establish the initial feasibility and practicality of proposed solutions to technological challenges. It should thus include studies, investigation, and nonsystem specific development effort. The dominant characteristic of this category of effort is that it be pointed toward specific military force operating capabilities (FOCs) with a view toward developing and evaluating the feasibility and practicability of proposed solutions and determining their parameters. Program control of the applied research element will normally be exercised by general level of effort. Applied research precedes the system specific research described in the *ASTMP*.

c. Budget Activity 3–Advanced Technology Development. This activity includes all efforts, which have moved into the development and integration of hardware and other technology products for field experiments and tests. The results of this type of effort are proof of technological feasibility and assessment of operability and producibility that could lead to the development of hardware for Service use. It also includes advanced technology demonstrations (ATDs) that help expedite technology transition from the laboratory to operational use. Projects in this category have a direct relevance to identified military needs. Advanced technology development may include concept refinement and technology development as described in the *ASTMP*, but is non-system specific.

d. Budget Activity 4–Advanced Component Development and Prototypes. Includes all efforts associated with advanced technology development used to demonstrate the general military utility or cost reduction potential of technology when applied to different types of military equipment or techniques. It includes evaluation, synthetic environment, prototypes, and proof-of-principle demonstrations in field exercises to evaluate system upgrades or provide new operational capabilities. The demonstrations evaluate integrated technologies in as realistic an operating environment as possible to assess the performance or cost reduction potential of advanced technology. It may include concept and technical development exploration as well as system development and demonstration, but is system specific.

e. Budget Activity 5–System Development and Demonstration. Includes those projects in system development and demonstration for Service use. This area is characterized by major line item projects and program control is exercised by review of individual projects. Includes system development and demonstration projects, and may include OT.

f. Budget Activity 6–RDTE Management Support. Includes efforts directed toward support of RDTE installations or operations required for use in general R&D and not allocable to specific R&D missions. Included are technical integration efforts, technical information activities, space programs, major test ranges, test facilities and general test instrumentation, target development, support of operational tests, international cooperative R&D, and R&D support.

g. Budget Activity 7–Operational System Development. Includes R&D effort directed toward development, engineering, and test of changes to fielded systems or systems already in procurement which alter the performance envelopes. Operational system development may include OT costs.

11–82. Procurement appropriations

The procurement appropriation funds the procurement of materiel systems that have been fully tested and type classified. The Army budget includes five separate procurement appropriations:

- a. Aircraft Appropriation.* Aircraft procurement includes the procurement of aircraft, aircraft modifications, spares, repair parts, and related support equipment and facilities.
- b. Missile Appropriation.* Missile procurement includes the procurement of missiles, missiles modifications, spares, repair parts, and related support equipment and facilities.
- c. Weapons and Tracked Combat Vehicles (WTCV) Appropriation.* WTCV procurement includes tracked and combat vehicles, weapons, other combat vehicles, and repair parts.
- d. Ammunition Appropriation.* Ammunition procurement includes procurement of ammunition end items, ammunition production base support, and ammunition demilitarization.
- e. Other Procurement, Army (OPA) Appropriation.* OPA covers three major categories:
 - (1) tactical and support vehicles,
 - (2) communications and electronic equipment, and
 - (3) other support equipment.

11–83. Research, development, and acquisition plan (RDA plan)

a. Overview. The Army RDA Plan is a 15-year plan for the development and production of technologies and materiel to advance Army modernization. Modernization is “the continuous process of integrating new doctrine, training, organization and equipment to develop and field warfighting capabilities for the total force.” Under ideal circumstances Army modernization would be fully supported by an unconstrained RDA program. However, the realities of limited resources restrict modernization to those efforts that are both technically and fiscally achievable. The RDA plan, therefore, is the result of a process that converts the Army’s unconstrained planning environment into a constrained RDA program that maximizes warfighting capabilities and supporting infrastructure requirements within limited resources.

b. The RDA plan assumes the form of a 1–N priority list of RDTE/procurement program packages called MDEPs with funding streams for the entire 15-year planning period. An MDEP represents a particular program, function or organization and displays the resources (dollars, system quantities, civilian and military manpower) needed to achieve an intended goal. An MDEP may receive its resources (funding streams) from any number of appropriations; the RDA Plan, however, includes only the RDTE and procurement funding streams of its MDEPs. There is no limitation to the number of commands to which the resources of an MDEP may be assigned. The RDA plan is recorded in and represented by the ODCS, G–8 RDA database.

c. RDA database. The ODCS, G–8 RDA database represents the RDA plan. The principal elements of the RDA database, management decision packages (MDEPs), are grouped by budget operating system (BOS). A BOS is a set of MDEPs that represent a common function on the battlefield or a common activity of the supporting Army infrastructure (e.g., aviation, ammunition). Most BOSs are managed by a G–8 division. The division chief (known as the BOS manager), assisted by his staff and his ASA(ALT) counterpart determines the requirements for each of the MDEPs within his or her BOS. Requirements are prioritized by G–37, Resource Analysis and Integration Division.

d. The RDA plan is a continual process comprising periodic revisions to the 15-year planning period of the RDA database. The revisions occur during the three principal stages of the PPBE cycle: the POM, BES and President’s budget process. During each of these three stages, the Army adjusts the first six years (called the Future Years Defense Plan (FYDP)) of the 15-year planning period. These six years are also referred to as the POM. After each stage, the Army’s RDA community adjusts the final nine years, called the extended planning period (EPP), to ensure a smooth and reasonable progression from the FYDP to EPP. The 15-year planning period of the RDA database moves forward by two years each alternate January. For example, the FY06–20 RDA Plan began in January 2004.

11–84. TRADOC capabilities needs analysis (CNA)

a. CNA is the process that TRADOC executes to assess materiel battlefield capabilities and determine modernization alternatives for input to the Army’s program objective memorandum (POM). CNA is an interactive process among TRADOC’s schools, proponents and HQDA staff. It compares the future required capabilities (and the associated doctrine, organization, training, materiel, leadership and education, personnel, and facilities (DOTMLPF) of the total force against the fiscally constrained budgeted force in order to determine modernization needs. These needs are prioritized according to their relative value to accomplishment of the mission. Recommendations are then developed to address those shortfalls. CNA answers three important questions:

- (1) How well do we do battlefield tasks?
- (2) How important is each battlefield task?
- (3) How important is a system to a task?

b. CNA exists for two reasons: to provide materiel resourcing recommendations to HQDA and to support TRADOC’s mission as “architect of the future Army”. CNA is the TRADOC vehicle for materiel resourcing recommendations to HQDA to ensure linkage with PPBE. TRADOC uses CNA to provide input to the Army’s RDA plan

and POM considerations. It is derived from a warfighter's assessment of future battlefield requirements based on JCIDS functional analyses (previously discussed).

c. TRADOC provides CNA recommendations to HQDA as key input for POM (December odd year). CNA is a living, evolving process and is initiated/updated each cycle through TRADOC implementation guidance developed to meet HQDA current year guidance.

11–85. Program stability.

Achieving early program objective consensus and following a good investment strategy will yield a stable program, clearly showing where we are today and where we want to be when we bring on the new system. To be successful, new systems acquisition programs must be developed and acquired in a timely and economical manner. Life-cycle cost estimates and changes to programs and schedules must be controlled. Changes to programs affecting established goals will be fully documented in the program management documentation, providing the justification for change (e.g., budget cut, design change). After entering System Development and Demonstration Phase B, design changes in system components that are meeting the approved requirement are discouraged and must be individually justified. The design should be frozen in sufficient time prior to DT and OT to provide an adequate system support package for testing. Changes to programs as a result of DT/OT must be of the “objective” nature to satisfy the requirement and not a “threshold” type of change, unless it can be demonstrated that the change will not have a significantly negative impact on the cost, schedule, producibility, and ILS aspects of the program.

Section XV

Summary and references

11–86. Summary.

a. This chapter provided a basic introduction to the management process, organization, and structure of research, development, and acquisition. Through the chapter description, the reader should have gained an appreciation of the logic of the process, its organization and management including recent changes. This chapter also highlights the current basic policies for materiel acquisition, recently updated DOD and Army policies for materiel systems, the Army's acquisition objectives, and descriptions of acquisition managers.

b. Difficult decisions, a scarcity of dollar resources, and honest differences of opinion cause disruptions and delays. It is unlikely that there will be total agreement on the best technical approach to satisfy a need—or, indeed, on the need itself. The annual budget cycle and budget constraints almost ensure that some projects will not be funded at the level desired—if at all. Tests are not always successful. Estimates of time, costs, effectiveness, and technical feasibility are often wide of the mark for complex systems. After all, they are estimates that are projected well into the future based on sketchy data. These real-world problems reinforce the fact that RDA management is a complex task of great importance to national defense. RDA can be a wellspring of new and effective weapons systems where effective management and professionalism can make the difference on any future battlefield. As with any activity involving the use of scarce resources to meet organizational goals and objectives, the people involved—the acquisition managers and the Soldier users and maintainers—constitute the most vital link to mission accomplishment.

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