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specific authority remained decentralized in the Military Departments.

By the end of World War II, a consensus had developed in the Legislative and the Executive Branches that a new organization was needed to coordinate defense production, distribution, and supply, as well as research and development, in the Military Departments. This consensus was a direct result of the World War II experience of trying to manage a full-scale conversion of the national economy from civilian to military production and of the recognition that the importance of science and technology in modern warfare was steadily increasing.

## 2. National Security Act of 1947

The National Security Act of 1947 established similar mechanisms to coordinate both military procurement and research and development. The Act established a Munitions Board and a Research and Development Board, each consisting of a civilian chairman and representatives of the Military Departments. In practice, inadequacies in the organization of these boards prevented them from performing their statutory functions in an effective manner. Three of the four members of each board were essentially required to judge the requests and programs of their Service. Moreover, the complicated administrative mechanism inherent in the board-type structure prevented the establishment of a clear line of civilian authority from the Secretary of Defense. In recognition of these inadequacies, the Munitions Board and the Research and Development Board were abolished in June 1953 and their functions were transferred to the Office of the Secretary of Defense.

The role of the Secretary of Defense in the procurement of major weapon systems, however, remained limited throughout the 1950's. The lack of an integrated DoD resource allocation process allowed each Military Department, using its own resources, to develop and procure weapon systems for the type of conflict that it envisioned. The higher military budgets resulting from the increased international role of the United States following the Korean War presented this system with a twofold challenge. This decentralized decision-making apparatus had to attempt to both efficiently manage the first peacetime defense industry in U.S. history and effectively coordinate military research and development efforts. David D. Acker characterizes the defense acquisition environment of the 1950's as follows:

Money was authorized to develop almost any new defense system that appeared capable of giving the United States a performance advantage over any potential adversary. Such considerations as "should-cost," "design-to-cost," and "life-cycle cost" were not uppermost in the minds of defense planners until the late 1950's. Both development and production were carried out under cost-reimbursement contracts. In this environment, production costs did not pose a major constraint on engineering design. When a design was discovered to be impractical in production—or to be inoperative in field use—it was modified in accordance with government-funded engineering changes . . .

The lack of a well-organized and integrated DoD financial management system, along with the practice of "piecemeal" procurement, led to unstable employment in defense industry and the emergence of a transient work force. Many of the contractors being challenged to develop and produce defense systems on the outer fringes of technology found it difficult to create and maintain smoothly functioning program management teams. ("The Maturing of the DOD Acquisition Process," *Defense Systems Management Review*, Summer 1980, page 14)

### 3. The 1958 Amendment to the National Security Act

The Department of Defense Reorganization Act of 1958 recognized the need for greater OSD involvement in the acquisition of major defense systems. In addition to providing the Secretary of Defense with greater authority in the administration of defense funding, the Act also gave the Secretary the authority to assign the development and operational use of new weapons to any Military Department or Service. This legislation provided the groundwork for the expanding role of OSD in the management of defense acquisition programs.

### 4. Program Management Concept

The experience of developing technologically advanced weapon systems also led to the development of an integrated program management concept in the late 1950's. This concept, first formalized by the Air Force Systems Command, uses a centralized authority for the business and technical management of selected tasks. In the case of a major defense program:

This process consists of a complex cycle that commences with identification of a need and the conception of a system to satisfy the need. The cycle ends —following deployment (and possible modification) of the system —with the retirement of the system from the inventory, or the expenditure of the system in service, as in the case of an air-to-air missile. A program...may be considered as an aggregate of controlled, time-phased events designed to accomplish a definite objective. Often, a program involves a pyramid of contractually interrelated government, contractor, subcontractor, and supplier organizations for long periods of time. In this complex environment, the performance of any one organization can affect the others. ("The Maturing of the DOD Acquisition Process," page 9)

Each Service adopted some variation of this process for the management of major programs. The program management office provided the mechanism for integrating various functional areas and overseeing defense contractors' internal operations that was required by the large number of sole-source contract awards. The program management framework has proven sound in practice, although such centralized management can result in the type of layered bureaucracy that stifles innovation and flexibility.

### 5. Secretary McNamara's Tenure

Secretary of Defense Robert McNamara, whose tenure spanned much of the decade of the 1960's, used the authority provided in

the DoD Reorganization Act of 1958 to centralize the resource allocation process in OSD. This action had a direct impact on defense acquisition management. Secretary McNamara introduced the concept of systems analysis as an integral part of the Planning, Programming, and Budgeting System (PPBS). An OSD office was given responsibility for conducting cost-effectiveness analysis of the different means to accomplish specific defense objectives. The results of these analyses were used in the selection of weapon systems for development and production. While the effectiveness of the resulting decisions was difficult to assess due to the absence of a quantifiable "right answer," systems analysis did provide an organized method to allocate limited resources.

Concern for greater efficiency in defense procurement led to the consolidation of most defense contract administration functions under the Defense Contract Administration Services in 1963. OSD also began issuing major policy directives emphasizing cost reduction in defense acquisition. The number of cost-plus-fixed-fee contracts was reduced in favor of incentive and fixed-price contracts. Life-cycle cost—the total cost of acquisition and ownership—was made a principal consideration in the selection of systems and contractors.

The desire to introduce an aspect of accountability into PPBS and to respond to industry concerns about the proliferation of resource management systems and reporting requirements led Assistant Secretary of Defense (Comptroller), Dr. Robert Anthony, to issue a series of DoD Directives beginning in 1966. These directives set up more rational resource reporting and management systems, including the Selected Acquisition Reports (SAR's), for major defense programs. The systems were designed to reduce the reporting burden on contractors while providing more pertinent information to the program manager and information required by the Office of Management and Budget, the Treasury Department, and the Congress.

#### 6. Secretary Laird's Tenure

At the end of the 1960's, the major concerns with the defense acquisition process were the inadequate ability to estimate and control costs and the lack of flexibility in the acquisition process. The Congress had also begun to reduce the defense budget to fund domestic programs. In response, the new Secretary of Defense, Melvin Laird, and his Deputy, David Packard, took a number of actions to improve the defense acquisition process.

Secretary Packard established the Defense Systems Acquisition Review Council (DSARC) within OSD to advise him of the status and readiness of each major defense system to proceed from one program phase to the next in its life cycle. Membership on the DSARC has included most of the senior managers within the Department of Defense, the composition of the individual boards depending on the specific program. The DSARC was intended to provide a mechanism for careful deliberation and evaluation before a decision to proceed to the next phase of the acquisition process. The Cost Analysis Improvement Group (CAIG) was formed in 1972 to provide independent cost estimates on programs before the DSARC and to set uniform DoD cost estimating standards.

In May 1970, Secretary Packard returned to the Services the responsibility for identifying needs and defining, developing, and producing the systems to satisfy those needs. OSD was to maintain responsibility for acquisition policy, to ensure fulfillment of mission needs, and to monitor the progress of major programs through the DSARC process. This shift was intended to improve the defense acquisition process by decentralizing authority and responsibility to the Services and the individual program managers.

Throughout the decade of the 1970's, further steps were taken to improve efficiency in defense acquisition. As a result of the recommendations made by the Commission on Government Procurement in 1972, DoD initiated a policy of focusing greater attention to alternative concepts at the "front end" of a program in order to reduce costs in later phases of the program. Then, in 1973, the senior military commanders responsible for acquisition issued a memorandum of agreement on joint program management among the Services as a means of reducing costs through standardization.

#### 7. Secretary Weinberger's Tenure

In April 1981, Secretary of Defense Caspar Weinberger and his Deputy, Frank Carlucci, issued 32 initiatives to improve the defense acquisition process. The major focus of these initiatives was cost reduction through greater program stability, more accurate cost estimating, and economic production rates. Also included in the 32 initiatives was the decision to try to strengthen the DSARC process by reducing the number of programs to be reviewed as well as the number of the phases in each program requiring review by the Secretary of Defense.

### C. CURRENT ORGANIZATION AND PROCEDURES FOR ACQUISITION

The acquisition process for the Department of Defense is extremely complex. Numerous elements of the Military Departments and OSD are involved in the process. This section briefly describes the major organizations and procedures involved in the DoD acquisition process.

#### 1. The Buying Commands of the Military Departments

The major responsibility for acquisition, maintenance, and support of weapon systems lies with the so-called "buying" commands of the Military Departments. These are the Army Materiel Command, Air Force Systems Command, Air Force Logistics Command, and the five systems commands of the Navy. The Navy systems commands were, until 1985, collected under the Naval Material Command. That command was disestablished, and the systems commands (Naval Sea Systems Command, Naval Air Systems Command, Space and Naval Warfare Systems Command, Naval Facilities Engineering Command, and Naval Supply Systems Command) now exist as independent organizations. The Marine Corps does not have a buying command comparable to that of the other Services. It is involved in operations of the Navy systems commands, however, and generally relies on buying commands of other Services to conduct its procurement.

The buying commands generally execute their acquisition responsibility for major weapon systems through program management offices. These offices consist of a program manager and other personnel assigned to the program manager. The program management office is responsible for the overall supervision of the program. The office has a contracting officer assigned to it, or a contracting officer from another organization within the buying command may be designated to support the program office.

The buying commands typically include a number of activities in addition to those committed to program management. For example, the Air Force Logistics Command operates five air logistics centers, which perform maintenance on Air Force systems. The Naval Sea Systems Command operates a number of naval shipyards, and the Naval Air Systems Command operates naval air rework facilities. Each buying command operates a series of laboratories as well as numerous test ranges and other facilities.

## 2. Acquisition Oversight in the Secretariats of the Military Departments

The Secretariat of each Military Department includes an office to provide oversight of that Department's acquisition activities. The Department of the Army has an Assistant Secretary for Research, Development, and Acquisition; the Department of the Navy has an Assistant Secretary for Shipbuilding and Logistics; and the Department of the Air Force has an Assistant Secretary for Research, Development, and Acquisition. Each of these officials, together with their staffs, represent the interests of their Service Secretary on acquisition issues.

## 3. Acquisition Oversight in the Service Military Headquarters Staffs

The Chief of Staff of the Army, the Chief of Naval Operations, the Commandant of the Marine Corps, and the Chief of Staff of the Air Force each have reasonably large staffs to oversee the acquisition activities of the Service. For example, there is a Deputy Chief of Staff of the Army for Research, Development, and Acquisition; a Deputy Chief of Staff of the Air Force with the same title; Deputy Chiefs of Naval Operations for Surface Warfare, Submarine Warfare, and Air Warfare, and a Director of Research, Development, Test and Evaluation; and a Deputy Chief of Staff for the Marine Corps for Research, Development, and Studies.

These military officers are involved in both the process that generates requirements and in monitoring acquisition activities for the Service Chiefs. In the Navy, the Deputy Chiefs of Naval Operations are primarily formulators of requirements. In the Army and Air Force, the formulation of military requirements is conducted primarily by commands in the field but ultimately is reviewed and coordinated for the Service Chief by the appropriate Deputy Chiefs of Staff. All of these offices are responsible for monitoring the activities of the buying commands on behalf of the Service Chiefs.

## 4. Defense Agencies

Certain Defense Agencies are also involved in the acquisition process. For example, the Defense Logistics Agency (DLA) is responsible for the centralized purchasing of a number of items

which the Services use. In many cases, DLA purchases items that are not related to the maintenance of weapon systems. Since weapon system acquisition is the primary focus of this discussion, the role of DLA in the purchase of more general types of items is not given substantial attention. Subsequent portions of this chapter do, however, discuss the contract administration services performed by a part of DLA, the Defense Contract Administration Services (DCAS).

A Defense Agency which has an important role in the acquisition process is the Defense Contract Audit Agency (DCAA). DCAA is the centralized auditor for DoD. The agency is responsible for the auditing of all defense contracts. The Director of DCAA reports to the Assistant Secretary of Defense (Comptroller), but audit policy for the Department is now provided by the DoD Inspector General.

#### 5. The Office of the Secretary of Defense

As OSD is presently organized, two key OSD officials have essential responsibilities for defense procurement: the Under Secretary of Defense for Research and Engineering (USDR&E) and the Assistant Secretary of Defense (Acquisition and Logistics). The second position was created as a result of a reorganization in 1985 by Secretary Weinberger. The reorganization resulted in a readjustment of some of the responsibilities of the USDR&E, who previously had been the DoD Acquisition Executive and who had been responsible for acquisition policy as well as all research and development.

Under the new organization, USDR&E continues to serve as the chief scientific technical advisor to the Secretary on military requirements. He is also responsible for the conduct of the DSARC process at Milestones I and II (demonstration and validation and full-scale development), and his staff is structured to provide the Secretary with an ability to comment on particular military requirements and materiel programs of the Services.

The Assistant Secretary (Acquisition and Logistics) is responsible for the conduct of the DSARC process at Milestone III (full-scale production). He also has responsibility for logistics and installations. The new position was created for several reasons. First, it brings the acquisition elements of logistics (such as spare parts procurement) together with the acquisition of major weapon systems. Second, it permits a senior DoD official to focus on all acquisition program and policy questions, while not having a substantial part of his attention diverted to the development of military requirements and to scientific and technical issues related to such requirements.

Reporting to the Assistant Secretary (Acquisition and Logistics) are three Deputy Assistant Secretaries for Procurement, Production Support, and Spares. These three individuals reflect the acquisition responsibilities of the new Assistant Secretary. (There are also Deputy Assistant Secretaries for Logistics and Installations.) Thus, the Assistant Secretary is charged with establishing procurement policy on a department-wide basis, and policies established in his office are to be observed by the buying commands of the Services.

Neither of these OSD officials, however, has line management responsibility for acquisition, maintenance, and support of weapon

systems. The Military Departments have this responsibility. Thus, for example, the Commander of the Air Force Systems Command would report to the Chief of Staff of the Air Force who, in turn, would report to the Secretary of the Air Force.

#### 6. The Acquisition Process

The acquisition process begins with the conduct of a threat analysis which evolves into the establishment of an operational requirement. For example, if the Marine Corps determines that it requires a landing craft which would have access to a larger percentage of the world's beaches than existing landing craft and which would have a higher speed than existing craft, a military requirement for such a landing craft would be established. If the Navy determines that it needs an anti-submarine warfare helicopter with certain capabilities, then that operational requirement would be established. Both requirements would reflect the capabilities of potential adversaries.

Once the military requirement is established, the acquisition process proceeds through the stages of concept exploration, demonstration and validation, full-scale development, and into production until initial operational capability of the system is reached. The approval to advance to each stage of this process is provided through the DSARC process.

The DSARC process was established in 1969 pursuant to DoD Directive 5000.1 and DoD Instruction 5000.2. The Secretary of Defense must approve the initial Justification of Major System New Start (JMSNS) to begin the process. The next major milestone, Milestone I, occurs prior to the demonstration and validation stage. Milestone II involves the decision to enter full-scale development, and may involve approval for limited production. The full production decision occurs at Milestone III. The length of time between new start approval and Milestone III is today approximately 8 to 12 years.

The principal DSARC members and advisors include the Under Secretary of Defense (Research and Engineering); the Under Secretary of Defense (Policy); the Assistant Secretary of Defense (Acquisition and Logistics); the Assistant Secretary of Defense (Comptroller); the Director, Program Analysis and Evaluation; the Chairman, Joint Chiefs of Staff; the Secretary of the Military Department concerned; appropriate Deputy Under Secretaries; the Director, Defense Intelligence Agency; the Director, Operational Test and Evaluation; the Director, Defense Test and Evaluation; and the Chairman, Cost Analysis Improvement Group.

The DSARC is typically concerned with issues such as the transition from development to production, affordability, cost growth, test results, inventory objective, joint Service program coordination, efficient production rates, and acquisition strategy.

#### **D. PROBLEM AREAS AND CAUSES**

This section discusses four problem areas that have been identified within the acquisition process and presents analyses of their contributing causes. First, there is an insufficient assured connection between national military strategy and the formulation of military requirements. The second problem area is failure to

achieve feasible and desirable levels of military equipment commonality. Weak management of, and general resistance to, joint programs is the third problem area. The last problem area is the lack of effective departmental coordination of acquisition.

In each of these problem areas, the causes are domination of the requirements formulation process and acquisition system by the Military Departments and insufficient coordination, review, and integration by other elements of DoD, primarily OSD and OJCS. This theme will recur in the discussion of each of the four problems, but its central importance indicates clearly that solutions to the problems require the enhancement of the coordination and integration role of elements of DoD other than the Military Departments.

#### 1. INSUFFICIENT ASSURED CONNECTION BETWEEN NATIONAL MILITARY STRATEGY AND FORMULATION OF MILITARY REQUIREMENTS

The process of determining what types of weapon systems and other defense equipment the United States buys is highly complex. As noted earlier, the process usually begins with a threat assessment of the military capabilities of potential adversaries. It is of critical importance to understand the capability of individual systems of potential adversaries, as well as the aggregate military capability of various types of adversary forces.

This threat is then considered in the context of U.S. national security commitments, and policy and planning objectives for U.S. military force capabilities are set. This should be followed by formulation of a national military strategy. Such a strategy would consider possible scenarios that might arise in different parts of the world and would plan for the use of military force, as appropriate, to deal with such scenarios. Part of this strategy would be the structure of forces to counter the threat. A key component of the force structure is the type of equipment available to United States forces.

Thus, a critical element in defense planning is the establishment of requirements for new military equipment. Such requirements should evolve from an assessment of the threat, existing United States military capabilities, and the national military strategy (which should reflect national commitments).

Consider, for example, the case of a new attack submarine, which is, in fact, currently being planned by the Navy. In the development of the requirement for the submarine, the Navy would consider the missions of such a platform and the relative capability of potential adversaries, in this instance the Soviet Union. Since one mission of an attack submarine is anti-submarine warfare (ASW), the Navy would regard the relative noise level of Soviet submarines as an important factor in determining how quiet American submarines would have to be in order to effectively perform the ASW role. In terms of offensive capabilities, the military requirement would have to reflect the anticipated use of submarines in the national military strategy. To what extent would submarines be based forward to attack enemy naval vessels in time of war? To what extent would submarines be responsible for keeping sea lines of communication open? What role, if any, would attack submarines have in the support of strategic missions? The answers to these questions should flow from the national military strategy; the

type of platform that is built should reflect that strategy and the intended employment of attack submarines in various scenarios.

The concern, then, which is the first problem in the acquisition process portion of this study, is that there is not an assured connection between the national military strategy and the formulation of military requirements. The reason that the term "assured connection" is used is because it would be an overstatement to say that there is no connection. In many cases weapon systems that are developed fit well with the national strategy. Such a fit may exist more through chance than as a result of a careful planning process that assures such a fit.

This is not to say that the Services are procuring equipment which serves no military purpose. The issue is whether the platforms and weapons that are identified as new requirements are the most appropriate platforms and weapons to execute an integrated, unified military approach, not the approach of a single Service. For example, if the Air Force designs a new fighter, that fighter should ideally reflect the view of how four Services on a unified basis will fight in certain scenarios. There may be a difference, however, between the Air Force's view of its role in these scenarios and the views of the OJCS and unified commands of the Air Force role. If the Air Force defines requirements to reflect its own view of its role, then, though the aircraft procured will obviously have military value, it may not be the optimal aircraft to perform all of the unified missions required of it.

This problem may arise even more dramatically in the case of the failure of a Service to develop a capability to perform a particular mission at all, if its own plans and strategy do not reflect national military strategy. Consider, for example, a scenario in which hostilities might arise approximately 1,000 miles inland, and the successful rapid insertion of heavy land forces in sufficient numbers to be effective is considered unlikely. The American response to such a scenario would probably rely, at least initially, exclusively on air power. Does the process for developing military requirements assure that one of the Services will have developed aircraft capable of performing this mission? There is a concern that the process does not do that, particularly if the Service involved conceives its mission priorities differently than they are envisioned in the national military strategy.

The task of developing military requirements is essentially a Military Department function. The process by which this is done is different in each of the three departments. In the Navy, for example, requirements are established by the Deputy Chiefs of Naval Operations for Submarine Warfare, Surface Warfare, and Air Warfare. These vice admirals and their staffs are part of the Office of the Chief of Naval Operations and generally decide on new requirements for ships, aircraft, and weapons. There is, of course, input from the fleet and from the naval laboratories.

In the Air Force, the process of formulating requirements is somewhat more decentralized. The requirements formulators are predominantly the headquarters of the operating commands—the Strategic Air Command, the Military Airlift Command, and the Tactical Air Command. Proposals for requirements are then consid-

ered by the Air Staff (the staff of the Chief of Staff of the Air Force).

The Army system is somewhat similar to that of the Air Force, in that the three major combat arms (infantry, armor, and artillery) and their supporting elements formulate requirements, which are then considered by the Combined Arms Center at Ft. Leavenworth, Kansas. Recommendations regarding new requirements are then transmitted for review to the Training and Doctrine Command (TRADOC) at Ft. Monroe, Virginia, and finally to the Army Staff.

Through these processes, the Services exercise primary responsibility for the development of requirements for new military equipment. The OJCS has a limited role, as do the unified and specified commands. The staff of the USDR&E is also chartered to be involved in the process of requirements formulation, but that office has far fewer resources than do the individual Services.

Because of Service dominance of the process by which military requirements are formulated, there is, as discussed earlier, a reasonable concern about whether these requirements fully reflect and support national military strategy. As noted, a particular Service may envision its role in various operational scenarios differently than the role contemplated for the Service in the overall national military strategy. Similarly, where a Service role is predominantly in support of another Service, there may be insufficient coordination between the two Services to assure that equipment developed for the supporting role is the optimal type of equipment. For example, in theory, if the Air Force were developing a multi-purpose air platform to perform combined missions, such as a general air-to-ground mission as well as a close air support mission, the Air Force might prefer a platform that would emphasize the general air-to-ground role (which would be an independent Air Force mission) as opposed to the close air support role. The Army, on the other hand, might prefer a platform with greater close air support capabilities. In either case, it is unclear that any neutral mediator —either OSD or the OJCS —could effectively direct a balance between mission capabilities in the platform based upon an understanding of national military strategy and priorities.

## 2. FAILURE TO ACHIEVE FEASIBLE AND DESIRABLE LEVELS OF MILITARY EQUIPMENT COMMONALITY

Though each Service obviously buys a number of weapon systems that are uniquely required for the missions of that Service, there are also systems and subsystems for which the general need is common among two or more of the Services. The opportunities for commonality vary depending upon the particular situation. In some cases, such as an air-launched missile, the same munition might theoretically be appropriate for all of the Services. In other cases, such as that of aircraft, it might be possible for one Service to make some modifications to the aircraft of another Service, rather than developing an entirely new aircraft. In addition, there are inevitably types of subsystems —such as radars, computers, and electronic countermeasure units —that might be commonly used in weapon platforms of more than one Service.

The Marine Corps, for example, relies almost completely on equipment procured for other Services to meet its needs. Much Marine Corps ground equipment is Army equipment, and the Marine Corps has for some time used carrier-capable aircraft procured by the Navy. The example of the Marine Corps is relatively clear evidence that there are substantial opportunities for common utilization of military equipment or the incorporation of common elements into various weapon systems.

For many of the same reasons that explain the insufficient assured connection between national military strategy and the formulation of military requirements, the amount of commonality in military equipment appears to be far less than might be desirable. Since the Services are responsible for the development of military requirements, the tendency is for each Service to develop a system uniquely tailored to the needs and mission which that Service seeks to perform. There is nothing necessarily sinister about this tendency; it is a natural desire of professional military officers to have equipment which best suits the specific needs and mission of their Service. There is always the concern that an emphasis on common utilization may force a compromise in capability in order to accommodate the needs of two or more Services. There is also the belief that lack of commonality confounds the enemy and complicates its task of responding to United States forces.

Nevertheless, given the very high cost of major weapon systems today and budgetary pressures faced by the country, every opportunity to achieve procurement economies by the common utilization of systems or subsystems ought to be explored. The structure of the Department of Defense as it now exists does not appear to be ideally suited to promote such exploration.

### 3. WEAK MANAGEMENT OF, AND GENERAL RESISTANCE TO JOINT PROGRAMS

A joint program is one in which two or more Services are participating in the development and acquisition of a weapon system. In such a program, the Services may ultimately buy the same item or variants of an item to reflect Service-specific needs, missions, and requirements. It appears that historically there have been significant management problems with such programs. The difficulties with managing joint programs generally flow from the difficulty in getting agreement on joint requirements. As noted in the discussion of problem area #2, the Services are reluctant to compromise on specifications or equipment capabilities. There are legitimate differences in the doctrine, tactics, and technical needs of various Services. Moreover, one Service may be willing to commit a greater amount of resources to satisfying a particular military requirement, because it is relatively more important to that Service than another Service.

If a joint requirement can be established, however, there are also problems in achieving effective joint program administration and management. Presently, when a joint program is to be undertaken, OSD appoints a lead Service which then appoints the program manager. Though the program manager has primary responsibility for staffing the program office, the participating Services in the joint program also assign representatives to the program office.

Often, these representatives will not be co-located. In some cases, such as the Joint Cruise Missile Project, co-location of all of the joint program participants was directed.

The joint program office, however, seems to have many of the conflict of interest problems that the Joint Staff does (which are discussed in detail in Chapter 4). These are briefly summarized in work conducted by the General Accounting Office (GAO) on this subject:

Representatives appointed to the joint program have divided loyalty —to their continuing Service affiliation, and to the ad hoc joint program. They are in the program first and foremost to protect their Service's interest. Promotions and reassignments are done by the parent Service. Several sources told us that officer careers have been blighted due to loyalty conflict when the parent Services were cool toward the joint program. ("Joint Major System Acquisition by the Military Services: An Elusive Strategy," December 23, 1983, page 25)

Exceedingly difficult demands are placed upon a joint program manager. He is responsible for obtaining funds from participating Services, negotiating requirements disputes, keeping all the necessary components of the project under contract, dealing with different chains of command, and trying to maintain the program on schedule. There are numerous review ladders in a single Service project; there are even more in a joint program.

Some of the problems associated with joint programs should be relieved by the establishment of the Joint Requirements and Management Board. This is an instrument of the JCS which has been charged with examining potential joint military requirements; identifying, evaluating, and selecting candidates for joint development and acquisition programs; chartering study groups to identify concept definitions, joint requirements, and joint management issues; providing oversight of cross-Service requirements and management issues; and resolving Service issues that arise after a joint program has been initiated. The board consists of the Vice Chiefs of Staff of each Service and the Director of the Joint Staff. Also, the Services have demonstrated an awareness of and concern about this problem. For example, the Joint Logistics Commanders issued a thoughtful study in July 1984 on joint programs, in which the management weaknesses discussed here were recognized.

#### 4. LACK OF EFFECTIVE DEPARTMENTAL COORDINATION OF ACQUISITION

A simple review of the organization of procurement in the Defense Department should make it clear why there exists a lack of complete coordination in the acquisition process. As has already been noted, the Services control the process. Though there are officials in OSD who are charged with setting procurement policy or otherwise monitoring aspects of the acquisition process, those officials have no direct line management responsibility over the Service buying commands.

Thus, though OSD procurement policy officials control department-wide regulations, further regulatory direction comes from the Services, the buying commands within the Services, and even the

buying divisions within the buying commands. The Services not only negotiate contracts for major weapon systems and for the support of such systems, but usually administer the contracts as well.

As a result of this Service domination of acquisition, there may be inconsistent policy or contracting practices. There is also a difficulty in establishing effective departmental standards and practices regarding the acquisition work force and the transfer of personnel between the procurement commands of the various Services.

It should be emphasized that the observations made here regarding this problem are a summary of the inevitable weaknesses of any decentralized system. There obviously, as is discussed later, would be other weaknesses of a highly centralized system. Many knowledgeable people believe that to the extent inconsistent practices exist among the Service buying commands, they have no tangible adverse impact on the overall performance of the system. The basic challenge in considering DoD organization is to determine whether a centralized or decentralized system offers relatively greater opportunities for effective acquisition, maintenance, and support of weapon systems.

## **E. DESCRIPTION OF SOLUTIONS TO PROBLEM AREAS**

Possible solutions to the problem areas in the acquisition process are described in this section. The options presented in this section may or may not be mutually exclusive. In some instances, the implementation of one option would preclude the implementation of other options; in other cases, several options could be implemented.

### **1. PROBLEM AREA #1—INSUFFICIENT ASSURED CONNECTION BETWEEN NATIONAL MILITARY STRATEGY AND FORMULATION OF MILITARY REQUIREMENTS**

- Option 1A —enhance the role of the OJCS in the evaluation of military requirements

Section 141 of title 10, United States Code, assigns the following duties, among others, to the Joint Chiefs of Staff:

- prepare strategic plans and provide for the strategic direction of the armed forces; and
- review the major material and personnel requirements of the armed forces in accordance with strategic and logistics plans.

Beyond these duties, the JCS system is responsible for overseeing the development of contingency plans. While much of the contingency planning is actually performed by the operational commands, the JCS system sets the framework and reviews operational plans.

These duties for strategic planning (which is part of the resource allocation process) and contingency planning make the Organization of the Joint Chiefs of Staff specially qualified to evaluate military requirements and to determine whether Service-identified requirements are consistent with strategic and operational plans. While military requirements focus on future warfighting needs, the connection that the OJCS provides with current deficiencies —as made evident by contingency plans —is important.

This option envisions that there would be a specific staff capability in the OJCS to assess the military requirements for each new major weapon system. This assessment would independently review the threat and the mission for which a military requirement has been established, and would either validate the particular requirement or propose adjustments to it.

For example, if the Navy proposed a new class of attack submarines of a certain size, speed, quietness, and weapons carrying capability, the OJCS under this option would prepare a military requirement assessment that would evaluate the relative appropriateness of the requirement as defined by the Navy, given an independent review by the OJCS of the threat, the Navy mission, the quantity of attack submarines required to perform that mission, the affordability of the new submarine design, and other pertinent factors.

- Option 1B —enhance the role of OSD in the evaluation of military requirements

A second alternative for assuring greater connection between the national military strategy and the establishment and validation of military requirements would be to substantially increase the size and capabilities of the staff of the USDR&E, and to call upon that staff for a more thorough review of military requirements. Presently, notwithstanding substantial criticism of the overall size of OSD, it is clear that the staff of the USDR&E is much smaller than that of the Services performing comparable functions. In fact, the program office alone for some individual weapon systems would exceed the size of the entire staff of USDR&E. Thus, if the Under Secretary seeks to question the validity of a military requirement established by the Services, the Services have far greater staff capability and expertise to justify the established requirement than does OSD to challenge it. If OSD is to be a more effective counterbalance to the Services in evaluating military requirements, then it needs to have more substantial and broader-based staff capability.

## 2. PROBLEM AREA # 2—FAILURE TO ACHIEVE FEASIBLE AND DESIRABLE LEVELS OF EQUIPMENT COMMONALITY

- Option 2A —create structures to promote communication among users, requirement formulators, and procurers of similar types of weapon systems

As noted earlier, the development of military requirements involves users, those charged specifically with requirements formulation, and the buying commands. Therefore, one means of promoting greater commonality of weapon systems or components would be to require the establishment of inter-Service committees of users, requirements formulators, and acquisition professionals. For example, if commonality in fixed-wing, high performance aircraft were sought, there would be a committee consisting of members of Air Force, Navy, and Marine Corps wings; another committee consisting of representatives of the requirements formulators in the Tactical Air Command, the Office of the Deputy Chief of Naval Operations for Air Warfare, and the Office of the Marine Corps Deputy Chief of Staff for Aviation; and another committee consisting of officers assigned to the Aeronautical Systems Division of the

Air Force Systems Command and the Naval Air Systems Command. Such committees are already being established in the acquisition community. For example, in June 1985, the Joint Aeronautical Commanders Group, the Joint Commanders Group for Communications-Electronics, and the Joint Ordnance Commanders Group were established.

It is recognized that the further establishment of structures like those described in this option would not necessarily overcome problems of Service loyalty, since this option does not contemplate anyone having directive authority. Rather, this option simply ensures exchange of information among users, requirements formulators, and procurers, so that commonality can be voluntarily achieved to the extent that any single Service sees value in utilizing the approach of another Service.

- Option 2B —enhance the role of OSD

The same approach suggested earlier for an enhanced staff capability in the office of the USDR&E for the purpose of ensuring the linkage of the national military strategy to the formulation of military requirements could be utilized to promote greater commonality in military equipment. This responsibility already lies with USDR&E; the issue is whether USDR&E has adequate resources to identify and promote all appropriate common utilization opportunities.

- Option 2C —consolidate the buying commands

There has been some discussion about a possible consolidation of all of the buying commands of the Services into a single department-wide acquisition agency. This option is described at greater length under problem area #4. While consolidation of the buying commands would not necessarily promote greater commonality among whole weapon systems, since the buying commands are not responsible for formulating requirements, such consolidation might promote greater commonality among components of weapon systems.

- Option 2D —develop a larger number of joint programs

Though there have been problems with the management of joint programs, the mechanism of joint program development may in certain cases be an effective option for achieving greater commonality. If a program is conducted jointly, then it offers the potential for obtaining commonality of equipment.

A joint program does not ensure complete common use of equipment, since in many cases the mission requirements of each Service will vary and equipment will have to be modified to reflect individual Service mission requirements. This was the case, for example, with the joint cruise missile project. But even with substantial differences in types of cruise missiles, the joint program offered an organizational structure for using common components to the maximum extent possible. The joint program structure also ensured that technical achievements in cruise missiles were readily available to each Service and could be incorporated into all variations of the missiles.

### 3. PROBLEM AREA # 3—WEAK MANAGEMENT OF, AND GENERAL RESISTANCE TO, JOINT PROGRAMS

- Option 3A —let DOD manage all joint programs and assign a program manager

Under this option, OSD —either through USDR&E or through the Assistant Secretary for Acquisition and Logistics —would be the direct manager of all joint programs. The responsible official at OSD would appoint the program manager, either a military officer or a civilian, who would then be directly accountable to the appointing OSD official.

Presently, the program manager for a joint program is from the Service with the lead responsibility for the program. Under this option, OSD would assume the management responsibility for joint programs.

- Option 3B —reserve a block of OSD funds to finance the development phases of joint programs

GAO has surfaced as an option in its report on joint programs the possibility of setting aside a block of OSD funds for joint major system development. According to the GAO study, the underlying rationale for this proposal is that the Services might be more willing to maintain a commitment to a joint program if development were “cost free.”

- Option 3C —ensure that OSD protects the funding levels for joint programs

In those instances where joint programs are justified and joint funding is appropriate, OSD should ensure through the budget process that participating Services fully fund their portions of the effort. OSD already has the authority to do this through the established budget preparation procedures. It would simply have to exercise that authority.

### 4. PROBLEM AREA # 4—LACK OF EFFECTIVE DEPARTMENTAL COORDINATION OF ACQUISITION

- Option 4A —consolidate the buying commands

This option has already been mentioned as a possible alternative for dealing with the problem of lack of commonality of military equipment. Under this option, the independent Service buying commands would cease to exist, and there would be a centralized defense procurement agency within the Defense Department, presumably headed by a senior civilian presidential appointee in OSD. This type of centralized procurement has been used by France among other countries.

The creation of a consolidated acquisition agency separate and apart from the Department of Defense has also been suggested. That particular option is not analyzed in this study, since it seems that any agency should appropriately be part of the Department and accountable to the Secretary of Defense.

- Option 4B —have the commanders of the buying commands report directly to a senior official in OSD

Under this option, the buying commands would continue to exist in their present form. However, the military commanders of the

buying commands would no longer report to the Service Chiefs of Staff or to the Service Secretaries. Instead, they would report directly to a senior official in OSD. In other words, OSD would become the line manager for the buying commands under this option. This type of procurement organization is currently used in the United Kingdom.

- Option 4C —strengthen OSD coordination using existing structures

Under this option, there would be no change in the basic departmental structure. Instead, the Secretary would simply be urged to put sufficient support behind USDR&E and the Assistant Secretary for Acquisition and Logistics to assure that the policy initiatives of those individuals and their staffs would be observed by the buying commands. Under the present highly decentralized acquisition system, there is some question about whether centralized direction from OSD has sufficient top-management support to be effective.

- Option 4D —consolidate contract administration

Rather than a consolidation of the entire buying commands, another option to address this problem would be the consolidation of the contract administration services only. The Defense Contract Administration Service of the Defense Logistics Agency already represents a consolidated contract administration service for certain contractors. However, the contract administration function for most major weapon systems and major contractors still lies with the Services. Since this results in one Service administering contracts for other Services, and since each Service has its own approach to and policies for contract administration, the suggestion has been made that at least contract administration should be a consolidated activity.

## F. EVALUATION OF ALTERNATIVE SOLUTIONS

This section evaluates the specific options for reforming the acquisition process that were set forth in Section E. No effort will be made here to compare these options with each other or to identify the most promising options for legislative action. Rather, this section seeks to set forth in the most objective way possible the pros and cons of each alternative solution. The options will be identified by the same number and letter combination used in the preceding section.

### 1. OPTIONS FOR DEALING WITH THE PROBLEM OF INSUFFICIENT ASSURED CONNECTION BETWEEN NATIONAL MILITARY STRATEGY AND FORMULATION OF MILITARY REQUIREMENTS

- Option 1A —enhance the role of the OJCS in the evaluation of military requirements

Greater involvement of the OJCS in the assessment of military requirements has substantial potential value. First, the OJCS, together with the unified commands, develops various operational plans.

Second, the OJCS has a major role in formulating national military strategy. Therefore, the OJCS should fully understand the underlying strategy, doctrine, tactics, and approach to various types

of operations, and should be in an excellent position to judge whether certain newly specified military requirements are consistent with current and future needs.

Third, the OJCS should be the repository of extensive professional military judgment, in that most of the personnel assigned to the OJCS are military officers. Since the question of appropriateness and validity of a military requirement in large part requires such military judgment and experience, it follows that the OJCS should be an effective and competent reviewer of requirements developed by the Services. The OJCS is likely, however, to be unable to forcefully evaluate military requirements unless the institutional deficiencies of the JCS system —as identified in Chapter 4 —are corrected.

- Option 1B —enhance the role of OSD in the evaluation of military requirements

The major advantage of increasing the size and breadth of the staff of USDR&E is that such a civilian staff should be well positioned to be an independent evaluator of requirements proposed by the Services. In addition, to the extent that civilian control of various DoD decisions is desirable, this would result in substantial civilian control over one of the key types of decisions the Department of Defense makes —what new weapon systems to develop and produce.

There are potential problems, however, with greater utilization of the OSD staff as the primary evaluator of Service military requirements. The OSD staff has historically had no access to the operational plans developed by the OJCS, has a limited role in the formulation of national military strategy, and has limited professional military expertise. To the extent that the responsibility of any independent evaluator of Service-developed military requirements is to ensure the fit of such requirements with operational and strategic plans, access to or understanding of such plans and related military judgment are essential ingredients to perform the job. In addition, some thoughtful observers already believe that OSD is unwisely micro-managing the Services in many areas, including acquisition programs. This option could increase such micro-management tendencies in OSD.

## 2. OPTIONS FOR DEALING WITH THE PROBLEM OF FAILURE TO ACHIEVE FEASIBLE AND DESIRABLE LEVELS OF MILITARY EQUIPMENT COMMONALITY

- Option 2A —create structures to promote communication among users, requirements formulators, and procurers of similar types of weapon systems

At a minimum, it would seem that there should be mechanisms to promote communication among users, requirements formulators, and procurers of similar types of weapon systems. Formal structures to ensure communication among individuals in different Services involved with similar types of equipment would appear to be essential in order to make certain that Services were aware of what other Services were doing. Thus, the recent effort of the Joint Logistics Commanders to create the joint commanders groups is most welcome. It must be recognized, however, that while the exist-

ence of structures of this type would promote communication, they would not ensure commonality.

◦ Option 2B —enhance the role of OSD

One of the presumed roles of the USDR&E should be to search for opportunities for commonality in military equipment and to take whatever actions might be required to prevent unnecessary duplication of such equipment. USDR&E should be able to require common approaches to weapon system requirements, when it is determined that such a common approach is feasible and desirable. In addition, USDR&E should be a repository of department-wide knowledge about technical capabilities, and should, therefore, be able to identify opportunities for common utilization of weapon systems or components of weapon systems.

◦ Option 2C —consolidate the buying commands

If there are strong arguments for consolidation of the buying commands, an issue that is discussed at somewhat greater length later, those arguments do not have to do with the formulation of military requirements. Since the buying commands do not formulate requirements, but become involved only in the execution, consolidation of the buying commands would not necessarily promote common utilization of weapon systems. Such consolidation might, however, promote utilization of a greater number of common components.

Each of the buying commands of the Services is presently an exceedingly large organization, and there is a real and serious question about whether a consolidated command would be manageable. In addition, a consolidated command would almost certainly take away the supervisory responsibilities of the Service Secretary and Chief. It remains to be seen whether such extreme centralization would have more advantages than disadvantages.

◦ Option 2D —develop a larger number of joint programs

The issue of joint programs is discussed at greater length in the discussion of problem area #3. It should be adequate to state at this point that a joint program is the most direct means of obtaining common utilization, if it is determined at the outset that two or more Services can use the same type of equipment, either in identical form or with only slight modification.

### 3. OPTIONS FOR DEALING WITH THE PROBLEM OF WEAK MANAGEMENT OF, AND GENERAL RESISTANCE TO, JOINT PROGRAMS

◦ Option 3A —let OSD manage all joint programs and assign a program manager

The main advantage to giving OSD a controlling role in joint programs is that, though a number of military officers serve in OSD, it institutionally has no Service bias or affiliation. As already indicated, one of the problems in the management of joint programs is that it is difficult to maintain equal Service commitments to various programs. Controlling these programs through a program manager reporting directly to an OSD official might relieve that problem. In addition, OSD should have the technical expertise to manage programs, and it should have the detachment from any

Service interest to resolve disputes about technical requirements that are raised.

This would be a significant role change for OSD. Some of the other impacts of this change are summarized by GAO:

It would alter the character and structure of USDRE, requiring enlargement of control and the scope and depth of the staff. It might have to infringe on the military service — doctrine, capability selection, and service expenditure choices. It would be at odds with DoD administration's favoring decentralizing the decision-making to the Military Departments. ("Joint Major System Acquisition by the Military Services: An Elusive Strategy," page 32)

The primary shortcoming of this option is that OSD presently exercises no line management over the various programs. Therefore, it would almost certainly not be well equipped to suddenly exercise such line management. The buying commands, on the other hand, already have very large program management organizations and the staff support that these require.

- Option 3B—reserve a block of OSD funds to finance the development phases of joint programs

The primary advantage of reserving department-wide funds, rather than Service funds, to finance the development phases of joint programs is that the Services might be willing to cooperate in joint program development if their own resources were not being used. However, there is some question as to whether this would truly be the perception, since set-aside funds are still defense money and would probably be viewed as such in the eyes of the Services.

- Option 3C—ensure that OSD protects the funding levels for joint programs

As has already been noted, OSD could achieve control of joint funding with existing authority, if it chose to exercise it. This option should theoretically pose no difficulties to anyone, since OSD should, with respect to all departmental programs (whether joint or single Service), be exercising sufficient control over the budget to ensure that resources commensurate with the importance of the program are committed. OSD could certainly use this same authority and discretion to maintain sufficient support of all Services for joint programs which it regards as programs of critical importance.

#### 4. OPTIONS FOR DEALING WITH THE PROBLEM OF LACK OF EFFECTIVE DEPARTMENTAL COORDINATION OF ACQUISITION

- Option 4A—consolidate the buying commands

The theoretical benefits of a consolidated acquisition agency are relatively apparent. There would presumably be common policies, common contract administration, greater coordination of departmental research efforts, greater flexibility in staffing, and other similar related benefits which should arise from having one procurement agency.

On the other hand, each of the existing buying commands of the Services is already an exceedingly large organization, and a consolidated agency might be unmanageable.

The Defense Procurement Improvement Act of 1985 directs the U.S. General Accounting Office to conduct a study of the feasibility of creating a consolidated acquisition agency and asks GAO to identify advantages and disadvantages of such a plan. It would seem essential to have a very detailed feasibility analysis and exceedingly careful study before any action as far-reaching as this option was undertaken.

In addition, it might generally be desirable to look toward more incremental means of achieving greater coordination and integration of the buying command activities. Incrementalism offers the benefit of being able to make careful adjustments at different stages of the process. There is always the concern with any change as massive as consolidation of the buying commands that substantial unforeseen problems might result.

- Option 4B—have the commanders of the buying commands report directly to a senior official in DoD

Option 4B is similar to the present system in the United Kingdom. Though the Ministry of Defense in Britain has procurement agencies in each Service, the senior official in the Service responsible for procurement reports to the Minister for Defense Procurement.

Under this option, there would be no change in the buying commands of the Services, but there would be a line reporting relationship directly into OSD rather than through the Service military and civilian chains of command. The advantage of this option is that it would give the senior OSD acquisition official control over the individuals actually performing procurement. Presently, for example, the Assistant Secretary for Acquisition and Logistics is limited in his ability to affect results. He may issue guidance, directions, or policy, but the implementing officials work for the Services. If those individuals worked for the responsible OSD official, then there should be far greater OSD control over day-to-day procurement activities.

A primary drawback of this option is that it is inconsistent with the general management policy of decentralization of the present Administration. Both the Service Chief of Staff as well as the Service Secretary would probably regard it as totally unacceptable to have all the acquisition functions of the Service removed from their jurisdiction. They might well feel that some of the most important areas of management were no longer under their control.

In addition, the process of weapons development and acquisition is one that must be carefully related to operational realities. Creating a reporting relationship directly into OSD would reduce the interaction between users, requirements formulators and the acquisition community.

- Option 4C—strengthen OSD coordination using existing structures

This option is another of the type where OSD technically has the authority to provide coordination, but may not be exercising that

authority. The question, then, is whether or not OSD coordination efforts have sufficient top-management support to require Service conformance with established policies. It would seem that this should be unobjectionable, since presumably if OSD issues a policy, it would be implemented by the Services.

◦ Option 4D—consolidate contract administration

The primary advantages of consolidating contract administration services are that plants would not shift from one Service to another for contract oversight purposes if the balance of business at a plant shifted from one Service to another; no Service would have its contracts overseen by officials of another Service; and there would be uniform contract administration policies, practices, and procedures.

The view has been expressed that the Services, through their plant representative offices, do an effective job of contract administration. It is not clear, however, whether the Services do the job of contract administration more professionally than the Defense Contract Administration Service. Service control of contract administration would seem to be preferred to consolidated administration only in those instances where tangible benefits from Service control can be shown.

## G. CONCLUSIONS AND RECOMMENDATIONS

This section presents the conclusions and recommendations of this chapter concerning the acquisition process. The conclusions result from the analyses presented in Section D (Problem Areas and Causes). The recommendations are based upon Section F (Evaluation of Alternative Solutions).

### Conclusions

1. There is insufficient assured connection between national military strategy and the formulation of military requirements.

### Recommendations

- 1A. Enhance the role of the Organization of the Joint Chiefs of Staff in the formulation of military requirements by requiring the OJCS to prepare an assessment of newly specified military requirements.

**Conclusions**

2. There is a lack of commonality of military equipment, both with respect to entire weapon systems and components of weapon systems; this results in unnecessary duplication of expense to the Department.
3. There has been weak management of, and general resistance to, joint programs.
4. There is a lack of effective departmental coordination of the acquisition process.

**Recommendations**

- 2A. Create formal structures to promote communication among users, requirements formulators, and procurers of similar types of weapons systems to enhance full exploration of opportunities for common utilization.
- 2B. Provide the Under Secretary of Defense (Research and Engineering) with adequate staff resources to act as an advocate for common utilization of military equipment where feasible and desirable.
- 3A. Urge OSD to more forcefully use existing budgeting authority to ensure that Service financial commitments to joint programs are commensurate with the priority of such programs.
- 4A. Urge OSD to more forcefully use existing authority to require, where appropriate, common acquisition policies and practices by the Services.

## APPENDIX A

### ACQUISITION MANAGEMENT ISSUES

As noted earlier, there has been extensive public and congressional interest over the last two years in the defense acquisition process. The purpose of this study is not to consider all of the issues related to that process. Nevertheless, because of the substantial interest in defense procurement generally, a brief identification of organizational issues related to defense acquisition would be useful. While this appendix will identify problems, questions, and issues, it is not intended to reach conclusions or to present solutions.

#### 1. COST OF WEAPON SYSTEMS

One of the most fundamental concerns about defense procurement is whether weapon systems are being purchased at minimum cost. There are any number of reasons that a system may cost more than it should. First, the military requirement may be excessive. In other words, the Service responsible for establishing the requirement may have specified more capability than that which is necessary to meet the expected threat and defined mission need. Second, the equipment actually procured may exceed the requirement to a greater extent than is desirable. Third, the design selected for a weapon system to meet the requirement may be relatively more costly to build than other possible designs. This may be true either because the design is unduly complex or because the design does not accommodate economic manufacture. Fourth, the production process used by the contractor may not be optimal from a cost standpoint. Fifth, the contractor may simply fail to achieve performance goals in production. Many of the acquisition problems discussed later in this appendix also have an impact on weapon systems cost.

There has been renewed attention to this issue as a result of the recent release of a study by the Contract Management Division of the Air Force Systems Command. The study reported conclusions from a comparison of the actual performance of several defense contractors with the standard work hours of certain manufacturing operations. Though there is some dispute about the methodology of this study, it concludes that the actual hours spent in the production of those weapon systems examined was substantially in excess of the standard hours.

Because the United States has a numerical disadvantage in most weapon systems when compared with the Soviet Union, and because substantial Federal budget deficits may severely constrain defense budget growth in the foreseeable future, acquiring weapons at minimum cost is critically important. Lowering the unit cost of comparable weapon systems is directly translatable into greater

quantities and thus additional military capability. The challenge, therefore, is to define military requirements which are appropriate but not excessive; to meet, but not unnecessarily exceed, the requirement; to select a design which is less costly than competitive alternatives; to optimize the cost of production lines; and to ensure that production workers are encouraged by incentives to meet or exceed production standards.

Of course, there are a number of other factors which affect contractor cost. Does the contractor have sufficient incentive to make capital investments which will lower overall production costs? Is the quantity procured annually generally an economical quantity for production purposes? Does the contract reward the contractor for cost-savings and thus create tangible incentives for efficient operation?

Finally, there has been extensive interest in the last year in overhead costs incurred by contractors and charged against contracts. Specifically, there has been a concern that government regulations on the types of general and administrative costs which the government will pay are too vague and that the system for the submission, audit, and final settlement of such costs is inefficient. Legislation to address these concerns was part of the Defense Procurement Improvement Act of 1985. (At the time this study went to press, the conference report on the fiscal year 1986 defense authorization bill, which included the Defense Procurement Improvement Act of 1985, had been passed by the Senate and was awaiting action in the House.)

## 2. COST ESTIMATING AND "SHOULD COST" STUDIES

The Department of Defense performs two substantially different types of cost estimating. The first type is the estimate of the likely cost of the weapon system done during its development. This type of cost estimating is essentially for budgetary purposes to facilitate decision-making on the long-term affordability of a particular program. The congressional emphasis on independent cost estimates over the last several years, as well as the work of the Cost Analysis Improvement Group (CAIG), has largely been focused on this type of cost estimating. Such cost estimating efforts try to determine, for example, at the stage of concept exploration and then at subsequent stages into and through full-scale development what the cost of developing, procuring, and supporting a particular system is likely to be.

A different type of cost estimating relates to efforts of the Department to know what a contractor's production cost should be for a particular system that is already in production. These "should cost" studies generally require a very large, multi-skilled team, with substantial technical expertise, to actually go into a contractor facility to independently ascertain whether the manufacturing operation is relatively efficient or can be improved.

The Congress has also had an interest in the second type of independent cost estimating. A provision in the Defense Procurement Improvement Act of 1985 would require the Secretary of Defense to develop an annual plan identifying those major weapon systems for which "should cost" studies are to be performed in any given year.

The need for independent, accurate cost estimates of both types described here is apparent. The challenge is to develop mechanisms that will provide the Department with an enhanced capability to develop accurate estimates both of the long-term budgetary type and of the "should cost" type.

### 3. COMPETITION

There have been few subjects that have received as much congressional and public attention as that of competition for weapon systems and spare parts. In 1984, the Competition in Contracting Act was enacted into law (Public Law 98-369). This measure made substantial changes to federal procurement law in order to limit those circumstances under which non-competitive procurements were permitted. In addition, the Congress passed the Defense Procurement Reform Act of 1984 (Public Law 98-525) and the Small Business and Federal Procurement Competition Enhancement Act of 1984 (Public Law 98-577), both of which included numerous provisions that were intended to permit the government to compete a larger percentage of procurements by DoD and other agencies.

If structured properly, competition offers the opportunity to reduce cost. Concern is sometimes expressed that competition for major weapon systems in DoD may place relatively too great an emphasis on the technical quality of proposals and other non-price factors, while placing insufficient emphasis on the price that is offered. A properly structured competition should ensure that the government obtains the lowest price for comparable items.

The interest of the Congress in promoting competition has also been evidenced by legislative provisions to establish competition advocates within the Services. The Services have established competition advocates in every buying command. Though there is some concern about the large number of individuals who have been committed to this effort, there is nevertheless preliminary evidence that competition advocates are having a salutary impact in promoting competition in instances where it was not previously being achieved.

There is also substantial concern over the appropriate amount of competition at different stages in the procurement process. For example, at concept exploration it would be desirable to have extensive competition and to permit competitors to submit widely varying proposals for meeting identified mission needs. The number of competitors will usually have to be reduced as the process proceeds through demonstration, validation, and full-scale development. In many cases, only one full-scale development source has been funded, and there is often only one production source funded for major weapon systems.

There has also been a long-standing interest in the question of whether or not competitive prototypes should be produced in development for the purpose of selecting a production source. For example, the Blue Ribbon Defense Panel in 1970 included among its recommendations the greater use of competitive prototypes and less reliance on paper studies. Though there are obvious advantages to competing actual prototypes, it is apparent that this is very costly.

Recently substantial emphasis has been placed on trying to obtain dual source procurement of major weapon systems, where it

appears economical to do so. Under dual source procurement, two contractors are maintained throughout the period of time in which the system is acquired, with an annual competition between the two contractors. Some of the benefits of dual source procurement can be obtained even where similar (but not identical) items are purchased, as is the case with the current Air Force aircraft engine competition.

Provisions of the Defense Procurement Improvement Act of 1985 establish a presumption of having two sources in both development and production unless certain criteria for exception are satisfied. It is apparent that significant congressional attention to the need for greater competition continues, and a strong view predominates in the Congress that competition has numerous benefits in addition to the cost-saving opportunities that it provides.

#### 4. SOURCE SELECTION PROCEDURES

The present source selection process involves the establishment by the buying command of evaluation criteria for proposals. Typically, the evaluation criteria will include such elements as the quality of the technical proposal, the management of the proposer, integrated logistical support that can be provided, and cost. The risk of a proposal is also carefully evaluated. These selection factors may be weighted in whatever manner is agreed upon in a buying command.

There are a number of questions that are periodically asked about the source selection process. For example, there is an interest in whether greater emphasis should be placed on the prior performance of contractors in source selection. There is also a concern about whether designs chosen in source selection give appropriate consideration to manufacturing factors, reliability, maintenance, production cost, and life-cycle cost.

There is always a concern in the source selection process about "buy-ins." A buy-in occurs when a contractor bids less than it anticipates its costs are likely to be under the contract, with the expectation that it will make the program profitable either through changes in the initial contract or through subsequent contracts.

Dealing with appropriate trade-offs between technical excellence and cost; ascertaining how to treat prior performance; and preventing buy-ins are all challenges of the source selection process. Source selection procedures should also encourage alternate design proposals during the development of the concept of a new major weapon system.

#### 5. CONTRACTOR PROFIT

There is always interest in the appropriate level of profit which defense contractors earn. Since the defense procurement process is based upon virtually all major weapon systems being developed and produced by private industry, it is necessary to permit contractors to earn a sufficient profit to attract equity capital. At the same time, there is a justifiable concern that profits earned by defense contractors not be excessive.

The Department of Defense has recently released a Defense Finance and Investment Review (DFAIR) study. This study considers

appropriate levels of contractor profit to reward risk and attract investment capital.

#### 6. PROGRESS PAYMENTS

The Department of Defense utilizes progress payments to finance contracts. Where progress payments are permitted under a contract, a contractor periodically receives a certain percentage of the expenses actually incurred in the performance of the contract. The appropriate percentage for progress payments and the basis for such payments have recently been disputed. The Secretary of Defense reduced the progress payment percentage from 90% to 80% in 1984. In addition, the Congress has included in the Defense Procurement Improvement Act of 1985 a provision which requires that progress payments be commensurate with work that meets the quality standards established in the contract that has been accomplished. The DFAIR study, which was mentioned earlier, also considers the subject of progress payments.

#### 7. PROGRAM STABILITY

The lack of stability in the acquisition of many systems has often been cited as a major reason for increased cost and other program difficulties. Stability basically refers to the expectation that a predictable and relatively economical amount of a system will be procured annually. An unstable program is one in which the procurement amounts fluctuate substantially from year to year.

One of the mechanisms most effectively used in the past to achieve program stability has been that of multiyear procurement. Under a multiyear procurement, a contractor receives a contract for several years. By having a firm government commitment to purchase a system for several years, the contractor should have a greater financial basis upon which to make capital investments to increase the efficiency of production, to enhance productivity, and to lower costs. The incentive to do these things may only exist if the contractor realizes greater profits as a result of these efficiencies. Greater contractor profit may also be tied to a lower price to the government, so both parties may benefit.

A number of members of Congress have expressed substantial interest in the establishment of a two-year defense budget. Though there are many reasons for a two-year budget (they are discussed in Chapter 9), one justification would be the stability in procurement which such a budget could create.

#### 8. TRANSITION FROM DEVELOPMENT TO PRODUCTION

The subject of managing of the transition from development to production has also received a great deal of attention in the last several years. The Defense Science Board issued a major report on the subject in 1983. It has been found on a number of occasions that many problems in a given program arise because of inadequate planning of the transition from development to production. There may have been inadequate attention during full-scale development to manufacturing issues. There may not have been adequate investment during development or at the start of production to achieve economy in the production process. Or there may have been excessive concurrency between development and production.

Such concurrency often introduces substantial risk into programs. It is clear that attention to this transition stage of the acquisition process is of fundamental importance and that further improvements can be made in the manner in which the transition is planned and managed.

#### 9. CONFIGURATION CONTROL

It has long been recognized that one of the major sources of cost growth in a weapon system is changes made during production. Changes tend to be very expensive. In addition, there is the further problem that the amount to be paid a contractor for changes that are agreed upon are negotiated in a sole source environment, since the contractor already has the work in progress and there is often no way to compete the amount to be paid for a particular change.

Increased attention has been given over the last several years to trying to achieve and maintain configuration control. In a program like the B-1 bomber, where a ceiling was placed on the cost of the program, especially tight control was recognized as essential. Similar efforts to assure that only minimum changes are made once a system is in production are key to controlling the cost.

#### 10. GOLDPLATING AND OVER SPECIFICATION

A great deal of attention has recently been paid to problems described as goldplating and over-specification. As the terms are used here, they refer to two different problems. Goldplating basically means giving a system more capability or additional capabilities than are required to meet the threat.

Over-specification, on the other hand, essentially means either writing specifications in so much detail that they exceed that which is necessary to meet the military requirement; or providing specifications which exceed the military requirement. For example, a great deal of attention was given in 1985 to a hot beverage warmer for the C-5 aircraft. There was some concern that the hot beverage warmer may have been overspecified. Without determining whether or not the allegation is correct, the assertion means that the specifications for the hot beverage warmer may have been unnecessarily complex, thus requiring the manufacturer to produce a more expensive warmer, while perhaps a functional specification would have permitted the substantial use of a commercial design. Alternatively, the assertion could be understood to mean that a functional specification issued to a designer exceeded reasonable requirements for the item.

These are inevitable problems in weapon systems design. Management techniques that provide constant attention to these problems are essential.

#### 11. CONTRACT ADMINISTRATION AND QUALITY ASSURANCE

Administration of DoD contracts is generally accomplished on major weapon systems through the presence at manufacturing facilities of a DoD plant representative, either from a particular Service or from the Defense Contract Administration Service (DCAS), a part of the Defense Logistics Agency (DLA).

The purpose of all these offices is to represent the interests of the Federal Government with respect to defense contracts. The of-

fices typically include individuals who are responsible for quality control, administering changes, supervising progress payments, and all other day-to-day aspects of contract administration.

Partially as a result of the quality assurance problems that arose in 1984 with some defense contractors, questions have been raised about the effectiveness of on-site plant representative offices. Nevertheless, the basic structure and organization of these offices seem to be a relatively efficient and effective means of representing the government's interest in administering contracts.

## 12. DEFENSE CONTRACT AUDIT AND REVIEW

The Subcommittee on Defense Acquisition Policy of the Committee on Armed Services held a hearing in 1985 on the coordination of defense contract audit and review activities. Though the witnesses appearing on behalf of DoD asserted that there was not duplication of various audit and review activities, evidence presented to the Committee indicated that the coordination of these activities was not nearly as perfect as their testimony suggested. For example, there was evidence that at least four different DoD entities (the Defense Contract Administration Service, the Defense Contract Audit Agency, the buying command of a Service, and the Inspector General of DoD) were conducting executive compensation reviews.

Though it is true that DCAA by charter has the exclusive responsibility for the audit of contractor costs and other financial data, numerous other DoD entities have some review responsibilities which are in the nature of audits. The report of the Senate Committee on Armed Services on the fiscal year 1986 DoD authorization bill urges the Secretary to ensure the proper coordination of DoD audit activities, and suggests that a lead agency be appointed for each type of contractor audit or review.

## 13. WEAPONS TESTING

The subject of weapons testing has received a great deal of attention over the last two years. In the fiscal year 1984 DoD Authorization Act (Public Law 98-94), a separate Office of Operational Test and Evaluation (OT&E) was established in OSD, with a Director of this office to be nominated by the President and confirmed by the Senate. The purpose of this office was to set department-wide policy on operational testing.

Though the policy for operational testing is now set on a centralized basis as the result of congressional action, the responsibility for actually conducting such operational testing still lies with the Services. Virtually all of the test ranges, test equipment, and other test assets are owned by the Services. For example, a Navy entity called the Operational Testing Force (OPTEVFOR) has been responsible for some time for designing and conducting effective operational tests for all new Navy equipment and for providing an independent analysis of such equipment. The Army and Air Force have similar organizations.

There is also substantial attention to developmental testing. The policy on developmental testing is established by a Director of Defense Test and Evaluation, who reports to the Under Secretary of Defense (Research and Engineering). Thus, the establishment of

policy, implementation, and oversight of operational and developmental testing have been separated in OSD.

The creation of the new Director of OT&E resulted from a concern that operational testing was not being conducted in a sufficiently rigorous fashion by the Services at appropriate times in the acquisition cycle. The stated goal of the sponsors of the provision to create this office was to ensure appropriate Service attention to operational testing and to require that independent test reports be prepared by the Director of OT&E and submitted to the Secretary of Defense and Congress.

Though the office was only recently activated, the candor of its recent report on the effectiveness of the Sergeant York Divisional Air Defense Gun (DIVAD) has created substantial confidence that the office is operating as anticipated. There is a continuing need to ensure that weapons testing procedures are thorough and adequate.

#### 14. ACQUISITION WORK FORCE

There has been continuing attention to the quality of the acquisition work force, including both military officers and civilians. First, there has been a concern about the qualifications of military officers assigned as program managers for major weapon systems or to other positions in the acquisition, maintenance, and support functions. Though impressive career planning for acquisition professionals exists in some situations, in the Services, a number of individuals with little or no procurement experience have still been given responsibility for major programs.

The Subcommittee on Defense Acquisition Policy held hearings in 1984 and 1985 on the acquisition work force and, as a result of those hearings, included provisions in the Defense Procurement Improvement Act of 1985 which would establish minimum standards for training and prior experience for individuals appointed either as program managers of major weapon systems or as general or flag officers in the buying commands of the Services. In addition, there has been continued interest by the Committee in the establishment and maintenance of a distinct career path for individuals pursuing acquisition as the primary part of their careers.

Substantial interest has also been expressed in the caliber of the civilian work force. There is evidence of serious problems in the grades available in the civil service, the ability to attract competent new personnel, and training and development incentives that can be offered to civilians.

#### 15. PERMISSIBLE EMPLOYMENT OF DOD OFFICIALS WHEN THEY LEAVE THE FEDERAL GOVERNMENT

Another subject that has received substantial attention over the last several years has been the so-called "revolving door." This issue generally refers to the question of the type of employment that individuals who have served in DoD in acquisition roles should be allowed to accept when they leave the Federal Government.

Some recent legislative proposals have required that an individual involved in any procurement function related to a particular contractor should be ineligible to accept employment with that contractor for a period of time, varying from two to five years, depend-

ing upon the proposal. The Defense Procurement Improvement Act of 1985 includes a provision which would prohibit a presidential appointee who served as a primary representative of the government in negotiations with a contractor from accepting employment with that contractor for two years. Other provisions in the legislation make it clear that an individual may not negotiate employment with a defense contractor at the same time that the individual is negotiating on behalf of the government with that contractor, and also strengthen the reporting requirements applicable to individuals who leave DoD and accept defense contractor positions.

#### 16. ACQUISITION OF SPARE PARTS AND SUPPORT EQUIPMENT

Few subjects related to defense acquisition have received more attention over the last two years than the acquisition of spare parts and support equipment. Support equipment is the specialized equipment that must be purchased to support a system. For example, a special tool required for the installation of a particular spare part on a system would be support equipment. Since support equipment is often designed for only one system, and then may be purchased in relatively small quantities (because it is used as a tool in the maintenance of the system, not as a spare part itself), such equipment often appears to be very expensive. The development cost of a particular item of support equipment may be high, and that cost may be distributed over a very small number of units.

There has been substantial attention on the part of both the Congress and DoD to the question of prices of spare parts and support equipment. In the Defense Procurement Reform Act of 1984, a number of provisions were intended to increase competition in spare parts procurement, and to ensure that the government obtains necessary technical data to permit competition in the procurement of spare parts. In addition, in the last two years numerous reports have been prepared by each Service and by OSD on the spare parts problem.

The Defense Procurement Improvement Act of 1985 requested a report by the Secretary of Defense on the progress that has been made in solving the spare parts problem. That legislation identified the following as major causes of the problem:

- (1) Some parts have been built to overly detailed specifications.
- (2) Some parts have been designed and fabricated in such a manner that excessive engineering and manufacturing steps have been involved, resulting in a price in excess of the intrinsic value of the part.
- (3) Some parts have been purchased in very small, and thus highly uneconomic, quantities.
- (4) Some parts have had inappropriate amounts of corporate overhead assigned to them, resulting in a price in excess of the intrinsic value of the part.
- (5) Some parts have not been purchased directly from the manufacturer, and thus the government has unnecessarily paid an additional profit to the seller.
- (6) Some parts have not been purchased through a competitive process.

(7) Some parts have been sold with unreasonably high profits included in the price.

The 1985 legislation requires the Secretary to report to the Congress on whether each of these problems has been solved and, in the event that any problem is not solved, to propose changes to regulations or statutes that would enable more progress to be made.

There is some evidence that the effort to assure reasonable prices for spare parts has not been without some cost. For example, preliminary reports indicate substantial increases in the time necessary to acquire spare parts, notwithstanding significant additional personnel being committed to this function.

#### 17. TECHNICAL DATA AND PROPRIETARY RIGHTS

One element of the spare parts problem that has received particular attention is that of technical data and a contractor's proprietary rights in that data. One difficulty that DoD found in its efforts to compete the acquisition of spare parts related to technical data. The Department found in some cases that it had not purchased the data from the original contractor that would permit it to compete the re-procurement of a particular spare part. In other cases, the government found that, though it had apparently purchased the data, the data could not be located, was incomplete, was not fully legible, or had not been properly updated, so that it was effectively not useful for re-procurement of spare parts. In other cases, the government found that though it had obtained the data, a contractor had asserted proprietary rights in the data. In other words, the contractor asserted that the government had no right to release the data to other private parties. Such proprietary rights were usually asserted in situations where the data had been developed at private expense (generally as part of a commercial product) and then used for the military items sold to the government.

The Defense Procurement Reform Act of 1984 directed the Secretary of Defense to issue new regulations on technical data and proprietary rights in technical data. The required regulation has recently been issued. DoD should establish a rational policy which will provide direction for obtaining a sufficient amount of data to permit competitive re-procurement of spare parts in appropriate cases, while not obtaining other large amounts of data that will have little usefulness. At the same time, the predominant view in the Congress has been to respect the proprietary rights of contractors which have developed certain items at private expense, though the Congress has specifically permitted DoD to establish limitations on the amount of time during which proprietary rights may be asserted, if DoD wishes to do that. In taking this approach, the Congress rejected proposals that would have established a mandatory statutory limitation on the period of time for which proprietary rights can be asserted on items sold to DoD.

#### 18. ORGANIZATIONAL STRUCTURE OF THE VARIOUS BUYING COMMANDS

In 1985, the Navy disestablished the Naval Material Command, which had been a single organization responsible for all Navy acquisition and logistics. There had, at the time of its disestablish-

ment, been five subsidiary commands of the Naval Material Command, with a four-star admiral designated as the Chief of Naval Material. After the reorganization, there are five systems commands, each headed by a flag officer, the most senior of whom is a vice admiral. In addition, the staff which had previously been the headquarters staff of the Naval Material Command has been shifted to the Office of Naval Acquisition Support. The Deputy Chief of Naval Operations for Logistics is acting as the Navy member of the Joint Logistics Commanders.

These adjustments by the Navy raise some question as to the most desirable organizational structure of the buying commands of the Services. The Air Force Systems Command continues to have a headquarters organization headed by a general, with subsidiary buying commands (Aeronautical Systems Division; Electronic Systems Division; Space Division; Armaments Division; and Ballistic Missile Office). The Army has a headquarters at the Army Materiel Command, also headed by a general, with various buying divisions (Tank-Automotive Command; Aviation Systems Command; Armament, Munitions, and Chemical Command; Missile Command; Communications-Electronics Command) reporting to the headquarters.

The Navy action raises the issue of whether a procurement organization with or without a centralized headquarters element is relatively more efficient. A general concern about the total size and complexity of all of these organizations is raised by Dr. Edward Luttwak in his book, *The Pentagon and the Art of War*. Dr. Luttwak is highly critical of what he views to be the unduly bureaucratic organization of the Air Force Systems Command, as well as its very large size.

There are several presumed effects of the Navy adjustment. Obviously, the change provides more direct access for the commanders of the various systems commands to the Chief of Naval Operations and his staff, to the Secretary, to the Assistant Secretary for Shipbuilding and Logistics, and to other appropriate members of the civilian secretariat. It would appear that the major issue involved in determining whether or not a Naval Material Command headquarters is valuable is whether the headquarters was an effective coordinator, integrator, and manager of systems command decisions.

Even if the Navy assessment that, on balance, the Naval Material Command should be disestablished is correct, it does not necessarily mean that the Navy experience is immediately translatable to the other Services. Virtually all of the Navy buying activities are located in the Washington, D.C. area. This is substantially different than the Army and Air Force, where the various buying divisions are distributed around the country. Thus, even if the Navy decision is sound for the Navy, it may be more necessary for the Army and Air Force to have a Washington-based headquarters staff to assure proper integration and coordination of the various buying activities of each of those Services.

It is reasonably clear that a fresh look at the organization, size, and structure of the buying commands of all the Services would be useful. These are immense organizations of great complexity and

there are probably opportunities to improve their organizational effectiveness.

#### 19. MILITARY AND CIVILIAN ROLES

Though the majority of individuals at all of the buying commands of the Services are civilians, the top management positions, including positions in program management, are held by military officers. Proposals have been made to turn the process of acquiring weapon systems over to civilians. Some believe, however, that it is essential to have military officers with meaningful operational backgrounds and experience in the most important acquisition positions. Others believe that there is no need for a military officer to devote his career to being an acquisition specialist, and that if acquisition is to be one's exclusive career, then it should be a civilian career. The pros and cons of both positions can be argued, though it is clear that whatever the role of civilians in acquisition, substantial involvement of the military is necessary in order to obtain meaningful input on operational realities.

Further attention to the appropriate distribution of responsibility between military officers and civilians would be useful. Should there be more civilian program managers than there presently are? What should be the distribution between military officers and civilians in the various program offices? Can civilians of outstanding ability be attracted into acquisition work at DoD despite numerous civil service impediments? These questions, of course, relate closely to the question of the professionalism of the acquisition work force which was discussed earlier.

#### 20. PROGRAM MANAGER AND CONTRACTING OFFICER AUTHORITY

The primary responsibility for planning and contracting for various procurement programs should lie with the program manager and the contracting officer. The program manager has responsibility for general supervision of the program. The contracting officer has the authority to contractually obligate the Federal Government. It is the procurement contracting officer's responsibility to negotiate contract details and to prepare solicitations and contracts.

Some concern has been expressed recently over whether program managers and contracting officers have sufficient independence in the execution of their responsibilities. Some believe that excessive involvement and review by higher level officers outside the buying commands have compromised the authority and responsibility of both the program manager and the contracting officer, and that this dilution of responsibility weakens the acquisition process. The General Accounting Office is presently conducting a study of this and related issues.

#### 21. CONTRACTOR INDEPENDENT RESEARCH AND DEVELOPMENT EXPENSES

In 1983, the House Appropriations Committee gave a great deal of attention to the system by which contractors are permitted to charge a certain pre-established amount of independent research and development expenses to corporate overhead for reimbursement by the government.

Under the present system, contractors which have previously done business with the Department of Defense are permitted to negotiate advance agreements with the Department on independent research and development (IR&D). An IR&D plan is prepared and reviewed by the Department, and this plan becomes the basis for the advance agreement. Under the agreement, the contractor is permitted to spend a certain amount of money on IR&D (that is, research and development on areas of interest to the company and not funded by particular governmental solicitations). If these amounts of IR&D are spent by the company, such amounts may then be considered corporate overhead and charged against other contracts with the Federal Government.

The rationale behind this program is that any high technology company, in order to maintain leadership and business growth opportunities, must do a certain amount of independent research. In the commercial world, this independent research is paid for in the cost of the products. For example, when one purchases an automobile, the purchase price of the automobile includes a certain amount of money which pays for the research activities of the automobile manufacturer. Since the government may be the predominant customer of a number of defense contractors, the justification for permitting the inclusion of some IR&D in corporate overhead is that the government should act as other commercial customers would and should pay these costs as legitimate costs of doing business. The government believes that it receives substantial benefit from the incorporation in specific equipment of advances made through IR&D expenditures.

There have from time to time been proposals made to try to either reduce the amount of IR&D that is chargeable to contractor overhead, or to more closely control IR&D. Greater controls would be inconsistent with the spirit of corporate independent research and development. In any case, it appears that congressional concerns from 1983 have been, at this time, adequately addressed by the Department.

## 22. RESEARCH AND DOD LABORATORIES

The process by which DoD conducts research in support of its programs is immensely complex. Much of the research is conducted by the Services through the buying commands. Some is done in the numerous laboratories operated by each of the Services. Other parts of the research are done through Federal contract research centers. There is also extensive research contracted with universities and corporations.

In addition, important research projects are coordinated by offices in OSD. For example, the Defense Advanced Research Projects Agency (DARPA) reports to USDR&E. The Strategic Defense Initiative Organization is responsible for extensive research in the area of strategic defense.

It is apparent that the coordination of all these various research activities is of central importance. Coordination is critical for at least two reasons. First, it is important that all potential users of research products be aware of research that is being done and of the results of such research so that it can be appropriately incorporated into hardware. Second, there is obviously a need to prevent

unnecessary duplication of research efforts from the standpoint of minimizing research costs.

Further attention should be given to means for coordinating the research activities managed by the Services and OSD to ensure the maximum utilization of research products and the prevention of duplicated research efforts, where such duplication is not likely to be of value.

### 23. LENGTH OF TIME IN THE ACQUISITION CYCLE

A subject that is almost always cited when a critique of the defense procurement process is made is that of the time involved from the development of the concept for a new weapon system to the initial operational capability of the system. This period of time now often exceeds ten years.

Defenders of the acquisition process will quickly point out that this lengthy time is often planned into the system. For example, in the view of the Air Force, initial operational capability for the advanced tactical fighter is not required before 1995. Nevertheless, concept exploration started in the early 1980's. One can question whether such an extended development cycle is relatively sound or unsound.

Even when the acquisition system is under pressure to develop something quickly, it seems to have a hard time doing so. For example, after the Scowcroft Commission report was issued, it became apparent that the development of the small mobile intercontinental ballistic missile would probably become a high national priority. Notwithstanding its importance, the development process will still take six or seven years.

What are the costs associated with this length of time? An extended acquisition cycle results in increased costs as a result of inflation experienced during the extended time in development. A lengthy acquisition cycle also invites changes (and possibly gold-plating) in the weapon system, all of which inevitably lead to increased costs. Finally, an inability to promptly field weapons leads to an inevitable concern that the technology incorporated in a weapon system may become outmoded before the system is operational.

For all these reasons, it is apparent that there must be an effort to try to streamline the acquisition process and shorten the time between the conception of a new major system requirement and its operational capability.

### 24. SOCIAL GOALS IN DEFENSE CONTRACTING

It has long been recognized that a number of social goals are explicitly promoted in defense contracting. For example, there are set-asides for small businesses, emphasis on minority business contracting, and certain "Buy America" provisions to ensure contracting with domestic firms. At points in time, there have been programs to test contracting in labor-surplus areas. Some question the relative effectiveness of these programs and whether the cost of the programs outweigh the social benefits they are supposed to yield.

## 25. RELIABILITY AND MAINTENANCE

One of the most important initiatives in defense contracting recently has been to place greater emphasis on the reliability and maintainability of weapon systems. It has been fully recognized that one of the most important characteristics of a weapon system is its reliability.

Tangible evidence of this concern is that Congress has passed two laws over the last several years on warranties on weapon systems. The most recent law requires that the Department of Defense obtain warranties of: (1) an absence of defects in materials and workmanship; (2) performance; and (3) conformity with design specifications, for virtually all weapon systems. These laws are intended to ensure greater emphasis on reliability and to ensure that the contractor assumes financial responsibility for such reliability.