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# Report of the Panel on R & D MANAGEMENT

6-18 July 1969

**1969 SUMMER STUDY**

Defense Science Board
Newport, Rhode Island

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Report of the Panel

on

# R & D MANAGEMENT

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## Defense Science Board 1969 Summer Study

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## FOREWORD

The Defense Science Board Summer Study on R&D Management is a follow-on to the work of the DSB Task Force on R&D Management. It took as its primary task the formulation of specific actions which OSD could consider taking to implement the recommendations of the DSB Task Force.

The report is submitted in two parts: first, a summary, which comprises the recommendations for action together with discussion to make this part self-consistent; and second, several supporting papers on the principal issues.

There was a substantial consensus among the members of the Summer Study on the views expressed and actions recommended in the Summary. The supporting papers, in general, also reflect the opinions of a majority of the Panel.

## SUMMARY

The R&D Management Summer Study is a follow-on to the work of the Defense Science Board Task Force on R&D Management and has made use of the background and conclusions of that panel, and, indeed, several members of the Summer Study were among its members. We are in general agreement with the management principles emphasized by the DSB Task Force, and supported as well by the Industry Advisory Council (IAC) Panel A and the Aerospace Industry Association (AIA) studies.

In this Summer Study, we set for ourselves the task of developing specific recommendations which, if implemented by the Office of the Secretary of Defense (OSD), could move our Defense efforts in the direction felt to be desirable by the earlier work. Since we wish to recommend specific actions, we confined ourselves to a few topics to consider. We believe the subjects addressed are important, and perhaps even fundamental to the R&D management process.

While it is not the purpose of this report to dwell on general principles, we became convinced of the importance of certain underlying difficulties in our present management system, and we wish to see some fundamental changes. If we have a theme, it is the following: we want to see more reliance on competent individuals and less enmeshment in bureaucratic procedures; we want to see more emphasis on the building and testing of experimental equipments and more penetrating and less voluminous analyses. Finally, we want to see procurement systems that recognize the changes necessary in any development program and properly distribute the risk between the government and the contractors.

A summary of our specific conclusions follows:

### People

Unless new training and assignment procedures are established, we are not likely to find program managers of sufficient quality to assure program success under present conditions. Even with improved procedures, we must not only be able to staff our key acquisition activities with highly competent individuals, but we must give them the authority to do the job. This situation needs much improvement and deserves top level emphasis.

We may need to make systems acquisition management a career. The individual chosen to represent the Government and direct a large RDT&E program should have worked in a laboratory developing equipment for which he was responsible to gain experience in the realities of technical design and to develop confidence in his own technical judgment. He should have performed creditably in a post demanding similar management abilities. Finally, he should be chosen from one of many with the preceding qualifications on the basis of demonstrated qualities of leadership, aggressiveness, tact, dedication, and, in particular, depth of understanding of the job to be done.

We need to recognize that the success of program management is a function of not only the program manager, but of the team with which he works. Indeed, selection of a specific program manager should be made with due regard for the rest of the organization, and comparable consideration should be given to the selection of the other key members of the program management office. The program manager must have confidence in his staff or the authority to make changes when necessary.

We should select some of our key managers from among the civilian Government staff. We also need to encourage individuals from industry to enter Government and take up posts as managers of development programs.

Program management schools are helpful, but they by no means assure the capability we find necessary. At best, these schools teach only the routine procedures, none of which are absolutely basic to management success.

We recommend, therefore, serious consideration of establishing a career specialty of weapon systems acquisition management. A major increase in the recognition, the status, and the opportunities in program management may be necessary to attract and retain a larger share of the most capable career officers and senior civilians that we wish to see committed to this activity.

## Delegation of Authority

The requirement that checks and balances need to exist for decisions that affect our national security is well accepted. However, if procedures intended for this purpose are not controlled, they reach the point where delegation and exercise of authority have little meaning. We need to overhaul in depth our management system to ensure that responsibilities are clear; individuals are accountable for decisions, actions, and results; and the independent avenues of review that we

provide are restricted only to those necessary for assurance that the national interest is safeguarded.

Today, program managers often spend more of their time briefing staff levels than they do in running their programs. Since many of these levels are not able to contribute constructively to the program direction or implementation, the program may suffer. Too often, the success of the program manager is a function of his ability to deal astutely with the politics of the bureaucracy rather than his capability to guide wisely the efforts of his program.

We recommend, for those programs especially designated, that the program manager be no more than the third level below the Secretary of Defense; that intermediate staffs be restricted to their capability to ask for reviews; that the Director of Defense Research and Engineering (DDR&E) control the program via the Development Concept Paper (DCP); and that ODDR&E restrict itself to an annual in-depth review of the program by a group (including outside representatives) it approves under a chairman it designates.

Preliminary Design of Weapon Systems

The formal term used by the Department of Defense for this process is Concept Formulation. It precedes Contract Definition which, if successful, in turn initiates the large engineering effort required to bring the weapon system into being. Today, Concept Formulation is too often prosecuted as a short-term paper study. We believe much greater management attention needs to be given to this initial phase of our effort to see that the design genius, the experimental investigations, and the meticulous comparative studies essential to the creation of a successful concept are thoroughly applied. We need to see that Concept Formulation more often involves laboratory test, and the design and evaluation of development prototypes, and that, for some important programs, the process is decoupled from approval of Contract Definition.

We recommend that a limited number of systems be designated by DDR&E for in-depth technical development during Concept Formulation, and the management of these programs, their technical plan, and funding be approved by DDR&E. The operation of these programs could benefit from the experience gained in the management of the Advanced Ballistic Re-entry System (ABRES) program.

It should be recognized that such efforts must be funded at an appreciable level to be effective. Since these funds should be allocated

from Advanced Development (6.3), it may be necessary to increase the advanced development category by transfer of funds from other budget categories. We are not suggesting that more RDT&E funds are required, but that more development be done during Concept Formulation rather than deferring so much until after Contract Definition as at present.

Management of Exploratory and Advanced Development

In addition to supporting specially designated programs just described, the 6.3 category and a portion of 6.2 (Exploratory Development) are also employed to support system-oriented development. We believe that these efforts should be managed by the Assistant Secretary of R&D of each Military Department. In this capacity, he should serve as a deputy to DDR&E and have the controls normally exercised by DDR&E delegated to him. He, in turn, should have complete authority to initiate or stop projects, allocate or apportion funds, and approve project managers. He would be expected to employ the results of carefully performed mission analyses to select those projects he approves. He will be accountable for results through the evaluation of direct contributions to our advanced weapon systems.

Contractual Environment

We believe that the Government/contractor environment is a far more important factor in the success or failure of the contractual relationship than the specific form of the contract itself. There have been examples of both fixed-price and cost contracts applied to innovative R&D projects which have gone well and others which have gone poorly. Contract histories often do not record the real problems in the contractual environment. This environment is influenced principally by the competence of the Government and the contractor program staffs, the mutual respect and confidence that they have toward one another, and the lines of communication that have been established.

We recommend the following:

1. Any form of contract covering development work should contain mechanisms to improve the flexibility available to the program manager. This includes the ability to slide production decisions without invalidating future contractor commitments.

2. Employ Cost Plus Incentive Fee (CPIF) contracts with carefully structured incentives where technical uncertainties are

large or where the Government objectives are likely to change substantially.

3. Delegate contractual authority to the program manager of DoD designated programs.

4. For programs of intermediate complexity (such as a tactical missile), use "try-before-buy" competitive development of brassboard or development prototypes to maintain real technical competition before production contract award.

Development Concept Paper

Although the Panel firmly believes that the intent of the Development Concept Paper is of major importance to DoD, we believe that it has and will continue to encounter difficulty as a viable management tool. This is principally due to the long gestation and modification time associated with its concept. For these reasons, we recommend the following:

1. The current DCP system be applied to programs at the time of approval of Contract Definition.

2. Procedures be established to permit DDR&E to modify the DCP to reflect changes in funding, schedule or performance without extensive re-coordination.

3. An Advanced Development Concept Paper (ADCP) be used during advanced development and concept formulation. This paper would address the operational use, but not the procurement and force structure issues, and thus the approval authority should be DDR&E.

These recommendations, we believe, are essential to substantially reduce the preparation and revision time, and thus allow the DCP process to be more compatible with the program dynamics and develop into the management tool that is intended.

Development Production Interface

In these days of costly weapon systems, prudent management of our resources demands that the scope of our production commitment be limited until the development work, including testing, is sufficiently complete to allow us to be sure of how completely the technical concept will be realized.

In considering ways to obtain early confirmation of the technical concepts so necessary for program success, it has been proposed that more prototypes be used and that development and production be decoupled. While it is the opinion of the Panel that the testing of prototypes is essential, we assume that the decoupling refers to the decision process and does not imply that R&D and production should be unrelated. Clearly, the problem is to seek the proper coupling and to avoid the extremes of complete coupling (as is too often true today) and complete decoupling. Waiting for complete tests of the prototypes before beginning to consider the program production efforts could leave a costly gap that could delay the program and might result in the production of obsolete weapons.

In addressing the problem of premature production decision on complex development/production programs, it seemed clear to us that contractual technical milestones might not be an appropriate approach. The problems appearing on some of the programs currently attempting such a solution are:

1. Complex systems depend on combined performance of many technical elements, and definition of single critical milestones and defining meaningful measurement of success in the midst of an R&D sequence may be impractical.

2. Contractual demand for singular performance demonstrations may force undue emphasis on one area to the detriment of a balanced system.

3. Milestone reporting of progress on all elements of a program is now an essential part of the program manager's quarterly report. He should have flexibility in balancing his program as he proceeds, and should not be forced by the contract to stop when any single milestone is missed, since this would lead to a series of starts and stops as the number of essential critical milestones grows, as they are likely to do.

The essential problem that should be addressed is that heretofore the program decision to begin production expenditures has been forced by a fixed date and the program manager was impelled to make decisions based on utilizing an option or fulfilling a Service imposed requirement date. Milestones now exist in the development plans of any important program, the combination of which really describes technical progress, but the program manager has no flexibility to delay a planned production start if he is not satisfied. Therefore, it is suggested that the contractual innovation needed is not so much a detailed milestone definition,

but a mechanism for delaying or sliding the production decision without violating the conditions of the contract which required the contractor to commit to certain production performance.

It is recommended that, for production portions of combined R&D and production programs, a careful study be made to develop contractual policy and language to provide the flexibility to slip production decision dates if technical progress on the program is not sufficient to justify such decisions. This flexibility must be achieved without invalidating program options previously committed to by the contractor.

Excess Baggage

Included in the management requirements of current Department of Defense contracts are a number of systems and programs which have worthy objectives, but which in implementation have generated overhead costs that overbalance their purported savings. It is believed that DDR&E's proposed "Paper Proliferation Study" will cover these items, but some examples are given below of systems that should be reviewed with the object of eliminating them or curtailing their application.

1. Cost Reduction - The system generally does not reduce costs (as the title implies) but rather reports cost savings achieved by other technical and management controls.

2. Value Engineering - A program whose objectives are desirable but, because its practical implementation is difficult, has been misused by showing savings on changes that should have been foreseen to begin with.

3. Zero Defects - Although quality control is an essential element of all production effort, and this program has been useful in motivating people, it need not be a DoD-wide designated system.

4. Contractor Performance Evaluation - A very involved system of reporting (still incompletely) data already well known to those involved in source selections.

5. Safety Programs - A newly found and rapidly growing cult which imposes a Government directed program to do things which good development programs logically do.

6. PERT Cost, PERT Tech and their various derivatives - The use of such systems should be optioned by decision of contractor management, not directed.

7. Excessively detailed cost, schedule, and performance reporting requirements (CSPCS) - Such management systems have tended to become an end unto themselves.

We strongly recommend that most of these programs be stopped now. In some cases, incontrovertible evidence may be brought forward that some parts of a program are essential. For these situations, implementation requirements should be sharply curtailed.

# SECTION I

## PROGRAM MANAGEMENT

## IN

## WEAPON SYSTEMS ACQUISITION

# PROGRAM MANAGEMENT

# IN

# WEAPON SYSTEMS ACQUISITION

## Introduction

The key job of program management in the weapon systems acquisition process is at the System Program Office (SPO) level within the Services. The System Program Office as presently defined is to oversee the development, production, and field turnover of a system which has already been through concept formulation and for which a procurement decision has already been made. In the short run, the program manager's objectives are clearly specified by regulations and directives as a series of hurdles to be overcome: Contract Definition, contract negotiation, budget exercises, categories of tests, configuration control, etc. The program manager is a sort of official champion of the system. In a hostile world, in which most of the senior people with whom he must deal seem bent on stopping, changing, delaying, or otherwise attacking his system, his people, or his money, he is the one dedicated supporter. His normal tendencies in this direction are reinforced by his knowledge that he will be judged on whether or not the system makes progress in the scheme of objectives and regulations imposed, not on the kind of progress it makes.

## Organization and Procedures

### Authority

Because authority is at present so highly centralized in the DoD, the program manager has little authority and is separated from those that have it by a number of intermediate staff levels which can distort and interfere but cannot help. A primary need is to increase the program manager's authority and to improve his communications.

To accomplish these ends, the number of levels between the decision making authority and the program manager must be reduced and the various staff and specialty agencies must be clearly defined as being in support of but not in control of the program manager.

Reduction in the number of levels implies both a delegation of Secretary of Defense authority to selected individuals closer to the

program manager and direct or nearly direct reporting by the program manager to the authoritative individual. The F-15 plan wherein authority is delegated by written agreement to the Secretary of the Air Force and the program manager reports to the Secretary only through the Commander, Air Force Systems Command, is most certainly a considerable improvement. Similar arrangements should be made for all designated high important programs. For programs of less importance, consideration should be given to arrangements where authority is delegated still further down in the Services and program reporting is equally streamlined.

The program manager should be given much broader authority than at present to make design, funding, and contracting decisions; to determine the procedural and paper work requirements; and to arrange and pay for his needed support. Specialists in the functional support organizations should support and advise the program manager but should not be empowered to veto or delay his decisions despite their organizational position or rank. If a specialist disagrees with a program decision, he should take the initiative to raise the issue to the designated authoritative individual, whose decision is final. A possible arrangement is to make staff specialists members of a review committee reporting to the authoritative individual.

Appropriate offices in OSD, particularly ODDR&E, should play a large role in the structuring and approval of programs at Secretary of Defense level. Following the approval and delegation of authority (presumably described in a DCP or equivalent document), DDR&E should continue in a monitoring role. Membership on a review committee or steering group chosen to provide system advocacy might be one appropriate mechanism. Direct contact with the program office is necessary for good communications. As long as the program remains within the agreed limits of the DCP, however, no OSD agency could interfere with or modify the program except by persuasion or by seeking the approval of the Secretary of Defense. The general policy should be one of assuring good communications with the program office with all responsible agencies but to limit authority to the program manager and a very small number of designated individuals in the higher organization. An important aspect is to assure that these individuals have a common understanding of the program and must work together in pursuing it.

## Resources

Program offices, at least in the Air Force, are probably too large at present, in part because the standard definition of an SPO organization and responsibility calls for a substantial number of people

independent of the size and complexity of the job. In part, the size is a reflection of needs generated by the cumbersome procedures and communications forced upon the SPO. The SPO, in fact, is usually overworked, no matter how large.

The general procedure should be reversed. The SPO should begin small but with emphasis on technical support. The SPO must be provided with adequate technical support either by being located at a laboratory or other source of engineering resources, or by collecting a suitable team of technical people at the SPO. In general, the preferred arrangement is a relatively compact SPO of high quality people resident with one or more support organizations which can supply technical, procurement, costing, and other specialists when needed. Instead of obtaining relief from various procedures and reporting schemes, justification should be required before any standard procedures are imposed on the SPO.

Although the program manager is the most important individual, he is one member of a team. The manager should at least influence where he cannot determine the key members of his team, removing or adding them when necessary. The key members should also be subject to higher level approval and should be encouraged to communicate directly with higher authority. It is from these key members that most future program managers will be drawn. Since it is really total team performance that is important, the character of available key team members should influence the choice of the appropriate program manager.

## Reporting

There appear to be at least two major problems in the reporting scheme. The first is that present conditions do not encourage honest and rapid reporting of troubles. The second, depending in part on the first, is the disastrous results of attempting to predict trouble through paper work reporting systems. The proposed statement of the program manager's job and his relationship to his decision maker should help alleviate the first problem. At present, especially where the program is at hazard all the time, the program manager is in an awkard position when he predicts a future difficulty. If he reports it, he probably will not get help but instead will be overwhelmed by requests for explanation, proposals of alternative courses of action, and the need to defend the program from its enemies, who will seize on any sign of trouble. It is not surprising that he will usually put his efforts on correcting the trouble and will not report it until he has to.

This reluctance to admit of possible trouble extends down into the contractor organizations for similar reasons. Therefore, the government at all levels (including the program manager) has trouble finding out what is going on in time to take corrective measures. The common remedy is to request detailed written reports. Since these are always after the fact, have a high noise or uncertainty level, and are unlikely to mention worrisome possibilities, they form an extremely poor basis for prediction. Instead of recognizing the fundamental nature of this difficulty, the usual next step is to ask for more reports at a finer level of detail and with more frequent milestones. It seems a human trait to believe we can predict the future if only we could measure the present and its derivatives with sufficient precision. Unfortunately, the detailed reports are not only enormously expensive, they obscure what little real information there is.

Reporting should be cut back to what is meaningful and useful. Since action is largely based on prediction, emphasis should be on information that will point out potential deviations from plan. It is unlikely that formal reporting schemes will ever do this very well. There is no substitute for competent and objective surveillance of the critical program elements on a continuing basis.

## Personnel

### Selection and Training

Successful program managers come from many different backgrounds and have many different working styles. It is not reasonable to try to set precise standards or to define an optimum program manager and force all managers into a single mold. But the ability and knowledge of the program manager can have a major effect on program success and some explicit mechanisms for training and selection are clearly desirable. The need lies somewhere between the one extreme of assuming that any senior officer can be a project manager, and the other extreme of a completely structured training process.

In industry, managers for important projects are individually chosen by the senior responsible people in the organization from among the supply of experienced managers. Character and background are matched to the special needs of the project insofar as possible, but related experience, demonstrated performance, and the personal knowledge and confidence of the company leadership are necessary. A successful company grows a supply of managers to choose from by a more or less informal training process that involves steadily increasing responsibility in subordinate positions in large projects, and the

leadership of subprojects and small or routine projects. It is unclear how much of this process is needed to provide necessary experience in the skills of program management and how much is needed to establish the necessary confidence of the management. Both are important. In any event, program management is a respected career in industry. Program managers move from company to company as the companies' needs change, taking their experience and reputations with them. This cross fertilization is a source of strength to the profession as well as a necessary ingredient of industrial flexibility. The DoD could profit from such flexibility and transfer of knowledge and experience.

The process of growing and selecting program managers in the DoD is probably not too different from that in industry except for certain special conditions. Most military program managers have some related experience and most are chosen on the basis of the personal knowledge of their superiors. The special differences seem to be as follows: (a) Program managers in industry are generally chosen for their extensive experience in engineering management, while in the military the choice may be limited largely to field officers with more modest technical experience; and (b) Program management is not a career objective in the military.[1] Managers do not stay with any particular project very long owing to personnel rotation policies. The best and most successful managers are promoted in rank and arbitrarily moved, usually outside of program management, to a job which is recognized as a military career step. As in any organization, there is a shortage of the best people in DoD, and project management does not have the priority to get more than a very small fraction of that scarce best.

Improvement could probably be made in the program management business in the DoD if something like the following steps were taken:

1. Acknowledge the importance of program management to the Services. After all, the systems for which military program managers are responsible influence the future capability of the military. A high priority would make it easier to get the best men for the job and also make the job more attractive to those men.

2. Encourage careers in program management. Such a career pattern might consist of initial selection from technically educated officers, design experience in laboratories, test

[1]Although "R&D Management" is a designated career field.

organizations, industry and FCRCs (Federal Contract Research Centers), a series of jobs of increasing responsibility in project offices, leading eventually to the leadership of major designated projects and finally to major R&D commands. Special flexibility would be required for such a career including especially long tours of duty when required, special training in colleges and industry, promotions without job change, flag rank for major projects, etc. Project manager career officers should, however, have enough experience in operational commands and staff agencies to understand their problems and operating methods and to be able to deal with them effectively and gain their confidence during project work.

3. Insist on personal contact between career program managers and the senior people in the Services and OSD to establish personal knowledge and confidence. Permit the authoritative people in the (hopefully streamlined) command chain to approve project managers.

Finally, however, it is also necessary to appreciate that first-rate program managers have developed in the Military Services from many different sources, that characteristic native ability is a vital attribute of program management, and that ultimately the environment in which a program manager must function has at least as much bearing on his potential for success as his background, ability, training, and experience. For that reason, the setting of program management in the military establishment and the assignment of authority, resources, and fundamental management freedom are dominant considerations in assessing probable program success.

## Civilians as Program Managers

There are a number of attractions to using civilians as program managers: The number of available able candidates is increased, and training, tour of duty, and career objectives may more easily be tailored to program management needs. Therefore, the use of qualified civilians as program managers should be considered, with the following provision:

- The program manager must look both inward to his program and outward to the universe of users, approval authorities, and staff agencies. Insofar as this universe is peopled with military officers, there may be advantages in the program manager being an officer, although that is probably not always true. Each

program is different. The choice of a program manager, military or civilian, should depend on an individualized assessment of the character of the program and the qualifications of the available people. For example, a development program with high technical content might profit by the assignment of a highly skilled civilian technical program manager, while a major production program primarily concerned with field installation training and acceptance, might best be handled by an officer.

# SECTION II

# CONCEPT FORMULATION

## CONCEPT FORMULATION

Concept Formulation is the technical process required to establish the feasibility and viability of a proposed design for a new weapon system. "It is not solely a prerequisite for Contract Definition. It is the formulation of concepts relevant to an understanding of and pursuit of operational capability objectives through the mechanism of hardware development and operational test—understanding the problem is at least half of the process. It is best understood as an iterative and continuous process that defines potential technical solutions and associated risks and corresponding operational concepts."[2]

The fundamental object of Concept Formulation is to develop a concept of the weapon system in sufficient detail that (1) we can see clearly what would be its advantages and limitations if deployed several years in the future, and (2) technical problems are identified and the feasibility of solutions to these problems established. Concept Formulation requires detailed threat analysis, comparative studies to determine the best compromises for achieving the required result, detailed identification of difficulties or limitations, laboratory tests or field tests to provide basic data and systems analysis to assess the real effects of these data.

OSD policy requires the completion of Concept Formulation as a prerequisite to approval for Contract Definition which, in turn, is the first step in the large scale engineering development required to bring a weapon into being. We have come to regard approval for Contract Definition as the most important gate to pass in the initiation of a new weapon system and in many cases Concept Formulation has become a race to get through this gate in the shortest time. The Concept Formulation process as it is generally practiced, therefore, tends to become a short time scale effort with the object of answering questions or objections raised by Contract Definition approval authority. Our efforts here have tended to become more shallow than they should be and to involve almost entirely paper studies. Fundamental difficulties are often not exposed with the result that technical problems need to be solved in the engineering design phase following Contract Definition that could have been solved much better in an earlier phase.

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[2] Defense Science Board Task Force on R&D Management final report on "Study of DoD Weapons Systems Acquisition Process."

We believe that, in particular, we need to do the following:

1. Decouple a number of advanced development activities from Contract Definition approval, thereby separating the development decision from the procurement decisions.

2. Create "special management" environment for these selected programs.

3. Substantially increase the technical depth applied to these programs and demonstrate resolution to uncertainties.

4. Insure that transition from advanced development (Concept Formulation) to engineering development and procurement is technically and economically sound.

To achieve the designed emphasis on Concept Formulation, we recommend that DDR&E initiate certain specific management act ons.

1. Revise 3200.9[3] to emphasize the type of effort that is required in Concept Formulation.

2. DDR&E should designate a number of special programs which he believes as worthy of special management attention. These programs should fall into two categories: those which he believes are of major significance to our military posture and are likely candidates for large scale engineering development two to four years from now (AX, Advanced Manned Strategic Aircraft (AMSA), Airborne Warning and Control System (AWACS)); those which are advanced development mission oriented activities which relate to potential, but yet undetected, threats to the effectiveness of our systems (ABRES, Bomber Penetration, Submarine Survivability).

3. An Advanced Development Concept Paper (ADCP) should be written for these designated programs.

4. Establish a 6.3 line item for these programs and establish an SPO. The program manager and key staff for these programs should be appointed for their particular ability to carry on the advanced development or concept formulation

[3]DoD Directive 3200.9, subject: Initiation of Engineering and Operational Systems Development, dated 1 July 1965.

stage of technical effort. Consideration of a multi-Service program office (ABRES like) should be made, if appropriate.

5. Establish mechanism whereby the SPO can task laboratories for 6.2 support (multi-Service if necessary).

6. The ADCP should be updated semi-annually or annually, reviewed, and approved by DDR&E. Activities should include in-depth studies and analysis of alternate means of satisfying an existing or projected operational deficiency, develop and test "brassboard" or "functional" prototypes to demonstrate technical feasibility, develop and test "engineering" prototype to demonstrate engineering feasibility of the weapon system concept.

7. When it is judged that the system has adequate technical maturity to be ready for full-scale engineering development, a DCP should be written which includes a procurement plan, deployment plan, operational and maintenance plan, as well as thresholds on cost, schedule, and performance. At this time a system manager should be appointed with as much continuity in the technical cadre as possible.

Some rather obvious pitfalls in the approach suggested by the Panel are enumerated below:

1. By emphasizing the advanced development aspects of Concept Formulation, greater difficulty can be expected in insuring that the system concept is acceptable to the "user" when proceeding into Contract Definition and procurement.

2. Because of budget limitations in 6.2 and 6.3 categories, this concept may be vulnerable to inadequate competition in the innovative stages where it is most required.

3. Unless carefully planned and executed, we are vulnerable to start-stop-start fluctuation in the technical work force, thereby many re-inventions.

4. Unless carefully controlled, the "paper avalanche" can be applied to advanced development—a circumstance the Panel wishes to avoid.

5. Re-competition during various phases of this system can be more time-consuming and thus should be decided on a case-by-case basis.

6. Misinterpretations of the intent of "engineering" and "production" prototypes can lead to an inflation of the RDT&E budget by Service and OSD Comptroller personnel.

7. Changing program manager between Concept Formulation and Contract Definition can lead to unnecessary re-invention.

8. Unless carefully explained, the concept could be interpreted as more centralized control which is not recommended by the Panel.

9. DDR&E could be accused of not completely "thinking the problem through" since the ADCP does not contain the complete life-cycle analysis, estimates and coordination.

# SECTION III

## MANAGEMENT OF

## EXPLORATORY DEVELOPMENT/ADVANCED DEVELOPMENT

## BUDGET CATEGORIES

## MANAGEMENT OF 6.2/6.3 BUDGET CATEGORIES

The basic purpose of the overall DoD R&D program is to place timely, effective and least-cost systems and equipment into the hands of military forces for the preservation of national security. Relating to this discussion, the longer-lead-time elements of the overall DoD R&D program (i.e., part of 6.3 Advanced Development and 6.2 Exploratory Development) are specifically included in the scope of this paper.

The rationale for such a grouping directly stems from consideration of an important aspect of part of the 6.3 Advanced Development program. As emphasized in the Report by Panel A of the Industrial Advisory Council, 14 June 1969, and the Report of the DSB R&D Management Task Force on "Study of DoD Weapons Systems Acquisition Process," a primary result of technology must be the resolution of technical uncertainties and/or the verification of technical design and operational concepts prior to the initiation of Contract Definition (CD). Viewed in this light, part of the Advanced Development program becomes the very lifeblood of the Concept Formulation phase and is time coincident with it.

An important aspect of the remaining program technology involves technological lead time. From the time point of Contract Definition initiation, 6.3 Advanced Development leads by at least two to four years and 6.2 Exploratory Development by at least four to eight years. Hence, the key to a sound, well-constituted program of technology, which will truly support Concept Formulation properly, is the degree of relevancy the program has at any given time for hardware expected to be completed in two to twelve years. Under the circumstances, most of the 6.3 Advanced Development—being the closest to CD—must have a high degree of relevancy with current Concept Formulation needs. For Concept Formulation needs expected in the future, the most succinct and longest lead time way to obtain reasonable guidance for the balance of 6.3 Advanced Development and a large portion of 6.2 Exploratory Development involves the establishment of technology needs. Such needs can best be derived through participation in, and correlation with the results of carefully and competently conducted comprehensive studies/analyses of military missions, of specific systems and equipment, and of new and extended technologies, in the order listed, as available. To the technologist, transitioning technology into the inventory can be frustrating, and this often is

because analyses have not established how the new technology can make a vital difference in our military capability.

It is extremely important to recognize, however, that some of the 6.2 Exploratory Development is expected to be based primarily on the judgment of the laboratory director (and his people) who are laying out and conducting the work in the basic R&D establishments of the Services. Considering the ever-changing threat/technology/lead-time environment, no amount of analysis can ever fully delineate the scope of "needed" technology over the long time period involved.

As for the 6.3 Advanced Development, it is important to note that it consists of two major types. The first has to do with specific system concept formulation and attendant technology development/demonstrations, and is discussed in the Concept Formulation Paper. AMSA is an example of this in the Air Force; and for the last two years, Project Mallard has been in this phase in the Army. Other examples include F-15, Light Intratheatre Transport (LIT), etc. The dominant feature of this type of conceptual formulation development is that one foresees a specific product emerging that is likely to go into engineering development when conceptual and/or technical demonstrations are successfully completed. Overall system aspects are a driving force, through a combination of studies, parametric designs, point designs, and the development and demonstration of one or more key/critical elements of the system for the purpose of removing uncertainties, reducing risks, and making cost estimates more realistic.

The second type of advanced development involves system-oriented subsystems and equipments which initially pertain to a broad spectrum of systems that may be selected to perform military missions. Obviously, the development could end up in just one system/equipment or on the shelf. Examples of such advanced developments range from the very large, like ABRES, to smaller ones like advanced composite materials.

ABRES is an example of a broadly constituted subsystem program for the purpose of developing equipments to meet an evolving threat/environment. The vehicles may pertain to any of a family of missile boosters, such as Minuteman, Polaris, Poseidon, etc. Once the decision is made to proceed to CD, the appropriate new and old system program picks up the responsibility for completing the engineering development and deploying the total weapon. It is believed that several more large programs of the nature of ABRES, for other technical areas, should be established with some of the existing smaller 6.3 programs being included in the larger package. Such broadly constituted Advanced

Developments could also be handled like those under Concept Formulation (and the ADCP).

The example of advanced composite materials is likely not identifiable with any single specific system in its early phases, and is quite likely to support many, if not all, future systems entering Contract Definition. Here, the nature of the advanced development program is to bring along new composite materials (high strength/light weight), use them in cost-effective applications and develop all the knowledge and criteria necessary to let the systems designers know how to use it in simple and complex structures, to let the producers make it in quantity, and to be able to inspect it and repair or replace as required in inventory use. Advanced Development programs of this type would be included with the 6.2 Exploratory Development under a separate management process.

As indicated above, that part of the 6.3 Advanced Development program directly supporting Concept Formulation would be managed by the several managers involved in Concept Formulation. For the overall management of 6.3 Advanced Development and 6.2 Exploratory Development, a single point of authority should be designated by each Service. This single point of authority would be expected to be given full authority for these areas of development, including reprogramming authority, and he should be held accountable for results. On an annual basis, he would present to DDR&E the overall results and performance concerning the 6.2 and 6.3 development items under his jurisdiction with emphasis on improvements to military capability. Based on such results, DDR&E would be expected to allocate the following year's resources.

Concerning advanced development resources, it is anticipated that a substantial fraction (1/3 to 2/3) of funds currently allocated to the combination of Advanced Development and non-discipline Exploratory Development will be required for conducting the system concept formulation items. Unless a reasonably broad spectrum of both kinds of 6.3 Advanced Development can be funded successfully and staffed with capable people, progress on this technological front will be extremely spotty and the business of keeping options open and maintaining flexibility of choice will simply not be done. It must be remembered that even upon successful demonstration of hardware or concepts or the completing of actual experiments, with which every one concurred initially, that one is still at least two years from first complete article in the case of an equipment and five years from first complete article in the case of a system. If the world of national policy or threat changes sufficiently to make it undesirable to proceed, despite

successful demonstration, and the overall 6.3 program had to be reprogrammed in order to get the resources to do the unused but successful demonstration, then we will have to add several more years to the technological regrouping, repregramming, and demonstrating in order to get back to the firing line once again.

As for the 6.2 Exploratory Development area, the Williamstown summer study report by the DSB Panel on Research and Development, addressed the situation in July 1967, along with 6.1 Basic Research. About the only thing different today is that the situation has gotten worse. Although the funding curves appear to be nearly level or dipping modestly, the real situation is considerably more alarming. Based on a five per cent devaluation of the dollar, year by year, one finds that today's 6.2/6.1 program effective value in terms of the number of competent man years that can be paid for to do program work is reduced by about 40 to 50 per cent below that obtained at the 1962-1963 level.

Moreover, manpower reductions and hiring freezes imposed in order to live within the budget ceilings have had an increasingly deleterious effect upon Government laboratories in the never-ending process to replace the aging work force with new, better-educated young scientists and engineers. Although this problem particularly relates to the 6.2 and 6.1 areas, it will become increasingly more serious—especially as the recognition of advanced development as an important and even critical dimension of the concept formulation phase results in the necessity to associate more high quality in-house laboratory manpower with the work.

If all the high-quality laboratory people are engaged in conducting the latter phase of a particular concept formulation, then the quality of the long-lead-time technology to support other or future concept formulations will suffer.

# SECTION IV

## CONTRACTING POLICY

## CONTRACTING POLICY

### Introduction and Summary

The summer study group recognizes that a number of detailed studies have recently been made that pertain to this subject. We have used material from most of them but we have not attempted to discuss or review contracting issues, recommendations and findings in detail. Of particular importance as references are:

AIA Study, Essential Technical Steps and Related Uncertainties in DoD U.S. Development.

Cheatham Report, DSB Task Force on R&D Management. Haber Briefing (Mar '69), Mutual Problems Confronting the Technical Community in Weapon Systems Development and Acquisition.

These contributions deserve serious study and evaluation. Our purpose in this summary is only to emphasize the points that we believe to be particularly critical to the success of the Government's contracting policies. There is a need for a change in today's contract environment.

It is suggested in General Notes on Contracting Policy that:

1. DoD should issue a new policy statement along with guidelines so that contract administration is more consistent with real program goals.

2. DoD should rewrite Contract Formulation, Contract Definition and Source Selection Directives in policy form rather than as procedures.

3. DoD should recognize that DoD Directive 5010.23, Flexibility in the Management of R&D, will require follow up to insure that its implementation fulfills the purpose of the directive.

The section on Types of Contracting discusses the importance of tailoring the contract to the specific acquisition.

The Milestone Contracting section provides a rationale to support the recommendation that this procedure not be used.

The advantages of substantial pre-RFP (Request for Proposal) dialogue on technical matters and rationale of approach to contracting is covered in the section on Pre-RFP Procedures.

The final section covers The Competitive Environment and suggests that a major change in competitive procedures may be helpful.

It is clear that new policies are required to put flexibility into contracts for R&D programs which have major unknowns. It is also clear that a new look must be given to the proper distribution of finarcial risk among the contractors and the Government.

## General Notes on Contracting Policy

A great deal has been written about the lack of realism and flexibility in contracting and budgetary procedures as they evolved in the 1960's. It is not our intention to restate this material but, instead, to suggest emphasis and priority for attacking RDT&E acquisition problems.

We are concerned that during the 1960's, contractual policy environment was naive and frequently motivated by a sense of distrust—it assumed and directed that the best interest of the Government was served by having as many contracts as possible on a tough, firm fixed-price basis, often in disregard of real life uncertainty and risk. The environment of negotiation was played as if it were a game of bartering and coercion to force an assumed powerful, rich and clever industry into being honest and efficient for the first time. A contract can also be a positive mechanism to express the job to be done in clear and unambiguous terms, it can motivate efficient interaction for control, review and essential dialogue, and it can create a fair and just environment for the definition of performance specifications, incentives and constraints on risks and liabilities. In short, the creative and common sense nature of the contracting document was put aside for an oversimplified and arbitrary set of procedural rules for all development and procurement projects to follow regardless of need or fit.

To recognize the mistakes of the 1960's is one thing—but to overreact to them is equally bad. There exists today a strong appreciation and understanding of the many misuses of the fixed-price type contract and of the lack of system oriented development that was supposed to be inherent in the R&D process within Concept Formulation. However, the misuse of a management technique or tool is not justification for its rejection and a total return to a cost-reimbursable frame of mind and approach.

We feel that the contracting environment and its capability for assisting program management is badly misunderstood in the Department of Defense. Both Government and contractor top management appear to take too simplistic an approach in defining the values and objectives of the contracting phase. It is not recognized as a continuous reiterative process of negotiation, evaluation and possible change to accommodate new knowledge and facts that evolve from the development process. The use of standardized procedures, applicable to all programs simply is unrealistic. Flexibility in the selection of management tools and controls will provide an improved environment.

If the degrees of anticipated change in a program are great then clearly a cost-reimbursable type contract with heavy customer interaction is called for, but one should not lose sight of the fact that in the grey scale between uncertainty in a program development and relatively little uncertainty there is room for a flexible and common sense fixed-price, incentive-type contract with limited or bounded liability. Realism and the flexibility for competent judgment is needed in the contractual environment! If the state of our knowledge of requirements and the technology needed for achievement is precise enough and clear enough, it is true that both the customer and the contractor prefer a fixed-price type of contract. The chances of having a useful product and therefore a satisfied customer and being rewarded with a predictable profit are greatest under these conditions. It should be emphasized, however, that this situation simply does not prevail for high technical content programs encompassing extensive engineering development.

Achievement of a "good" contract should be a common challenge and objective to both the Government and the contractor. It requires an early, informal, and almost continuous dialogue—it is of equal importance to the achievement of a viable operational capability objective and a creative technical solution—none of which comes out of a sterile, procedurized and arbitrary environment. We need creative technical skills; we need creative management that leads and motivates; and we need a creative, common sense contractual interface between the customer and the contractor. Clearly the best contract will result from a tailoring of arrangements and requirements to the job to be accomplished. A good contract negotiation starts with a handshake and ends with a handshake; it is, above all, mutually profitable in its objectives of experience and achievement. We recommend that the distortions and oversimplifications of the 1960's be corrected in spirit, philosophy and intent. We

single out these important areas of policy that affect the contractual environment in its broadest sense:

Concept Formulation
Contract Definition
Source Selection

We recommend that each of the above be briefly described and oriented for policy guidance and that the tendency to procedurize in detail be curbed so that flexibility and judgment can again prevail. This then would create an environment in which the art and science of management can recapture its own chemistry, style, and sense of responsibility.

The prime target of criticism in recent months has been the total package procurement. The advantages sought for this type of contract are all commendable but there are two key problems that must be solved before it will be a successful process:

1. Rational and fair methods must be devised to permit schedule modifications in the event of major perturbations in the development phases.

2. Some means must be devised to balance the financial risk and the resources available to a contractor so that a single program cannot destroy an element of industry, since it is unlikely that any kind of profit scheme can be devised which would compensate for the loss potential of a large TPP (Total Package Procurement) program.

## Types of Contracting

Of the many groups who have studied this subject in the recent past, there is virtually a unanimous opinion that the contract types available to the Government are adequate. The problems which have occurred have been due either to improper selection of contract type or to poor implementation.

The problem would seem to start with the Armed Services Procurement Regulations (ASPRs) which state that the preferred type of contract is fixed-price and the least desirable type is cost plus fee. This has resulted in the fact that many high technical content programs encompassing extensive development were contracted for during the sixties on a fixed-price incentive basis. This trend led to the total package procurement concept and its overreaching long term commitments.

The well publicized, unsatisfactory experiences encountered in the RDT&E of weapon systems programs conducted during the past several years using fixed-price type contracts are testimony to the fact that they should not be used for high technical content programs requiring extensive development.

Legally, there is no difference in the change procedures, responsibilities, or degrees of technical control that can be exercised with fixed-price type or cost type. It is necessary, however, that agreement be reached on all the terms and conditions under which the contractual task is to be performed. The degree of difficulty in reaching such agreement may be quite different for each Service as well as the various organizational entities in any one Service. It is of interest that in Navy aircraft procurement, for example, no distinction in design, data, or demonstration specifications, or in guarantee and change procedures is made between cost-plus and fixed-price type contracts. However, the financial consequences and contractual relations are completely different.

Fixed-price contracting does involve greater discipline both within the Government and on the part of the contractor. It is essential that full agreement be reached on the scope of the task and that the responsibilities of each party be fully understood in advance. Some of the hard-to-define tasks which can be deferred under cost-plus type contracts have to be faced prior to the signing of fixed-price contracts.

The fundamental problem would appear to be, on the whole, the difference in attitudes and behavior of both Government and contractor personnel as a function of the contractual environment. The behavioral pattern during a fixed-price type contract has been characterized by rigidity, inflexibility, and the inability to respond effectively to changing requirements and the fiscal and economic environment.

This Panel strongly endorses the recommendation of the DSB Task Force on R&D Management that high technical content programs encompassing extensive development application of cost type incentive contracts should be used for the development phase.

## Milestone Contracting

"Milestone" contracting procedures have been introduced recently by OSD as a desirable step in the procurement process. As contemplated by the originators, the Government's funding and other contractual schedule commitments (such as a production option date) would be made a function of specific predetermined development accomplishments

termed "Milestones" rather than having the option date related to the calendar. As a specific example, the Navy was required to introduce such a contractual "Milestone" plan in the proposed S-3 contract. If any slippage occurred in one of the specified "Milestones," the Government would have the right to slip the option date and the entire subsequent schedule on a day-for-day basis.

The plan has the appearance of providing greater program control with go-aheads related to accomplishment. In actuality, contractual necessity for slipping the entire production schedule due to early and temporary development problems can cause significant and unnecessary cost increases. In addition, it may not be technically possible to select, define, and measure truly critical, single "Milestones" during a complex program. Extraordinary attention to accomplishing some selected event may well detract from the success of the development program as a whole.

The lack of enthusiasm for the "Milestone" approach as defined above does not mean that a planned schedule with many related milestones should not be a part of any development contract. Such milestones are indeed an inherent part of any rational development plan. The budget process normally leads the option release schedule dates by approximately a year. With the initial definition of a firm schedule (including related milestone events) and with progress reports to OSD and to Congress on a quarterly basis, it appears that the budget process itself will adequately control the program without contractual technical milestones. The important innovation should be the incorporation of contractual provisions to allow reasonable schedule flexibility without invalidating production options.

If contractual technical milestones appear to be required, it is suggested that the program probably has sufficiently high risk to justify only an R&D contract, probably CPIF, with no consideration of concurrent production or future fixed-price production options.

## Pre-RFP Procedures

One approach to improving industry-Government relations is to create an atmosphere and attitude on the part of DoD and the Services in which a dialogue is encouraged on the subject of the content of an RFP, before the RFP is released to industry. Such discussions should be between appropriate general management representatives and the content should include the approach to and type of contracting, terms and conditions, RFP characteristics and any other matters that clarify the objectives of the procurement for the mutual understanding of all.

The consequence of such pre-RFP dialogue could result in a more realistic assessment of risk and costs relating thereto. This type of review must be for policy determination only or the time required may prohibit this necessary exchange of judgment.

## Management Controls

Another suggestion is that something be done about the large numbers and types of management controls and data required by the Government as contrasted with those required by industry to conduct their business. In no way are we suggesting that the Government give up its authority and responsibility for the acquisition nor for the controls or monitoring capability, but rather to finding some middle ground between the extremes of too much and too little. One approach to the proliferation of—and oft confusing—requirements would be to ask industry to provide, in accordance with Government furnished criteria, their recommendations for the management controls and data for a particular project. This must be done outside the competitive environment to prevent bureaucratic organizations from giving black marks to those who attempt to free themselves from unnecessary and burdensome procedures.

In any event, it is recommended that the DoD proposed evaluation of management controls and data requirements, as used on several projects, be conducted with dispatch. The findings hopefully would identify the ultimate users and usage of the various documents, procedures and restrictive controls with the objective of comparing real needs with historic and arbitrary requirements.

## The Competitive Environment

In reviewing current R&D projects it is obvious that one of the most important factors in causing programs to be unrealistically optimistic in cost, schedule and performance is the environment within which these programs are created.

One can scarcely deny that industry has been guilty of unreasoned optimism in proposing some development programs and even total package procurements. The curious fact, however, was that in these instances all competitors were frequently equally optimistic—a sure signal that the competitive environment was driving all potential contractors into unrealistic commitments.

Several basic factors are worth considering in the situation which produces those results:

1. The Government is the only customer for many of these industrial concerns and if they missed a major cycle of procurement the character of the company would alter drastically and even higher potential costs would be incurred for start up when they next competed.

2. The eventual size of the market cannot be accurately predicted since it depends on the Service itself, the Congress, and the future international situation. The market is certainly not elastic like most commercial markets. That is, it does not expand when product prices are lowered.

3. Low cost is the most obvious and therefore the easiest measure in a competitive evaluation to explain to those who must approve the expenditure but have little insight into the complexities of development.

4. Evaluation by the "customer" now includes many "ilities" all of whom demand that their particular specialty requirements be fulfilled and guaranteed if the evaluation is to be successfully passed. The costs of fulfilling such requirements are only sketchily known and the liability for later product problems can only be accounted for by large contingencies, all of which diminish the liklihood of winning the competition.

5. Finally, this type of bidding pattern is relatively new and experience with it is only now showing the extent to which financial risk has been shifted from the Government to industry with no commensurate promise of profit to compensate. This risk exposure is now obviously a crucial element in the survival of companies which have served the Government well.

The Government is in possession of data and has the capacity for analysis to make reasonable estimates of how much a program should cost. With this knowledge it is suggested that competition from capable contractors on a technical basis alone should be sufficient for contractor selection. The Government, using its own data as a base, has enough monitoring capacity and negotiating skill to contractually agree with a selected contractor on a reasonable program. It can, of course, move on to the second place winner if the winning contractor insists on an unrealistically high cost program.

We recommend that competition for extensive R&D efforts be based on a technical basis only and that subsequent "Contract Definition" be a single contractor negotiation in which a major effort is made to cut down all reporting requirements that aren't absolutely essential. This would save both contractor and Government costs and provide an environment in which only the essential technical problems are addressed and the really necessary demonstrations made before production is initiated.

# SECTION V

## DEVELOPMENT CONCEPT PAPER

## DEVELOPMENT CONCEPT PAPER

The Development Concept Paper (DCP) was established in late 1967 as a vehicle for Secretary of Defense decisions on important development programs. The DCP is intended to be the source of primary information and rationale for such decisions. The central issues relating to divergent views, if any, are to be succinctly stated with each concerned element of DoD and OSD recommending their preferred course of action to the Secretary of Defense. It is also supposed to be a living document which is kept current throughout the life of the program. The Director of Defense Research and Engineering is designated as having the responsibility for preparing a DCP.

The DCP is intended to improve decision making and implementation on important development programs by increased assurance that:

1. The full military and economic consequences and risks of these programs are explored before they are initiated or continued.

2. Information and recommendations on these programs are prepared collaboratively or coordinated with all interested parties prior to review and decision by the Secretary of Defense.

3. The premises and essential details of his decision on these programs are regularly recorded and made known to those principally responsible for their implementation.

4. An opportunity for review is provided to the Secretary of Defense if any of the information or premises on which his decision was based change substantially.

Another way of expressing the purpose of a DCP is that it serves as a:

1. Historical record of the environment at a decision time.

2. Contract between the Secretary of Defense and a Service Secretary

3. Communication instrument.

To date, approximately 75 programs have been selected for the DCP procedure. One or more drafts on many of these programs have been prepared but to date only some 25 DCPs have been approved by the Secretary of Defense—5 during 1969. It is believed that very few of those approved by the Secretary of Defense reflect the current circumstances under which the program is proceeding, principally due to budgetary decisions relative to the FY '70 budget.

The Panel has examined the purpose and implementation of the DCP procedure. There is widespread agreement with the DCP concept in that it provides a common frame of reference for all of DoD. However, there is also general agreement that the DCP is not adequately serving the purposes for which it was designed.

The environment in which the DCP must operate is shown in Attachment 1. As presently constituted, the DCP cannot compete timewise with other internal DoD decision mechanisms because it requires more coordination.

Most program decisions, in the final analysis, are reflected in decisions made on the budget. It does not appear that the DCP procedure is now dynamic enough to be used during the budget process (briefly outlined in Attachment 2) except to the extent that the budget for a program is consistent with an existing DCP. Budget reviews and decisions are so constricted by time as to effectively prohibit DCPs or revised DCPs from being prepared as the budget on a given program is adjusted upward or downward in the dynamic process. To the extent a budget on a program remains consistent with an existing DCP a strong tool exists to support the budget estimate.

There are six primary problems which seem to limit the effectiveness of the DCP. These are:

1. There are different motivations on the part of the signatories which make it extremely difficult to process a DCP in a reasonable period of time, if at all.

2. Within each signatory organization viewpoints can vary widely between the initial level of coordination and the final signature level, which results in long delay.

3. In the initial preparation of a DCP there often exist inconsistent analyses on threat projections, threat effectiveness and system cost effectiveness of various U.S. responses. Reaching agreement is a time-consuming process.

4. The rationale for decisions on well established programs cannot adequately be reconstructed, making it almost impossible for the DCP to serve as a historical record on these programs.

5. The inclusion of force and production implications of a development program is often required too early and complicates the coordination process, as well as causing commitments to Congress prematurely.

6. The inability of the DDR&E to devote adequate timely attention to a DCP and those management issues which must be resolved with other organizations prior to submission to the Secretary of Defense.

In examing the problems associated with the DCP, it appears that the following may offer some assistance in the alleviation of problems associated with the DCP.

1. Give up the requirement to write a DCP on a well-established program except where a significant change is proposed. When written, the historical environment should not be recreated—the proposed change should be based only on current environments and threats.

2. In order to restrict the problem of creation of a large number of DCPs, it is suggested that the criteria for requiring a DCP be re-examined. The current criteria are related to an arbitrary expenditure level. It is suggested that if no management issue worthy of SecDef attention exists, then a DCP not be required.

3. The DDR&E be permitted to process changes to a DCP, judged by him to be relatively minor, without the necessity for reopening the whole rationale for a program by coordination with all of the original signatories.

4. Permit the various mechanisms, such as contained in Attachment 1, (if coordinated) to update a DCP without the necessity for processing a revised DCP.

5. Create an Advanced Development Concept Paper (ADCP) which applies to selected mission-oriented advanced development programs prior to approval to enter into Contract Definition. These ADCPs should be prepared and approved by

DDR&E and coordinated only with organizations and levels judged by DDR&E to be required. Such ADCPs should be signed by the appropriate Service Secretary or his designee and would represent a contractual agreement between OSD and the Service. The ADCPs need not include production implications, logistic implications or force level, but should include rationale for satisfying an existing or projected operational deficiency. The ADCP procedure should apply through Concept Formulation, the contents of which are described elsewhere in the Panel report.

The current DCP procedure should be utilized at the point of entering into Contract Definition.

6. The DDR&E must be willing to delegate authority to negotiate and compromise on a given program when he is unable to devote personal attention to a DCP or ADCP.

7. Request the Secretary of Defense to discipline his decision actions by consistent use of DCP vehicle on applicable programs. The DCP cannot remain a viable document unless used.

ATTACHMENT 1

## Current Decision Mechanisms and Influences

A. Mechanisms

Draft Presidential Memorandum (DPM)/Program Budget Decision (PBD)
Letters or memos from Service Secretary to Secretary of Defense
Response to Joint Strategic Objectives Plan (JSOP) by letter or DPM
Program Change Requirements (PCR)/Program Change Decision (PCD)
Congressional action by statute
Development Concept Paper (DCP)/Program Change Decision (PCD)

B. Influences

Special pleading by Services/JCS/OSD elements
"In and out of channel" inputs to Congress
President's Science Advisory Committee inputs to the Secretary of Defense
Bureau of the Budget input to White House/Congress
White House inputs to the Secretary of Defense
Defense Science Board inputs to the Secretary of Defense
Industrial inputs to the Secretary of Defense/Congress
Congressional inputs to the Secretary of Defense
General Accounting Office inputs to the Secretary of Defense

ATTACHMENT 2

## Budget Process in Summary

Tentative program guidance/DPM

Service submission

ODDR&E review (coupled with Comptroller, Systems Analysis, and Bureau of the Budget (BoB) review)

Tentative DDR&E decision

Service reclama

DDR&E submission to the Secretary of Defense

BoB/Secretary of Defense review

Secretary of Defense to White House through BoB

President to Congress

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| Congressional review ) | During this period, the Services update budget estimates and submit an apportionment request which is reviewed by DDR&E, other OSD offices and BoB. |
| Congressional authorization ) | |
| Congressional appropriation ) | |

BoB/DoD apportionment