

This PDF is a selection from an out-of-print volume from the National Bureau of Economic Research

Volume Title: Public Finances: Needs, Sources, and Utilization

Volume Author/Editor: Universities-National Bureau

Volume Publisher: NBER

Volume ISBN: 0-87014-303-4

Volume URL: <http://www.nber.org/books/univ61-1>

Publication Date: 1961

Chapter Title: Defense Planning and Organization

Chapter Author: Alain C. Enthoven, Harry S. Rowen

Chapter URL: <http://www.nber.org/chapters/c2279>

Chapter pages in book: (p. 365 - 420)

Defense Planning and Organization

ALAIN ENTHOVEN and HENRY ROWEN

THE RAND CORPORATION

Preface

SINCE this paper was written expressly for an audience of professional economists, we felt free to use the technical language of formal economic theory. Those readers who are not economists are warned that some of the words used in the paper, such as "efficiency," are used in a definite technical sense and not in their more general meanings.

This is an exploratory essay on the organization of the Department of Defense. We use the word "organization" in a broad sense, to include not merely the assignment of roles and missions, but rather the whole set of mechanisms through which the business of defense is conducted. In this essay we attempt to do three things. First, we explain what we think are some of the shortcomings of the present organization. Next, we consider the general question of intelligibility of defense allocation problems. Finally, we develop some of the implications of the principles we have discussed, and we put forward a few practical suggestions.

Defense organization is a controversial subject. Being aware of this, we ask the reader to keep in mind three disclaimers. First, we believe that the problems of choice in defense are intrinsically difficult. The uncertainties in political, strategic, and technological factors are usually great, and the pace of technological change is especially rapid. Our views on defense organization are influenced a good deal by a realization of our own fallibility in dealing with these problems. Second, we believe that the failings in our defense organization are to be attributed mostly to the difficulty of the problems and to the system, not to the people involved. The people directing our defense establishment are honest, patriotic, of above average intelligence, and they work extremely hard for limited rewards. Finally, our conclusions are still tentative. We regard this paper as a vehicle for discussion and as a progress report on our thinking on the matter, not as a definitive statement of our point of view. In fact, since the writing of this paper, we have come to feel that we understated the harmful effects of interservice rivalry.

We have benefited, in the preparation of this paper, from discussion

with and criticisms and suggestions from Gene Fisher, C. B. McGuire, Charles Hitch, Malcolm Hoag, Burton Klein, Roland McKean, Charles Lindblom, William Niskanen, Thomas Schelling, William Taylor, Albert Wohlstetter, and Charles Wolf. We would like to acknowledge gratefully their assistance.

1. Introduction

Since the end of World War II, there has been a widespread and growing belief that the organization of our military establishment has not been satisfactory. This has not been changed by the various reorganizations which have taken place during the past decade. It is possible to identify two points of view or schools of thought on the shortcomings of defense organization and what ought to be done about it. One school includes among its members President Eisenhower, Secretary of Defense McElroy, Henry Kissinger, and the authors of the Rockefeller Report. At the risk of some oversimplification, their point of view might be summarized roughly as follows: The roles and missions of the separate Services are defined in terms of modes of transportation rather than by missions or purposes which are relevant to the strategic problems of the day. This situation has prevented the development of unified strategic planning to accomplish broad military objectives, it has encouraged "wasteful" and "harmful" interservice rivalry, rivalry which has also diverted attention away from the important problems, and it has led to an undesirable amount of "duplication and overlap," particularly in research and development. Although complete unification of the Services would not be politically feasible because of the power of vested interests, both in the Services and in Congress, an end to interservice rivalry brought about by unification would be desirable and we should move as far in that direction as political realities will permit.

In April 1958, President Eisenhower made a series of proposals for defense reorganization, and a bill providing for them was introduced into the Congress. The President's message suggested very strongly that the cause of the difficulties in the defense organization was to be found in the rivalry and in the "duplication and overlap" between the separate Services.¹

¹ The following paragraphs are illustrative.

"The products of modern technology are not, in many cases, readily adaptable to traditional service patterns or existing provisions of law. Thus there has tended to be

Writing in *Foreign Affairs* a year earlier, Henry Kissinger also put the blame for the failings of defense organization on interservice rivalry: "In the absence of doctrinal agreement, interservice disputes can be resolved only by compromises which may define merely the least unacceptable strategy or by adding to the number of missions and weapons systems."² The Rockefeller Report on the problems of defense took a similar view. It listed the following as the three defects in defense organization:

"The roles and missions assigned to the individual military services have become competitive rather than complementary because they are out of accord with both weapons technology and the principal threats to our national safety; the present organization and responsibilities of the Joints Chiefs of Staff preclude the development of a comprehensive and coherent strategic doctrine for the United States; the Secretary of Defense is so burdened with the negative tasks of trying to arbitrate and control interservice disputes that he cannot play his full part in the initiation and development of high military policy."³

If the blame can be placed on interservice rivalry, then the corollary must be that unification is desirable. What can be said for disunity? Must not the opponents of unification be partisans of special interests? This seems quite clearly to be the view of Kissinger:

"It would still be the wisest course to move in the direction of a single service initially by amalgamating the Army and the Air Force.

² Henry Kissinger, "Strategy and Organization," *Foreign Affairs*, April 1957, p. 385.

³ *International Security—The Military Aspect*, Special Studies Report II of the Rockefeller Brothers Fund, New York, 1958, p. 27.

confusion and controversy over the introduction of new weapons into our armed forces and confusion and controversy over the current applicability of long-established service roles and missions.

"... Confronted by such urgent needs, we cannot allow differing service viewpoints to determine the character of our defenses—either as to operational planning and control, or as to the development, production, and use of newer weapons. To sanction administrative confusion and interservice debate, is, in these times, to court disaster. I cannot overemphasize my conviction that our country's security requirements must not be subordinated to outmoded or single-service concepts of war.

"... While at times human failure and misdirected zeal have been responsible for duplications, inefficiencies and publicized disputes, the truth is that most of the service rivalries that have troubled us in recent years have been made inevitable by the laws that govern our defense organization."

See "The President's Reorganization Plan," *Air Force*, May 1958, pp. 103-8.

The strategic problems of the Navy may remain sufficiently distinct not to require integration and in any case resistance to complete unification in the Navy would be so bitter as to obviate its advantages.⁴

There is an alternative point of view that we consider deserving of at least equal attention. Briefly stated, it is that the fundamental defects in defense organization are to be found largely in the inadequacies of the mechanism of choice among alternatives in research and development, in procurement and operation, and in the allocation of the defense budget in general. While some of these inadequacies stem from the existing lines of division of the Services and from interservice rivalries, most would remain and some perhaps even worsen if there were complete unification. Thus, unification is neither necessary nor sufficient for improvement, nor is it necessarily desirable. Indeed, interservice rivalry has some real benefits. What may be needed is an improvement and strengthening of the system that will channel interservice rivalry into more productive outlets. Although we do not profess to know exactly how it should be constructed, a mixed system which includes both strengthened unified commands, defined in terms of purposes, along with the traditional Services, has the possibility of capturing the advantages of competition among the Services and the advantages of organizations defined in terms of missions which correspond to current strategic requirements.

This is not to suggest that interservice rivalry has no harmful effects. The separation of responsibility for missions that depend for their execution on the closely knit interaction of forces from two or more Services has made efficient planning extremely difficult. The problems of continental air defense or of limited war operations, for example, are very complex and would be taxing even if there were no service rivalries to contend with. One result of these rivalries is that much of the staff of each of the Services is busy, in effect, developing debating points to be used against the others. Moreover, interservice rivalry strengthens a tendency toward underestimating the costs and overestimating the performance of both old and new weapon systems, and encourages each Service to compete with the others, in the public press, in making exaggerated claims in its own behalf—claims that cannot easily be controverted because of the limitations imposed by the requirements of secrecy. These effects are

⁴ Kissinger, *op.cit.*, p. 390.

serious. They have been recognized and some improvements have been made by the Administration and the Reorganization Act of 1958 through the strengthening of command channels and the authority of the Secretary of Defense.

However, it is important to recognize that a single command structure of the kind that is needed for fighting a war is not necessarily the best structure in peacetime for developing a flexible capability to meet a wide range of contingencies over the long term. As the House Armed Services Committee observed in its Report on the Defense Reorganization Act of 1958, such a command structure is efficient in time of war because it suppresses alternatives and reaches decisions quickly.⁵ But in peacetime, as technology and international conditions change in ways difficult to predict, it is important that alternatives be developed and that old choices be continually reconsidered. One of the most important things any defense allocation mechanism should do is to help prevent gaps from appearing in our capability. We need a broad spectrum of capabilities because the enemy, free to apply pressure at the weakest point, can choose the form in which he will challenge us. If anything, we should err in the direction of duplication. But rather than charge one group with responsibility to think of all important contingencies, it seems to us safer to have an organization in which competing groups have an incentive to think of gaps that need filling along with a central staff able to choose among the alternatives offered. Thus, it is valuable to have the separate Services "looking for business," trying to expand and take on new jobs. The solution to difficult problems of choice cannot be found by changing the system so that it will not develop alternatives. Human limitations being what they are, there is good reason to believe that a decentralized competitive system, in which people have incentives to propose alternatives, will usually meet this test more effectively than a highly centralized system.

The values to be found in interservice rivalry, then, are the values of competition. We need diversity, experiment, discussion, and criticism (the motives for the criticism are not the important thing). Competitive incentives can act as a powerful stimulus to change and improvement, a stimulus which helps to offset the inertia of bureaucracy. But, one may ask, doesn't competition with the Soviet Union provide enough stimulus? The answer is that the Soviet

⁵ *Department of Defense Reorganization Act of 1958, Report, Committee on Armed Services, House of Representatives, Report No. 1767, May 22, 1958, pp. 27-8.*

challenge often seems too distant and hypothetical and uncertain, whereas the possibility of losing part of the budget to a sister Service is a clear and present danger.

Even some of the apparently unpleasant facets of the rivalry serve very important purposes. In the absence of periodic wars, critical discussion must play an important role in exposing error and inefficiency. The competing Services have not only the incentives but also the military expertise to be each other's critics. The famous B-36 hearings are a good example. This episode was valuable in raising questions and stimulating discussion about the missions and performance of the Navy's supercarriers and the Air Force's B-36's. Whether the motives of the Services are purely patriotic or tinged with self-interest is less important than that the discussion take place. Moreover, criticism inspired by self-interest has the advantage of being persistent. In the absence of the separate Services, our defense programs would not have the benefit of as much expert military criticism.

It is interesting to note that the House Committee on Armed Services was particularly aware of these points. The introduction to the Committee Report emphasizes that

“Our defense organization must be flexible; it must be responsive to rapidly changing technologies; it must be dynamic and versatile; it must have our national survival as its one and only objective. But the organization of our defense system must also recognize certain fundamental concepts that do not change. It must at all costs be capable of correct decisions. Those decisions must represent the divergent views of several military experts, not the doctrine of one individual It must at all costs retain the capability to meet any type of aggression, not merely one type of aggression.”⁶

The existence of the separate Services with their own traditional interests provides a stability in military policy that can often be very valuable. Mankind is often the victim of fashion. For example, the view that nuclear weapons provided a solution to our principal military problems, to limited as well as general war, has been widely held. It received its initial impetus from our atomic monopoly and, later, from the “more bang for a buck” principle adopted by the Administration. Accordingly, there has been a premium on all-out

⁶ *Department of Defense Reorganization Act of 1958, Report, op.cit.*, p. 2.

war capability and our limited-war forces have been cut back. Those branches of the Services with limited-war forces resisted the cuts in part by trying to show that they too had atomic delivery capabilities and should therefore be counted as all-out war forces. Though this has left the United States weak in conventional, limited-war forces, the situation might well have been worse if there had not been some organizations vitally interested in conventional warfare whose members believed that they had an important and unique contribution to make to that mission. Because the aggressor can, to a large extent, choose his weapons, it is better to be too slow than too fast about discarding apparently obsolete missions. This is a useful aspect of vested interests.

It is curious that, although interservice competition has probably stimulated development of better weapon systems than would otherwise have been produced, as well as the development of new tactics and doctrine, (e.g., the remarkable development of the Sidewinder air-to-air missile in competition with the Falcon; the development by the Marines before World War II of amphibious techniques later adopted by the Army), competition in the field of research and development seems almost universally agreed to be the most undesirable feature of interservice rivalry. For example, in his address, the President emphasized that "The Secretary must have full authority to prevent unwise competition in this critical area. He needs authority to centralize, to the extent he deems necessary, selected research and development projects under his direct control. . . ."⁷ In this, the President was following one of the recommendations of the Rockefeller Report.⁸

In commenting on the effects of the Reorganization Act of 1958, Secretary McElroy provided his hearers with an insight into the way he views the problems of research and development management.

"However, I believe that there will be savings and I think they can be quite substantial, principally in the direction of a more orderly development of new weapons through better over-all supervision and direction of the research and engineering program which should be supplied by the newly authorized Director of Defense Research and Engineering. There has been some coordination in this area in the past, but *our real problem is to avoid getting started on research*

⁷ "The President's Re organization Plan," *op. cit.*, p. 107.

⁸ See *International Security—The Military Aspect*, *op. cit.*, p. 33.

programs that are duplicative, overlapping, or of marginal usefulness. Once a thing gets moving down the road, it is very hard to stop it. . . . Then you get contractors involved, vested interests, and all kinds of other considerations which you understand. The thing that is important in order to avoid getting into duplication and waste is to think it through right at the very beginning." (Italics added.)⁹

As we pointed out earlier, the solution to difficult problems of choice cannot be found in simply not developing alternatives, as Secretary McElroy would seem to suggest. Again, the problem lies largely in the method for making choices and enforcing decisions, and the solution must be found here, in strengthening and improving it. Rather than preventing duplication of research projects, research and development policy should aim at preventing the creation of a few, large-scale programs, which large and powerful interests will want to preserve, before the major uncertainties have been resolved and before sound choices can be made. As Admiral Rickover put it "There ought to be a 'chopper-off'er' in every research and development organization who chops off complete developments or parts of them."¹⁰

In research and development, we should want competition, duplication, and overlap because research and development deal with matters that are uncertain and unpredictable, and duplication and overlap is the price we pay for the reduction of uncertainty. It simply is not possible "to think it through right at the very beginning." If it were, it would not be research. As Burton Klein has argued, "research and development is being crippled by the official refusal to recognize that technological progress is highly unpredictable, by the delusion that we can advance rapidly and economically by planning the future in detail."¹¹ In an uncertain and rapidly changing world, what we cannot afford is to be without alternative means of doing important jobs. The single way without alternatives is the expensive way; the costs are the undiscovered cheaper ways of doing the job.

⁹ Department of Defense Appropriations for 1960, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 1959, pp. 194-5.

¹⁰ See *Inquiry Into Satellite and Missile Programs*, Hearings Before the Preparedness Investigating Subcommittee of the Committee on Armed Services, United States Senate, Part 2, 1958, p. 1435.

¹¹ See Burton Klein, "A Radical Proposal for R. and D." *Fortune Magazine*, May 1958, p. 112.

2. *The Defense Economy*

The defense economy is more like the economy of a college student being supported by his father, than like the economy of a household trying to allocate its expenditure efficiently within a fixed set of income possibilities. The college boy may receive a set allowance to cover minimal living or operating expenses, but beyond that he must persuade his father of the value of particular projects for which he wants financial support. One day he may want a set of new law books, another day a new automobile. How much he gets will depend on how much he asks for, how he plans to spend it, and also on how he has spent his money in the past. The important characteristic of his economy is that he does not attempt to allocate optimally within a fixed budget constraint. Because the typical father considers himself to be the moral guardian of his son, budget level and allocation are inseparably tied together, and it would not be rational for the son to ignore this.

The independent household, by way of contrast, generally has a fixed set of income possibilities, and it must attempt to allocate efficiently within them. Within rather broad limits, the employer, unlike the father, is not concerned with the allocation of the employee's income. This is not the case in the Department of Defense. The military departments estimate their needs or "requirements" and then send them on to be joined with the requests of other departments. These requests are not determined on the basis of a pre-existing budget constraint which is assumed to be binding and unchangeable. The military departments, like the college boy, know full well that how much they get depends very much on what and how much they ask for. During the allocation process, various agencies, such as the Service staffs, the Defense Comptroller and Assistant Secretaries, the Bureau of the Budget, and then the Congress, try to "weed out" requests for things which they deem to be unnecessary, while the military departments defend their requests as being in accord with their "needs if they are to be able to defend the United States." The question of efficient choice among alternatives is rarely raised, even when appropriate. Rather, both budget allocation and level are determined by a never-ending process of bargaining; that is, a series of exchanges of offers and counteroffers, sometimes explicit and sometimes implicit, pertaining to budget level, allocation, and effectiveness. What the participants in this process

say and do must be judged by the effect of their actions on the over-all results, and not simply on the assumption that each alone is making the decisions.

A. SOME VIEWS ON DEFENSE ALLOCATION

A regrettably widespread view of the nature of efficient choice in defense allocation, and one which should be disposed of quickly, is that it is primarily one of efficiency in the small or avoidance of "obvious waste," for example, one service selling as surplus and at a low price supplies which another service is buying new, or people sitting about with nothing to do, or duplication and overlap in research and development. Congressional hearings on military appropriations provide ample evidence that problems of this sort consume a great deal of energy at the expense of more important issues. By efficient choice, we mean allocation of the budget and other scarce resources in such a way as to maximize the relevant output. Efficient choice is concerned primarily with decisions as to whether or not to adopt alternative programs, secondarily with how well the programs are run. Genuine efficiency, in our sense, may generate apparent waste. For example, the cost of improving the coordination of all of the military departments and organizations in their buying and selling may exceed the extra savings which can be obtained thereby, in which case it would be better to tolerate the apparent waste than to try to correct it. (Unfortunately, the potential savings are likely to be more easily identifiable than are the costs.) Or again, apparently wasteful duplication and competition in research and development are popularly regarded as evidence of inefficiency. The problem of allocating defense expenditure wisely is far more subtle and difficult than mere identification of apparent waste.

One major school of thought which seems to have more adherents in the military than elsewhere follows what might be called the "requirements approach." During the Symington Committee Hearings of 1956, Senator Goldwater illustrated its view very neatly.

"If I have any criticism of the Air Force since the second war, it has been their seeming timidity to put down on paper what they want and then let those of us who believe in them fight for that amount, and let the money take care of itself.

"I have felt for a number of years that we were not approaching the total Air Force properly and that goes probably over ten years,

that we ought to say we need X number of air planes and X number of men to do the job.

"I am convinced that if we can come up with a figure like that the American public will back it and we can provide it.

"I do not necessarily mean that we need 10,000 air planes or a thousand air planes.

"Certainly these professionals know what the figure is, and if we can convince the top commanders in the services to come up with it, we can get a balanced, over-all program."¹²

The essence of the requirements approach is that there are certain absolute needs, stated in terms of military hardware and manpower which must be met regardless of cost, if the security of the United States is to be guaranteed in some absolute sense. Taken seriously as a set of principles for the determination of the level and allocation of the defense budget, this approach has major shortcomings. It is based upon a failure to recognize that both we and our opponents have a wide range of alternatives from which to choose to accomplish any objective, and a failure to recognize the existence of the uncertainty, both strategic and technological, intrinsic to military planning. It contains the implicit assumption that the world is deterministic. The concepts used are drawn more from engineering ("technical requirements") than from economics ("efficient choice") and the theory of games ("alternative strategies"). It assumes that intelligence makes estimates of the enemy "threat" for various future dates, and that these are point estimates, not interval estimates. The possibility that the enemy may choose to do something different—perhaps influenced by our own choices—is ignored. The estimates are handed to the military planners who calculate the forces "required" to overcome this fixed enemy, and the results become our military requirements. The uncertainty in our estimates and the uncertainty in the performance of our future weapon systems is ignored.

The requirements approach is not the same thing as the specification of a set of objectives and the determination of the minimum cost method of achieving them. The two differ in several ways. First, in the requirements approach, costs are considered irrelevant except for purposes of a rough check of fiscal feasibility. Second, there is little if any systematic consideration of alternatives. Third,

¹² See *Study of Airpower*, Hearings Before the Subcommittee on the Air Force of the Committee on Armed Services, United States Senate, 1956, pp. 230-1.

the requirements are stated in terms of military hardware and manpower rather than in terms of purposes or objectives. They are thus stated in a way which predetermines the means and precludes consideration of alternatives. There is little need to dwell on the fact that here is a series of misconceptions. There is nothing absolute about national security. We attempt to reduce our insecurity by spending money on national defense. The real issue is, considering the other demands on our resources, how far and by what means can and should we reduce it. There is no possibility of eliminating it altogether.

As a position in the bargaining process, the requirements approach is a convenient way of presenting and defending requests for resources. By proceeding from the hypothesis that what has been requested "is necessary if the job is to be done," the bargainer can portray any cut in his program as a threat to national security. Programs are presented as entities with strong internal interdependencies, whose contents are all of equally high value, and whose value will be impaired seriously if tampered with. An implicit denial of the existence of alternatives makes possible the avoidance of the notion of marginal items. By avoiding discussion of marginal items, it is possible to direct attention away from the relationship between costs and benefits at the margin, where it would be possible to discuss intelligently changes in the scale of the program, and to focus it on the much less relevant total value of each program. If the issue is total acceptance or rejection, in the case of many military programs the security of the United States *will* be at stake.

Another popular conceptual framework for dealing with problems of allocation in defense is a variant of the requirements approach—the use of the priority list. The priority list seems to be favored by Congress because it is a way of attempting to force the exposure of marginal items and of getting some insight into what is really of greater and lesser value in the program under discussion. Of course, the demand for a priority list, if it is for this purpose, is vulnerable to a fairly obvious counter. The relative priorities can be adjusted so that the items at the bottom of the list are either of obvious and substantial military value or known to be favored by an influential congressman. In other cases, the priority list is an instrument used by the Services to increase the budget level. The organization using the priority list insists on its number one priority item until it gets it, and then points to all the complementary things that are needed to make it work properly.

As an instrument for allocation, the idea underlying the priority list is that all projects or expenditures can be ranked in order of their priority, so that when the budget level is determined the projects to be funded will be revealed automatically. This overlooks two important possibilities. First, at a higher budget level it may be better to spend the extra money on modifications of, or increments to, items included in the program at a lower budget level rather than on the next items on the list. Second, given a larger budget, it may be rational to drop out some items included in the smaller budget, replacing them with better ways of accomplishing the same purpose. In fact, with larger budgets we may find it desirable to change some programs in very fundamental ways.¹³

In their bargaining for larger budgets, the Services find themselves opposed by a group of people whose attention is riveted almost exclusively upon costs and the budget. We may describe the views of this school as "budget first." It is possible to distinguish at least two variants of this view. One group holds that national security is best served by a healthy economy, and that the health of the economy would be seriously impaired by further increases in government spending.¹⁴ They would argue that if the defense budget were increased substantially the inevitable consequence would be inflation and bankruptcy. Now there is no possibility of bankruptcy of the federal government in the literal sense. But the danger of inflation is a real one. However, at least within the range under consideration, there is no question but that the extra inflationary pressures of increased defense spending could be offset by tax increases. There is no basis in fact for the argument that we cannot afford more defense spending. We can afford more. The real issue is one of balancing extra sacrifices against extra gains.

The other budget first group, whose members are to be found, for example, in the Bureau of the Budget and in the office of the Comptroller of the Department of Defense, conceives its job to be entirely a matter of holding the line on the defense budget. In the bargaining process they are the custodians of the budget, just as the Services are the custodians of military effectiveness. The essentially limitless

¹³ For one example of the misconception of what a priority list can do, see the discussion in *Military Construction Appropriations for 1958*, Hearings before the Subcommittee of the Committee on Appropriations, House of Representatives, 1957, pp. 416-27.

¹⁴ For a good example of this position, see the Interim Report of the Cabinet Committee on Price Stability for Economic Growth, *The New York Times*, June 29, 1959, p. 16.

demands of the Services and the inevitable limitations on total expenditure place the Comptroller and the Bureau of the Budget in a strategic position. Someone has to reconcile the competing demands with the limited resources available, and the Services are unwilling to do it because this would mean tacit acceptance of the existing budget level. ("If they can live within the budget they have, then they don't need more.") And, in a sense, this reconciliation *is* the formulation of defense policy, since this is the place at which choices must be made, and to make choices is to determine policy. However, both the Comptroller and the Bureau of the Budget are handicapped in the performance of this reconciliation in two ways. First, neither in principle nor in fact do they have the military expertise of the Services. This means that they are without adequate criteria of military effectiveness for determining where programs should be cut. As a consequence, political resistance often seems to be the criterion employed. If the defender of a program shows any uncertainty or lack of determination, he is likely to find his program cut, and this perhaps quite independently of its merits. Second, the focus of attention is inevitably on the current budget since it is within the current budget that choices must be made. Next year's budget is always a year away, and both sides feel, quite correctly, that anything can happen between now and then. The budgeteers are neither in a position to bargain over questions of current allocation insofar as they affect future budgets, nor do they seem to us to be particularly interested in doing so. As a result, present expenditures which will bring about future net savings tend to be neglected.

If the requirements approach and budget-first views are unbalanced, what is a balanced view? Only a brief sketch can be given here. Broadly speaking, our defense objectives derive from higher goals of national policy. We wish to defend the United States and its allies from attack and to provide for a secure and just peace in the world. These goals can be furthered, though not achieved absolutely, by our defense establishment. The defense establishment pursues lower level objectives, such as defense of the United States against bomber attack, which promote the achievement of national security goals. Generally speaking, our defense objectives cannot be achieved absolutely either. It is always a question of more or less. Our society, on the other hand, has limited resources, whence it cannot do everything that would otherwise be desirable. Part of these resources,

measured by the budget limitation and other constraints, are turned over by society to the defense establishment for the purpose of achieving the various national defense objectives. It should be the task of the defense establishment to allocate these limited resources in such a way as to achieve as much as possible of that combination of defense objectives which brings us closest to the achievement of the goals of our national policy.

For any combination of defense objectives, an allocation of the budget can be described as *efficient* if there is no alternative allocation which does at least as well with respect to all objectives and better with respect to some. Efficiency is a standard by which we can evaluate how well the budget is used. As a practical matter, we cannot hope to reach perfect efficiency, or even anything very close to it. The problems are too difficult for that: our objectives are not that clear, and the technology with which we achieve them is changing too rapidly. But we can hope to avoid gross inefficiency in the sense of avoiding choices which are inferior, unambiguously and by a large margin, to other alternatives open to us. And we can hope to make improvements, in the sense of reallocations within the same budget and other constraints which leave us in a better military position. Above all, we can hope to avoid the worst kind of inefficiency, the situation which leaves us with completely open gaps in our capabilities which are exploitable by an enemy. The concept of efficiency relates the achievement of our objectives to cost and to the budget. Whatever the interests of the contending parties in budget level and defense effectiveness might be, they should have a common interest in efficient allocation, that is in spending whatever budget is agreed upon in such a way as to maximize military effectiveness, or, what amounts to the same thing, in achieving whatever level of the objectives has been agreed upon at minimum cost.

B. CONFLICT OVER BUDGET LEVEL AND THE EFFICIENCY OF ALLOCATION

We have examined briefly the language of defense allocation and found it lacking. One school emphasizes effectiveness and does not give adequate attention to cost, particularly the cost of alternatives. Another emphasizes cost and the budget at the expense of military effectiveness. However, we do not want to place ourselves in the position of criticizing the defense allocation process on the grounds that nobody is trying to do the right thing, much less on the grounds

that what people say does not suggest that they are doing the right thing. It is altogether possible that even though no individual appears to be taking a balanced view and attempting to allocate the budget efficiently, the process may be producing satisfactory results. Charles E. Lindblom has made the point that "... the notion that to accomplish a social objective someone must try to accomplish it degenerates into a proposition that most of us would reject at once—that only do-gooders do good."¹⁵ Moreover, if the process does produce satisfactory results, it might well be positively undesirable that any of the participants in the process individually take a larger view. If the Bureau of the Budget were to forget its preoccupation with the budget and worry about military effectiveness, we might soon find ourselves with an undesirably large defense budget; or if the Services were to stop bargaining for more money, we might find ourselves with an undesirably small defense program. Moreover, if they were to offer balanced programs at alternative budget levels to Congress, thus exposing their marginal items, the Services might expose themselves to large cuts, and the rest of us to undesirable military risks. Given the structure of the present system, it is therefore not obvious that any party should abandon its current bargaining positions and try to act consciously but naively in the public interest.

It is worth emphasizing that the results of the defense allocation process could be worse, indeed much worse, than they actually are, and that it would be undesirable to upset the existing balances of bargaining power without some expectation that the new set of relationships would produce better results. But unfortunately, the system as it now exists does contain biases which work against efficient allocation and which are not corrected by countervailing forces. As a result, the bargaining between the Services and the Office of the Secretary of Defense and between the Department of Defense and the Bureau of the Budget and Congress produces allocations which in many cases are quite inefficient. Part of the problem can be illuminated by drawing a contrast between the defense economy and the classical model of the competitive private market economy. In the competitive economy, the motive of private profit gives the businessman an incentive to minimize his costs of production and to reduce prices and expand output until marginal costs are equal to the corresponding competitive market prices.

¹⁵ Charles E. Lindblom, *Bargaining: The Hidden Hand in Government*, The RAND Corporation, RM-1434-RC, February 22, 1955, pp. 6-7.

Given the admittedly unrealistic assumptions of the model, this produces an efficient allocation of resources in production, whence, at least from the point of view of the efficiency of allocation, private interests are consistent with the public good.

By way of contrast, in the private economy as it exists and still more in defense, the legitimate interests of at least some of the individuals and organizations involved are not entirely consistent with the public interest, and the latter seems remote and unclear. For example, the military services are concerned with the performance of our defense establishment, that is, with effectiveness, and not with cost as such. In the pursuit of greater defense effectiveness, for the Services improved efficiency and larger budgets are often alternatives. Moreover, seeking a larger budget may be easier than improving efficiency. Improved efficiency requires hard choices and generates conflict within the organization; the opposition to a higher budget is external, and it is easier for the organization to unite against the outside world. Furthermore, because the case for a higher budget is based upon need, improved efficiency may make it harder for a service to get future budget increases. In this sense the two are conflicting alternatives. In any given year with a given budget, effectiveness will be greater, the greater the efficiency. But in the long run, when budget levels are variable and subject to negotiation, it is not at all clear that the efficient route maximizes output.

We do not mean to suggest that this is a conscious choice or that anyone is intentionally wasting money. The point is simply that the Services are concerned primarily with the defense of the United States and not with saving the taxpayers' money.

The tendency to fight for higher budgets is strengthened by the difficulty of making an objective estimate of how well defense activities perform. Fortunately from most points of view, the actual wartime performance of most military systems must remain hypothetical. But this does mean that the importance of an activity, and therefore of the people directing it, tends to be judged by the amount of resources it uses, or by the size of its budget and the number of people it employs. This is still another reason to fight for a larger budget. The incentives now at work cut against improvements in efficiency and in favor of expensive programs, for the rational response at a higher level to improvements in efficiency at a lower level is usually to realize some of the potential savings by cutting the improved activity's budget. Improved efficiency thus appears to be

penalized, and the system of incentives is perverse. Only at a very low level are there rewards for improvements in efficiency.

This emphasis on getting more budget stems in large part from the fact that the budgetary process does not provide *ex ante* budget constraints, either for the Services or for major combat commands, within which they are free to allocate. This is not to say that there are no prior guidelines sent down through the Bureau of the Budget and the Office of the Secretary of Defense. But the guidelines appear to the Services as moves in a bargaining process and not as binding constraints.¹⁶ Furthermore, they are not generally presented in such a way that they appear as constraints within which the Services will be free to buy alternative programs on an equal budget basis. Rather, they are "one-sided" constraints. The limitation side is emphasized. The promise that would be implicit in a genuine budget constraint—that the organization constrained can trade weapons on a dollar-for-dollar basis—is not given. If the Services give up a project, they are not assured of getting the money for another project of higher value. In defense, a dollar saved is not a dollar earned. New projects must be considered anew "on their own merits." As a consequence, the Services are reluctant to give up approved systems because they represent a budget category. This leads to hoarding of large and expensive programs of relatively low marginal value.¹⁷ The other side of the constraint does not work either. When fighting for approval of new projects, the Services do not typically feel called upon to offer compensating cost reductions of an equal amount elsewhere. If they were to offer such reductions they would have good reason to fear that the proposed cuts would be accepted without the increase being granted, at least in the next budget cycle, because such proposals are taken to be a sign that the programs to be cut back are "not really necessary." As a result, every question of allocation is a potential battle between the Services and the budgeteers over budget level.

The struggle over budget level fosters the use of what might be called "foot-in-door tactics" for getting larger budgets. One variant of this is the use of the priority list in the manner we have described.

¹⁶ For an explanation of an example of this, see the testimony of Assistant Secretary of Defense W. J. McNeil in *Department of Defense Appropriations for 1960*, Hearings Before the Subcommittee of the Committee on Appropriations, House of Representatives, 1959, Part 2, pp. 2-3.

¹⁷ This is a point made by Kissinger, *op.cit.*, p. 384. "Because to relinquish a weapon system may mean to relinquish the appropriations that go with it, every service has a powerful incentive to hold on to every weapon even after it has outlived its usefulness."

The organization using the priority list insists on its first priority item until it gets it, and then points to all the complementary things that are needed to make that item have any military value.¹⁸ In its extreme form, this tactic can be characterized as the "critical weakness" strategy. A military department will buy only part of a system and then later point to the obvious gaps that need closing if the system is to be useful. This technique exploits the strong complementarities between the components of a weapon system, and it exploits the continuing character of the bargaining process. The same device can also be used to forestall budget cuts as well as to press for increases. Budget cuts are represented as affecting the most vital areas. The trouble with this from the point of view of the allocation of the defense budget is that it leads to unbalanced programs and incomplete weapon systems, and sometimes leaves large gaps in our defense capability over substantial periods of time.

The general character of the situation fosters a downward bias in the estimation of the cost of new weapons and of new ways of using existing ones. From the time the cost of new weapons is first presented, at a point when the weapons are still a gleam in the eye of the designers, until they are actually produced and in the field, often their estimated cost increases many times over. This happens mainly because there is little incentive on the part of anyone to take a realistic view. The contractor wants to sell the weapon, the using command wants to have it (and does not have to pay for it), and the Service wants to get a commitment to the weapon and hence whatever money is needed for it. This introduces an uneven bias into the choice among new weapon systems, and it causes distortions in their design. Moreover, the cost underestimation leads to an important bias in the choice between existing systems and future systems. It often prevents us from doing things that we should do now because of the belief that something very cheap and effective will soon be here. Then, when it proves that the new system is not so cheap and not so effective, we are left with a gap in capability.

The structure of the bargaining situation also poses a temptation to the Services to exploit the effect Secretary McElroy alluded to when he testified "once a thing gets moving down the road, it is very hard to stop it Then you get contractors involved, vested interests, and all kinds of other considerations. . . ."¹⁹ By making large

¹⁸ For an illustration, see *A Study of Airpower*, *op.cit.*, pp. 96, 231-2.

¹⁹ *Department of Defense Appropriations for 1960*, *op.cit.*, pp. 194-5.

commitments of money to research and development programs very early, before the technical uncertainties are resolved and before large commitments are really necessary to the rapid progress of the program, it is possible to prejudice the choice which must be made when the uncertainties have been resolved. Not only does this interfere with rational choice but also it leads to conducting some development programs on a wasteful scale.

We have mentioned already the position of the Defense Comptroller and the Bureau of the Budget. As custodians of the budget they inevitably play a part in the reconciliation of the limitless demands of the Services and the limitation of the current budget. But as we noted earlier, given the nature of the situation, they cannot do much bargaining over future plans. They must focus attention on the current budget because that is where their power lies. This leads to a very high implicit discount rate applied to prospective future savings, and thus to a neglect of current expenditures which will yield larger future savings. Ideally, if the allocation of the current budget is to be efficient, it should be based on a projection of future budget levels. Despite the bargaining, large changes in budget level *ex post*, that is changes large enough to have an appreciable effect on allocation, generally occur only in response to large and unforeseen changes in the international situation. Therefore, the best working assumption is probably that this year's budget level will be in force indefinitely (adjusted for price level changes, and perhaps growth in income).²⁰

The problem of expenditures now for savings later was posed for the Bureau of the Budget and the Administration by the Cordiner Committee proposals in the Spring and Summer of 1957. The Cordiner Committee was appointed to study the problems of military pay. In the Spring of 1957, it published a report which contained an explanation of the serious problem of keeping skilled manpower in the Services, a proposal for a set of pay increases designed to ameliorate the problem, and estimates of the cost of the increased salaries and of the savings which would result.²¹ Since the savings

²⁰ Of course, part of the peacetime job of the military services is to be ready to expand rapidly in time of emergency; i.e., to be able to exploit sudden and large increases in the budget. But this capability should be identified as a kind of output and should not be confused with attempts to allocate in such a way as to bring about an increase in the peacetime budget.

²¹ See *A Modern Concept of Manpower Management and Compensation for Personnel of the Uniformed Services*, Volume I, Military Personnel, Defense Advisory Committee on Professional and Technical Compensation, May 1957, which we refer to as "The Cordiner Report."

would be the result of improved retention, they would not be realized until the program had been in effect for a year or two, whereas the extra costs would be felt right away. In the first full year of operation, the net increased cost of the program was estimated to be about \$300 millions. By the fifth year of operation of the plan the projected extra costs (gross) were about \$660 millions whereas the projected (gross) savings were about \$660 millions in material and maintenance, \$430 millions in personnel savings, mainly in training costs, and about \$4 billions in measurable increases in combat effectiveness.²²

The evidence that military salaries were too low, just from the point of view of retention, was quite clear cut.²³ It is also clear that large gains in military effectiveness and substantial cost reductions in training and accidents could be obtained with even modest improvements in personnel retention. One could reasonably dispute the estimated savings projected in the Cordiner Report, and it might have been open to question whether the proposed salary scales were really just the right ones.²⁴ But the evidence suggested very strongly that the Cordiner proposals were a step in the right direction. It is difficult to believe that the Bureau of the Budget and the Administration really were opposed to the idea. Nevertheless, they did oppose the recommendations.²⁵ A reasonable hypothesis to explain this may be that the Department of Defense offered no offsetting budgetary savings in the first years of operation of the plan and as a result the Bureau of the Budget felt called upon to resist the pay increases probably because it had no way of enforcing the realization of the savings in the form of budget reductions in later years. On this hypothesis, the alternatives to the Bureau were improved efficiency and a higher budget or rejection of the plan and a maintenance of the same budget.²⁶

As well as biasing the resulting allocation in the direction of inefficiency, the bargaining process by which a "coordinated"

²² *Ibid.*, pp. 25-42.

²³ As well as the Cordiner Report, see the testimony of the personnel officers before the Symington Committee, *A Study of Airpower, op.cit.*, and Alain C. Enthoven, "Supply and Demand and Military Pay," The RAND Corporation, Paper P-1186, September 30, 1957, or "An Economist's View of the Cordiner Recommendations," *Air Force*, Vol. 41, No. 1, January 1958, pp. 38-41.

²⁴ In fact, Secretary Wilson did just this. See *The New York Times*, July 7, 1957.

²⁵ See *The New York Times*, April 27 and July 7, 1957.

²⁶ Interestingly enough, the early returns suggest some improvement in re-enlistment rates since the enactment of the pay increases, and this despite a decrease in civilian unemployment. See *Department of Defense Appropriations for 1960, op.cit.*, pp. 105, 354, and 382.

position is arrived at imposes costs of its own. A policy-making organization can make two types of error: it can decide to do something which should not be done, or, what is likely to be more serious, it can fail to do something which should be done. Unfortunately, the former often seems to be more identifiable than the latter. Perhaps partly as a consequence of this, the typical coordination process in the Department of Defense is biased against getting things done, particularly against getting them done quickly. The effects of this are particularly pernicious in research and development where changes must be made and failures must occur if there is to be any progress at all.²⁷ In the structure of checks and balances, there are too many layers of authority with veto powers.²⁸ Authority without responsibility can cause undesirable and unnecessary delay because it conveys a veto power which can be used without sufficient cost to the user. It costs one nothing to delay a project if one is not responsible for the results. The costs and incentives are unbalanced unless those who can cause delay have a corresponding interest in avoiding it.

All this is not to suggest that bargaining is necessarily a bad thing or that, even if it could, it should be replaced by a well-defined hierarchy in which decisions are made unilaterally. Rather, we wish to suggest only that in the defense establishment the conflict over budgets and the failure to separate questions of allocation from questions of budget level, insofar as the two are separable, does produce inefficient allocations. This should not be taken to imply

²⁷ For a discussion of this point, see Burton Klein, "A Radical Proposal for R. and D.," *op.cit.*

²⁸ The testimony of Admiral Rickover on this point is illuminating. In discussing the purchase of nuclear cores for naval ships before a Senate Committee, Rickover related the following episode.

"Next time the purchase of nuclear cores came up there was a six-months' delay. Even though the Chairman and the General Manager of the Atomic Energy Commission were for it, it wound up with the necessity for an official request from the Navy to the Atomic Energy Commission via the Secretary of Defense. The matter was handled by General Loper, the Chairman of the Military Liaison Committee. I went over to see General Loper with the draft of the letter which he agreed to and which he initialed. After that it took the initials of fifteen or twenty officials in the Pentagon and a month's delay before the letter got out of the Pentagon.

"So it took six months just because one staff person with no responsibility but with authority had on his own decided that the policy was wrong. This is the sort of thing we face. So therefore I get back to the point that if you want these research and development jobs done expeditiously you had better see to it that somehow or other you do not separate responsibility from authority."

See *Inquiry Into Satellite and Missile Programs, op.cit.*, Part 2, p. 1,394.

that a system in which budget level and allocation would be determined without any bargaining would necessarily be better than the present one, or that the existing bargaining process could not be changed in such a way that it would produce better results. Some of the defects in the present system which we have described should be remediable; some may be inescapable costs of an otherwise advantageous system; some may be intrinsic in all large administrative structures. We are not now prepared to say to which category each belongs. Neither are we prepared to advance an entirely different method for allocating resources in defense which we would consider to be unambiguously superior. Further study is required.

Obviously some method is needed for determining budget level as well as allocation and, the problems of information in a context of rapidly changing technology being what they are, the choice of budget level is bound to be a collective decision in which the agencies affected have some voice. This almost inevitably opens up the possibility that agencies which believe (perhaps quite justifiably) that more resources should be devoted to their activity will use whatever leverage they have to increase their budgets. However, it is all too easy for the participants in the budget struggle to lose perspective, to feel that they must resort to extreme bargaining tactics, and to over-value the effectiveness of the tactics. The stability of the total budget over the past several years does suggest that the budget level forces are fairly evenly balanced. (This is not a prediction that there will not be a large increase in the defense budget in the next few years.) The changes that are made in allocation turn out in retrospect to be roughly one-for-one dollar trades. Over-all allocation would be improved if both sides in the contest over budget level could recognize this stability, separate questions of budget level from budget allocation, and redirect some of their energies from the struggle over budget level to the problem of improving allocation.

C. BUDGET STRUCTURE

The budgetary process does not provide *ex ante* budget constraints by classes of military output in a form that can be a guide for military planning. There are guidelines or expenditure totals for each service sent down by the Administration early in the budgetary process. But as we pointed out earlier, these are partly bargaining counters and only partly constraints and, moreover, they have little effect on military planning except in the single year for which the

budget is being prepared. In general, the following observation by Arthur Smithies holds good:

“Planning and programing precede budgeting, and programs provide the basis on which budgets are prepared. Programs, however, are prepared in terms of military concepts and not in terms of dollars. When a program is completed the cost in dollars is not known.”²⁹

The defense budget is subdivided into input rather than output categories, and Congress and the Services consider allocation in terms of these subbudgets. The appropriation titles are military personnel, operation and maintenance, procurement, research and development, and military construction, rather than, say, strategic offense, continental air defense, antisubmarine warfare, and the like.

The subdivision of the budget along input rather than output lines is both a symptom and a cause of one of the principal weaknesses in the structure of the defense economy. The concept of military output as something which exists and can be measured independently of inputs is neglected. The issue of criteria is rarely raised. It is all too easy to measure the strength of our fleet in the Pacific by the number of its ships rather than by its ability to accomplish some objective. As a result, there is not enough explicit consideration given to raising military output by trading among inputs within a subbudget. The existing budget classifications make this situation worse because they do not present decision-makers with very manageable allocation problems. They do not enable the decision-makers to factor out reasonably independent “suboptimization” problems because there is no common set of criteria spanning the items considered in such a subbudget. Consider the aircraft procurement category. This subbudget covers procurement of bombers, tankers, transports, fighters, and other aircraft. In order to allocate this budget efficiently, the allocator would have to know, among many other things, the marginal product of another bomber in SAC, and then the marginal product of more SAC in our over-all strategic offensive position, and, in turn, the marginal product of more strategic offense for national security. Then he would have to know the marginal product of another interceptor in our air defense system, the marginal product of more air defense in our over-all national security, and so forth. These decisions, in turn, should

²⁹ Arthur Smithies, *The Budgetary Process in the United States*, New York, 1955, p. 241.

depend on what is being done in personnel, installations, and elsewhere. And at the same time, another committee is allocating the installations budget in comparable circumstances.

There are important interactions between air defense and air offense, for example, but these are much less strong and much more manageable than they are between the personnel, equipment, and installations that go into a bomber system. Members of a board charged with responsibility for the allocation of the aircraft procurement subbudget could not possibly master simultaneously the range of questions they would have to understand in order to make the decisions efficiently. Not only are the criteria governing the different types of aircraft different in detail, they are also different in kind. For example, the marginal product of another fighter in the air defense system is a relatively easily analyzed quantity by comparison with the marginal product of more strategic offensive power in our over-all national security position.

In practice, of course, there is informal communication between the different committees and boards making the various decisions, and some communication is assured by overlapping memberships. This communication does help to minimize the gross and obvious errors. But there is no reason to believe that the results are efficient. Quite the contrary. The impossibility of constructing criteria which span an input budget means that it is not possible to compare alternative allocations of a subbudget in terms of a definable military output. Moreover, this budget structure leaves the division of total service budgets between alternative activities to be decided largely by a number of independent committees.

The operating commands are organized broadly along output lines. They are organized to accomplish certain missions. However, within the operating commands there is, in general, no possibility for trading between budget categories. For example, there is no such thing as a budget for the Strategic Air Command or Continental Air Defense in the *ex ante* sense. There is no point in trying to persuade an operational command that it should give up, say, some personnel in order to get more aircraft, or give up some aircraft to get more installations, since by the nature of the budgetary process these trades do not appear to be open to it.

Since resources are not as a rule charged to the using command, there is little incentive to economize on their use. Personnel, for example, are either free or unobtainable. Similarly, supporting

services (airlift or depot maintenance or trained men) are free if they are available. If demand exceeds supply, the inputs in short supply have to be rationed and, as a result, are often simply not available when needed. In any case, their costs do not enter into the calculation of the organizations that use them, or if they do enter, it is as an absolute constraint (e.g., a method of operation might be rejected because there is no prospect of getting the necessary crews from the training activity).

The subbudgets treated separately by decision-makers in the Department of Defense are also treated separately by Congress. This congressional method may be partly accounted for by the notion that the military departments are going to Congress for *means* (i.e., inputs) to accomplish hard-to-understand objectives on which they are expert, and by the tendency of congressmen to concern themselves more with how and where the money will be spent than with military objectives and ways of attaining these objectives. Nowhere in the budgetary process from the bottom to the top is there an explicit analysis of the possibilities for trade-offs between installations and personnel and equipment. (Fortunately, some new weapon systems are being treated more as a system than as an independent collection of inputs. Unfortunately, however, there is no evidence that this modest but very promising reform is about to be extended to the whole of the military establishment.)

The treatment of military construction presents an especially important obstacle to efficient planning. Construction is handled separately from procurement of weapons and personnel. The Congress examines construction proposals in considerable detail and makes specific appropriations to individual projects. This rigidity in the treatment of construction, which leads to underbuilding and to a neglect of passive defenses (shelter and dispersal) has been especially dangerous in a period in which the performance of entire weapon systems and even our ability to deter general war can depend critically on the speed with which construction plans can be initiated and carried out. There is little consolation in having more than enough money for bombers and missiles if there is no money for bases and for shelters which are essential if the bombers and missiles are to be able to deter war or to fight effectively if war comes.

The Congress is not inflexible in its budgetary procedures. There have been important changes in the past ten years in the direction of allowing greater flexibility to the Services. For example, in the late

1940's, there were about 110 rigid budget categories in which money was appropriated for the Army; today there are about 10.³⁰ However, the treatment given to construction and to some other categories remains extremely detailed. Each construction project, and many are quite small, must be approved individually by Congress. There is little possibility of transfer within this category, and, of course, none between it and other categories.

In view of the budgetary procedure of the Department of Defense, it is hardly surprising that our military services do not operate with a concept of scarce resources. They think in terms of needs and feasible solutions to meet the needs. Any characterization of "military thought" is likely to be inaccurate, but it does seem to be the case that the explicit consideration of alternatives as such is less interesting to the military than it is, say, to private industry. Choice between alternative means as such rarely enters in nor, given the institutional framework we have described, should we expect it to.

D. ORGANIZATION STRUCTURE AND DECENTRALIZATION

Paralleling the lack of correspondence between budgets and objectives is a lack of correspondence between organizations and objectives. It is now a commonplace that the military services are organized along the traditional lines of ground, air, and sea combat that no longer reflect military objectives. This is in conflict with the establishment of an orderly system of decentralization of decision making. It would be impossible to construct a set of criteria for evaluation of the performance of, say, the Army, which spans all of the activities of the Army. The "output" or product of the defense establishment is too remote for the Services to consider the relative merits of many alternative allocations. Like the budgetary breakdown, the organization of the Services along lines that do not correspond to military missions tends to divert attention from output and ways of improving it.

In order to focus attention more on output and to facilitate the development of performance criteria, it is particularly desirable that each organization have a reasonably homogeneous set of purposes. Herein lies the particular merit of the proposal of the President to organize the military forces into unified commands. These organizations can concentrate their attention on efficient ways of carrying out their missions. It is undesirable to have missions and organizations

³⁰ *Reorganization of the Department of Defense, op.cit.*, p. 6,577.

separated when they interact strongly. Two good illustrations of this are the separation of close air support for infantry from the Army and the separation of local defenses for SAC bases from the Air Force. In both cases, not only should the supported or defended force be able to buy its own support or defense in the amounts desired, but also it should be required to pay for it.

On the other hand, there are advantages to having more than one organization to carry out any particular mission. Diversity fosters desirable variation; the existence of different organizations for the same mission encourages competition. Thus, merging the Army and Marines or the strategic offensive forces of the Navy and the Strategic Air Command into single combat commands would appear to offer limited prospect for increased efficiency and a clear reduction in desirable competition which fosters large gains in effectiveness.

The case for reallocating roles and missions should therefore be tempered by the value of preserving competition in the attaining of given ends by keeping easily distinguishable and largely independent activities separate, and it should be based on evidence that gross inefficiencies exist as a consequence of separate planning and control of highly interdependent activities. When there are different organizations serving the same general purpose, however, the organizational structure should provide for another body at a higher level whose job it is to allocate budgets and parts of the general mission between them.

Some decentralization of decision-making is both unavoidable and desirable in a large organization such as the Department of Defense. In allocating a budget of \$40 billion a year, there must be subbudgets in order to permit specialization in particular problems of allocation. However, it is one thing to decide which subproblems can be factored out and another to determine at which level in the organization different classes of decision should be made. The problem is complicated in defense by rapidly changing technology. This makes it difficult to specify in advance which decisions will be routine and unimportant and which will be of very great importance. Nevertheless, it should be possible for the character of decentralization in the Department of Defense to be improved. The Department has in fact become very highly centralized, with many decisions of a relatively unimportant character being made in the office of the Secretary of Defense. The Secretary of Defense and his staff, however, are too remote to be able to manage efficiently and in detail all of these

questions. Moreover, the Joint Chiefs of Staff provide a battlefield for the contending services, but not, in practice, an instrument for effective planning. As a consequence, in spite of the apparent high degree of centralization of control, many critical decisions of great national importance are actually made at remarkably low levels of authority. This stems largely from the fact that higher officials are absorbed with a great mass of relatively unimportant detail. They simply do not have time left over to reflect on and decide all of the major issues that they should. Rather than focusing attention on how to carry out missions and achieve objectives which have been assigned to them, subordinate commands actually determine much of our national policy. As long as high officials and congressmen continue to concern themselves with such questions as the need for extra fuel hydrants on Base X, much more important questions will continue to be decided by default at lower levels.

E. THE LACK OF PERMANENT STAFF

Underlying the whole problem of defense organization, the issue of roles and missions, the adequacy of our strategic planning and our command channels, and our budgetary process, is the adequacy of the staffs of the office of the Secretary of Defense, the Joint Chiefs of Staff and in the service headquarters. At the present time, the staffs of the three Services are composed of officers who have a three-year tour of duty which, under special conditions, can be extended to four. This is a statutory limitation. There are many reasons advanced why officers should not spend more than three or four years in staff positions. The arguments have to do with the generalized experience the officers require and with fears on the part of some congressmen that a professional military staff would be a danger to our democracy. If these arguments are persuasive, the alleged benefits are not without cost. Moreover, many civilians at high levels, including political appointees in particular, often remain in their jobs for even a shorter time than do military staff officers. This rapid turnover of personnel would damage seriously the efficiency of any organization, and in defense, the damage is worsened by the extraordinary changes in weapons technology taking place all the time.³¹ The important problems are objectively difficult and uncertain and many are highly technical. Nevertheless, staff officers, most of

³¹ See, for example, the comments of Admiral Rickover on this problem in *Inquiry Into Satellite and Missile Programs*, *op.cit.*, p. 1,391.

whom do not have the appropriate technical background, are expected within a short time to master these problems and to make critical decisions. This impermanence of personnel means not only that much time is lost in educating new arrivals, but also that it proves difficult for more than a very few officials to acquire over time the deeper wisdom on defense matters that should be possessed by a sizable core of permanently assigned officials.

There are several ways of increasing the quality of the professional management of the Department of Defense. No single measure is likely to be sufficient. Undoubtedly a relaxation of the rule restricting military officers to short tours of duty would be beneficial. It might be useful to expand the number of civil servants employed as full-time experts, at the expense of a reduction in the large number of part-time experts serving on committees, and to offer better career opportunities through promotion within the Defense Department. Finally, there should be higher pay at top levels. The number and, if possible, the salaries of higher grade civil service posts should be increased. While it is commonplace in government that relatively poorly paid civil servants are responsible for decisions concerning billions of dollars, and the obstacles to pay increases are well known, in the case of the defense establishment more than our money is at stake, and we should be prepared to pay handsomely for the services of the people who run it.

3. Some Theoretical Aspects of Defense Organization

The shortcomings in the workings of the defense allocation process which we have discussed testify to the fact that the problems are difficult. The Defense Department is large, and it has grown rapidly. Its very objectives are subject to constant revision, and the technology which it must use to carry out its objectives is changing at a fearsome rate. In these circumstances, can the problems of defense policy be made intelligible? The rapidity of change in military technology and the very nature of the problem, which make the accumulation of relevant experience and experimentation particularly difficult, combine to make a theoretical understanding of the problem especially important. As in all sciences, there is a "trade off" between theory and experience; the scarcity of the latter increases the extent to which we must rely on the former. It is therefore interesting to inquire whether the economic theory of rational choice can be useful in the construction of a theoretical framework

which can illuminate the problem of defense budget structure and organization.

The answer to these questions is "Yes," although there is good reason for modesty. The problems are not easy. Current economic theory cannot guide us to a total solution, except in a very formal and empty sense. However, it often can be a useful guide to finding improvements. Indeed, this is the basis for fruitful analysis. Because of the difficulty of the problems of weapons choice and operation, it is always likely to be the case that major improvements will be possible whereas total over-all optimum solutions will continue to elude us.

Ideally, it would be desirable to organize much of the problem of allocating the defense budget into a set of independent subproblems, each divided into further independent subproblems, and each capable of being decided in terms of a relevant criterion or set of criteria.³² Corresponding to a hierarchy of subproblems of allocation of increasing scope, it would be desirable to have a hierarchy of criteria increasing in generality and measuring the achievement of more and more general objectives. Such a structure would have numerous advantages. Factoring out independent subproblems would make possible a high degree of decentralization and specialization. Separate organizations could be charged with the responsibility of allocating their budgets in such a way as independently to maximize definable criteria. The required information flow within the whole organization would be small, being composed mostly of budgets, marginal costs, and marginal products. The allocator of each subbudget would need to know only his budget and criterion and the costs of alternative ways of accomplishing his assigned objectives. The resulting specialization would be particularly valuable because, in so many areas, it requires a specialist to keep up with the pace of technological change. However, as one attempts to construct such a hierarchy and to extend it to cover broad objectives, some formidable difficulties appear.

A. WHICH CRITERIA? WHOSE CRITERIA?

The first problem is the selection of criteria for making allocation decisions. Of course it is possible to discuss the efficiency of allocation

³² A structure of this kind would be reminiscent of Robert Strotz' "utility tree." See "The Empirical Implications of a Utility Tree," *Econometrica*, April 1957, pp. 269-80.

only in terms of a specified criterion. But what criterion? Whose criteria should be used? How are good criteria to be identified? These questions are at the heart of the whole problem of defense policy. The criterion problem is an extremely difficult one on which we have no satisfactory general statement and no clear cut position. We can only suggest some principles which seem to us to be relevant.

Good criteria can be found only by working with the problems. We do not believe that it is possible to develop a set of criteria for defense policy *a priori* independently of cost and technology.³³ Ends and means interact. Particular objectives are often themselves means to higher objectives. Therefore, the desirability of attempting to accomplish an objective cannot be decided independently of the possibility and cost of achieving it and of achieving alternatives. For example, the United States has adopted the broad policy of strategic deterrence as the primary means of protecting itself from Soviet attack. This decision could be made only in the context of the costs and technological possibilities of alternatives such as active air defense. For these reasons one cannot deduce intermediate criteria "from the top down" nor construct them "from the bottom up." One must break into the problem somewhere in the middle, work up and down and out, attempting to carve out reasonable partial orderings of alternative possibilities. Also for these reasons criterion problems must be dealt with by people who understand the relevant aspects of the technology and the economic possibilities. But this does not tell us what or whose criteria.³⁴

There are many areas in which there is widespread agreement among informed people on at least the broad outlines of criteria. For example, there now appears to be widespread agreement that an important criterion for the performance of our strategic offensive forces is their ability to survive a surprise attack designed to destroy them, and then to be able to carry out their missions. Also there are many areas in which intermediate criteria can be deduced from

³³ The contrary view seems to be suggested by Henry Kissinger in *Nuclear Weapons and Foreign Policy*, New York, 1957, Ch. 12.

³⁴ Beyond the identification of reasonable goals, there is a problem of choosing the form in which they are to be stated for purposes of analysis and decision. Here there are some rules for selection though they are primarily negative rules. For example, as a general matter, it is important to avoid using the ratio of an output to an input as a criterion for allocation. For the literature on this subject, see e.g., Roland N. McKean, *Efficiency In Government Through Systems Analysis*, New York, 1958, Part 2; Charles J. Hitch, "Suboptimization in Operations Problems," *Operations Research*, Vol. 1, May 1953, pp. 87-99.

agreed upon policies. This is generally the case with decisions in the small. Moreover, many disagreements over criteria are of the kind which can be resolved by analysis, agreement on the relevant facts, and appeal to agreed upon higher level criteria. Our analysis is directed primarily to problems in these areas. It is possible to find inefficient allocation even where objectives are understood and agreed upon.

There are, however, important areas in which there is no general agreement among informed people on objectives and criteria. There are strong differences of opinion, for example, on whether our tactical forces based overseas should be designed primarily as atomic striking forces with conventional capability only as a by-product, or designed primarily as conventional forces with atomic capability as a by-product. Issues of this kind cannot be settled directly by the democratic process because the subject matter of defense policy is esoteric. The relevant information is largely technical and abstruse and there is an inevitable requirement for secrecy. As a result, it is not possible to get an informed public opinion on most issues. Moreover, most of the people who are informed have access to information because of their institutional commitments. For this reason, also, the fact of general agreement may not be an entirely reliable guide to the merits of a policy.

It is important that there be open agreement within the defense establishment on criteria (on the reasons for policies) and not just on the policies themselves. Moreover, as much as possible, decisions should be defended in terms of explicit criteria. There are several reasons for this. First, it helps to limit the extent to which purely private interests govern. Second, though imperfect, open discussion is the best method for determining, refining and improving criteria that we know. Third, technology and circumstances are changing rapidly. A policy that is decided upon in terms of good criteria made explicit is more likely to change in the right direction as circumstances change than a policy which owes its existence solely to the fact of agreement. Where there is no agreement on criteria, we have nothing of general significance to say about the efficiency of allocation decisions.

B. THE MULTIPLICITY OF CRITERIA

Consider, for example, the problem of designing forces for fighting all-out war. It seems natural to structure the problem into strategic

offense and continental air defense, and then to divide air defense into warning systems, area defense and local defense systems, and passive defenses, and to divide strategic offense into the different weapon systems designed for the purpose. Indeed, as Roland McKean has suggested, such a breakdown has a great deal of merit both for budgetary and for organizational purposes.³⁵ But what should we use as a criterion for evaluating alternative allocations among these categories? And what should the criteria be for evaluating alternative offensive and defensive systems?

The problem is not a shortage of criteria, but rather an overabundance. We have a number of general war objectives, and corresponding to them, a number of criteria for the design of our forces. Our primary objective in maintaining all-out war forces is deterrence. That is, we attempt to maintain forces which will be able to inflict damage on our potential enemies that is sufficiently severe that they will not find it to their advantage to attack us or to commit other aggression warranting retaliation. In effect, in pursuing the deterrence objective, we attempt to adjust the payoffs to alternative courses of action open to potential enemies so that they will not choose, as the result of a rational calculation, a course of action severely disadvantageous to ourselves.

But deterrence may fail, and we may find ourselves involved in an all-out war because of miscalculation or an inadequate deterrent. In such circumstances, we have other objectives which we would like our forces to accomplish for us. For example, we would like to limit the damage we suffer. This can be done by defensive forces shooting down attacking vehicles, and it can be done by offensive forces striking at the bases of the enemy's offensive striking power, that is by "counterforce" attacks. But a good counterforce capability may weaken our deterrent by reducing the value, to the enemy, of not attacking us because it may make him think that we are more likely to go first. Thus deterrence and limiting-damage partially conflict.³⁶

Beyond these two objectives, one can think of others. We would like our all-out war forces to give us the power to win the war, or at least to terminate it on satisfactory terms, if war does occur. This may call for a force which differs in some respects from a pure

³⁵ See Roland N. McKean, *Evaluating Alternative Expenditure Programs*, The RAND Corporation, Paper P-1602, January 27, 1959, p. 14.

³⁶ For a discussion of this and related problems, see T. C. Schelling, *Surprise Attack and Disarmament*, The RAND Corporation, Paper P-1574, December 10, 1958.

deterrent. And we have, of course, many other military and foreign policy objectives which interact with and are furthered by our ability to wage all-out war successfully.

How does one deal with multiple objectives in making choices? Formally, the problem could be solved by defining a single criterion for ordering alternative combinations of levels of satisfying the multiple objectives. But as a practical matter it is very difficult to do this explicitly, even though it is done implicitly by decision-makers every day. The formal possibility offers little comfort to the analyst who is interested in helping his country to survive.

First, we can seek unambiguous improvements, that is changes in allocation which leave performance as good as or better than before with respect to all important criteria. At the end of this road would be efficient postures, that is postures which do not admit of unambiguous improvements. But as a practical matter, perfect efficiency in this sense is simply not attainable, and to seek it in one area would require forgoing the opportunity to seek large improvements elsewhere. Instead, although we may be unable to resolve our multiple objectives into one, we can seek to design systems which are at least tolerable in all circumstances with respect to the important criteria. That is, we can solve higher level criterion problems when they are easy; when they are not easy it *may* be because they are not important.

Usually, it is not necessary to pay a high price in terms of one objective in order to improve performance with respect to another if the system is designed to maximize achievement of the first objective to begin with. This is a reflection of the ubiquity of diminishing marginal returns and of the fact that related objectives are not generally directly opposed. If we care about several objectives, and a design performs extremely well with respect to one of them but extremely badly with respect to the others, we are likely to be willing to yield some in performance with respect to the one if by doing so we can improve performance with respect to the others. At what point do we stop trading? If we are uncertain about the answer, it may mean that performance is in a range in which we do not feel strongly about minor differences. This is another way of saying that the problem is no longer important.³⁷

³⁷ A similar point can be made with respect to uncertainty. If a system performs satisfactorily and we are uncertain about the net effect of marginal variations in design, then uncertainty may exist because the effect is not important.

C. INTERACTIONS

Another obstacle to the factoring of the whole defense allocation problem into a hierarchy of independent subproblems is the existence of direct interactions between apparently separate elements of the defense organization.³⁸ The natural separation between strategic offense and continental air defense, for example, is much more apparent than real. Air defense can contribute a great deal to the value of the offensive systems by providing them with warning of attack and by providing them direct protection.³⁹ Thus there are both area and local defenses protecting SAC bases. Our offensive systems, in turn, help the defenses limit the damage we suffer by disrupting or destroying the enemy's striking power on the ground in his own territory. Even more distant parts of our defense establishment interact in important ways. We attempt to deter potential enemies from launching an all-out attack on us by the threat of all-out retaliation. But we can attempt to deter peripheral challenges by combining the threat of all-out attack with the use of conventional ground and air forces. By increasing the range of challenges that we meet with the threat of an all-out response, we increase the probability of general war, and thereby increase the burden on our damage-limiting active and civil defenses.⁴⁰ To ignore such interactions is to run the risk of making serious errors in defense planning.

In order to understand the theoretical significance of direct interactions, consider a very simple allocation problem in which we wish to maximize an index (in one dimension) of performance which itself depends upon the performance of two systems (each measured in one dimension), subject to an over-all budget constraint, by appropriate choice of the combination of the two systems and by appropriate design of the systems themselves. Let the performance of the two systems be measured by the variables "x" and "y" respectively, and suppose that groups or individuals designated as "managers" are responsible for designing each of the systems, and that a "coordinator" is responsible for combining the two systems in

³⁸ This is analogous to the phenomenon of direct non-market interaction in a market economy which leads to problems for Welfare Economics similar to the ones which we discuss for the defense economy. For a lucid discussion of the problem for Welfare Economics, see Francis M. Bator, "The Anatomy of Market Failure," *Quarterly Journal of Economics*, August 1958, pp. 351-79.

³⁹ Indeed it is not at all clear that the warning function should "belong" more to the defense than to the offense; if anything, quite the contrary.

⁴⁰ For a discussion of this point, see Malcolm W. Hoag, "Is 'Dual' Preparedness More Expensive?" *Bulletin of the Atomic Scientists*, February 1957, pp. 48-51.

such a way as to maximize the over-all performance index. It would be desirable to factor the whole problem into three independent problems so that decision-making can be decentralized in such a way as to minimize the amount of information that the managers and the coordinator need to have about the rest of the problem in order to do their jobs, both to permit specialization and in order to minimize the costs of communication.

If the performance of each of the systems is independent of the performance and design of the other, i.e., if there are no direct interactions between the systems, the decentralization problem is easy. Each manager needs to know only the technology of his own system, his budget, and the prices of the inputs he buys. If, given this information, each manager maximizes the performance of his own system, an over-all maximum can be achieved by the coordinator by dividing the total budget between the two systems appropriately. To do this, the coordinator needs to know only the marginal costs of x and y and their marginal products in terms of the over-all performance index.⁴¹

Suppose, however, that the output of one system, say x , depends on y , the output of the other. This may be described as an interaction between outputs. Such an interaction increases the amount of knowledge that each participant must have about the rest of the system if he is to make his decisions correctly. Beyond what he needed to know when there were no interactions, the manager of system x must now know the aggregate performance of system y , since his allocation will depend on it. The coordinator must know how y affects x , i.e., the marginal product of y in x , and this, in turn, may mean that he must be acquainted in some detail with the design of system x since the marginal product of y in x is likely to depend on the character of system x .

However, in the case of a simple interaction between outputs, an over-all maximum can still be attained if each manager maximizes the performance of his own system, subject to his budget constraint, and if the coordinator divides the total budget correctly. The interactions will play a part in determining the optimal division of the total budget into subbudgets—the marginal product of the air defense system in limiting damage to cities will have an indirect

⁴¹ This assumes constant or diminishing marginal returns everywhere. If there are increasing returns, the coordinator will need to know more about costs and the relationship of x and y to the over-all performance index. But the important point for present purposes remains: the information requirements are aggregative and simple.

component by way of protecting SAC—but the allocators of sub-budgets can act independently. If the interactions are positive, that is if improvements in the performance of each system increase the effectiveness of the other system(s), there will be no possibilities for cooperation between managers in the sense of increasing total effectiveness at the higher level by doing anything other than maximizing independently within the budgets which are given to them and which they take as fixed. If there are some negative interactions, that is if improvements in one system directly reduce the effectiveness of another, there may be possibilities for cooperation. If improvements in system y reduce the effectiveness of system x , the designer of system y may be able to increase over-all effectiveness at the higher level by not using up his whole budget. This will be so if the reduction in over-all effectiveness caused by a reduction in the effectiveness of y is more than offset by the consequent improvement in x . In this case, however, it would pay the coordinator to reduce the budget for y and spend it on x . Although cooperation may be possible if there are negative interactions, it is not necessary for reaching the over-all maximum if the budget division between the two has been correctly arrived at (i.e., if someone else at a higher level does their cooperating for them).

But the output of system x may depend not on the aggregate performance of system y but rather directly on the *design* of system y , or, in other words, on the combination of inputs chosen to produce y . This may be described as an interaction involving inputs. The retaliatory power of SAC is a function of the amount and reliability of warning, irrespective of how that warning is produced. This is an interaction between outputs. However, the cost of any specified amount of warning depends not only upon the ability of the radar system to detect and count aircraft and missiles but also upon the deployment of SAC. Decisions on how SAC is based affect the minimum number of aircraft the enemy must send in an attack to accomplish a given amount of destruction, and therefore the ability of the warning system to detect attack. In this type of interaction, the particular inputs of one system affect the output of another.

Weapon systems which have multiple purposes lead to interactions of this kind. The aircraft carrier, which carries both tactical aircraft for conventional, limited-war operations and longer range aircraft with nuclear weapons for purposes of strategic retaliation, is alleged to be an example of this. Suppose one organization employs

a multiple-purpose weapon system which has a value to another organization. Then there is an interaction between the two organizations because the product of the second depends on the extent to which the first uses the system, and therefore on its weapons mix.⁴²

When there are interactions involving inputs, the problem of decentralization becomes more complicated. A simple scheme in which the two system managers maximize the performance of their respective systems independently, taking all relevant features of the other system as parameters, and in which the coordinator controls only the division of the total budget, cannot be expected to lead to optimal results. There is an analogy to game theory here. By acting independently, the designers of the two separate systems overlook any possibilities for over-all improvement through cooperation. Perhaps by modifying his design in such a way as to reduce the performance of his system only slightly, the designer of one system might make it possible for the performance of the other system to be improved more than enough to offset the effect of the reduction in the performance of his system in terms of the higher level criterion. For example, perhaps at the cost of a very modest reduction in its ability to defend cities, the air defense system might, by shifting resources to the protection of SAC bases, be able to bring about a large increase in the power of our deterrent and thereby greatly reduce the expected damage to cities.

If the interactions take place in one direction only, that is, if x depends on the composition of system y but not vice versa, a division of the whole problem into two parts could be brought about if the coordinator were to join with the manager of system y and design that system in such a way as to maximize over-all performance rather than to maximize y . In such an organizational scheme the manager of system x could be left independent and instructed to

⁴² In his writings on Welfare Economics, Professor Samuelson has introduced the concept of *public goods*, goods which contribute to the utility of many, but which cannot be rationed by the private competitive market mechanism. At the heart of this concept is the nonallocability of the services produced by these goods. We all benefit from national defense, and the extent to which I derive utility from it does not affect the extent to which others derive utility from it, at least to a first approximation. See P. A. Samuelson, "The Pure Theory of Public Expenditure," *Review of Economics and Statistics*, November 1954, pp. 387-9. There are counterparts in the defense establishment. As we pointed out earlier, both the offensive and the defensive weapon systems benefit by improvements in the amount and reliability of warning. The extent to which one system benefits does not affect the extent to which the other benefits, at least to a first approximation. "Public goods" of this kind can lead to interactions of both kinds.

maximize x . However, he would have to know all the relevant aspects of system y since, by our definition of the problem, his performance and therefore, in general, his allocation depend on them. The coordinator and the manager of system y together would have to know x 's technology since their decisions would depend in part on the effects of the design of system y on x (and this depends on the design of system x), and, of course, y 's technology also. That is, in effect, the coordinator would have to know everything. Alternatively, the coordinator could leave both managers independent and tax and subsidize system y 's use of the various inputs as well as setting budgets for both x and y in order to bring about an over-all optimum. But again the coordinator would have to know enough to solve the whole problem himself. When there are interactions involving inputs, then, unless the circumstances are particularly favorable in the sense that few inputs are involved and the effects of the interactions are not extensive, decentralization of information is no longer compatible with over-all maximization. Whether decentralization for purposes of computation is desirable depends on the circumstances.⁴³

⁴³ Mathematically, all this could be stated as follows. Let the coordinator's task be to maximize $F(x, y)$ subject to an over-all budget constraint and a list (vector) of prices, p . Let $x = f(v^1)$, $y = g(v^2)$ where v^1 and v^2 are vectors of inputs used by the respective systems and controlled by their managers. In this case, there are no interactions. An over-all maximum can be reached if the coordinator knows only $F(x, y)$ and the marginal costs of x and y , and if each system manager knows his production function, f or g , and his budget and the prices of inputs. Each manager maximizes his performance index and the coordinator divides the budget. This is the standard case in Welfare Economics. Now suppose $y = g(v^2, x)$. This is an interaction between outputs. Then, assuming F , f , and g are concave and differentiable, the over-all maximum will be defined by conditions of the form

$$\frac{\partial F}{\partial y} \frac{\partial g(v^2, x)}{\partial v^2} - \lambda p \leq 0 \quad \text{and} \quad \left[\frac{\partial F}{\partial x} + \frac{\partial F}{\partial y} \frac{\partial g(v^2, x)}{\partial x} \right] \frac{\partial f}{\partial v^1} - \lambda p \leq 0.$$

The y manager who controls v^2 can satisfy the first set of conditions if he maximizes independently and knows x . The x manager does not need to know y , but the coordinator must know $\frac{\partial g(v^2, x)}{\partial x}$ and, therefore, in general (though not always), v^2 and g , in order to determine the optimum budget division. Finally, suppose $y = g(v^1, v^2)$. This is an interaction involving inputs. Now, under the same assumptions, the over-all optimum will be defined by conditions of the form

$$\frac{\partial F}{\partial y} \frac{\partial g(v^1, v^2)}{\partial v^2} - \lambda p \leq 0 \quad \text{and} \quad \frac{\partial F}{\partial x} \frac{\partial f(v^1)}{\partial v^1} + \frac{\partial F}{\partial y} \frac{\partial g(v^1, v^2)}{\partial v^1} - \lambda p \leq 0.$$

The y manager can proceed to maximize y independently, though he must know v^1 to do so, and this will be consistent with an over-all optimum. But the x manager must take into consideration the effects of v^1 on y if his allocation is to be consistent with an over-all optimum. To do this, he must know $F(x, y)$, $g(v^1, v^2)$, v^2 , and of course $f(v^1)$, i.e., he must know all the elements of the problem.

We discuss decentralization in terms of setting budgets instead of prices for output

Moreover, the above illustrations are rather simple cases. It is not difficult to imagine or to find cases which combine both kinds of interaction and which are complicated further by multiple criteria of performance.

What can be done to offset or to remove complicating interactions? It is important to remember that their existence and strength is a function of the way in which the larger problem is factored into subproblems. For example, the trouble with factoring the budget for central war into subbudgets for equipment, personnel, and installations is that the interactions between these categories are particularly strong and involve inputs. The advantage of factoring the problem into offense and defense, and then into the different offensive weapon systems, area defense and local defense, and warning, is that the resulting interactions are weaker and are more between outputs, though interactions involving inputs remain. In general, an important objective in the decomposition of large allocation problems should be to minimize the remaining interactions and to restrict them wherever possible, to those between outputs.

D. THE SIGNIFICANCE OF GAME ASPECTS

As well as the multiplicity of criteria and the problem of finding subdivisions sufficiently free of direct interactions, the strategic or game aspects of most defense problems complicate the task of constructing a set of orderings and subproblems. Game aspects enter at every level. The balance which we select between offense and defense should depend on the balance which our opponent selects, and the kind of offensive and defensive forces which we choose must depend upon his. Our allocation between ballistic missiles and bombers depends on the level of, and balance between, his active and passive defenses. The design of our bomber systems should be influenced by the offensive and defensive choices of our opponent. We can trade, in the design of our bomber systems, between vulnerability in the air to his defenses and vulnerability on the ground to his offense. The extent to which we should shelter and disperse our bombers depends on the characteristics of his

because, as a general matter, defense outputs are only ordinally measurable. Cardinal numbers are used, of course, but their significance is generally largely ordinal.

In principle, the coordinator could find the optimum, with independent maximization of x and y , without knowing f and g , by an infinite number of experiments at setting subbudgets and taxes and subsidies on input use and evaluating the resulting value of F . But such a possibility has little practical significance.

offensive vehicles. Even at the level of design of the electronic system for the bomber, an important game is involved. In fact, the electronic countermeasure and counter-countermeasure game bears a striking resemblance to the two-person, constant-sum game.

The reason that game aspects complicate the task of structuring defense allocation into a hierarchy of criteria and independent subproblems is not that *we* have a broad range of alternatives available for countering his strategy, for we would have this even if he were fixed in his choices, but rather that *he* has a list of possible alternative strategies which includes the possibility of countering our moves in very indirect ways. This gives rise to a kind of interaction which would not occur if he were fixed in his choices. If we should improve our air defense radars to the point where he is unable to blind them with electronic countermeasures, he may look for such broader alternatives as using decoys or other penetration aids, or equipping his bombers with air-to-surface missiles; or he may try to increase the numbers of bombers which he can deliver by reducing their vulnerability on their own bases, by sheltering and dispersing them; or he may choose to increase his missile force at the expense of bombers; or he may attempt to reduce the need for strategic bombing capacity by improving his ability to respond to challenges in other ways. A conceivable response to a reverse in the electronic countermeasure game is an improved civil defense program. And the significant point is that each of these responses to our improved radars reduce our capability in some other, possibly remote, area.

E. THE POWER AND LIMITS OF ANALYSIS

But these difficulties should not be allowed to obscure the fact that there are many important cases in which it is useful to optimize with respect to one criterion, in which the criterion is definable with some vital interactions and game aspects embodied in it and others consequently able to be ignored, so that it is possible to use the standard economic model of efficient allocation, or, to use an expression of C. J. Hitch, to "suboptimize."⁴⁴ Often it is possible to factor a larger problem so that a subproblem naturally meets these conditions. In some cases in which there are multiple criteria, one

⁴⁴ See C. J. Hitch, "Suboptimization in Operations Problems," *Journal of the Operations Research Society of America*, May 1953, pp. 87-99; also "An Appreciation of Systems Analysis," *Operations Research*, November 1955, pp. 466-81. By the standard economic model of efficient allocation we of course mean maximization of a quasi-concave ordinal function of variables constrained to lie within a convex region.

criterion may dominate, in the sense that what is optimal from one point of view is optimal from other points of view also, or one criterion may be sufficiently important relative to the others that it is useful to optimize system design on the basis of that criterion and then to make marginal adjustments to allow for the others. We would judge the latter often to be the case with strategic offensive systems, for example. There, the deterrent mission is sufficiently important that an optimum design from the point of view of deterrence is likely to serve as a good first approximation to an over-all optimum. And sometimes it is also possible to neglect interactions and game aspects in arriving at a good first approximation to an over-all optimum.

Some problems which otherwise meet the requirements for sub-optimization are complicated by increasing returns. However, this is generally not an important qualification, affecting as it does only the computational procedures. Moreover, the increasing returns can often be turned into decreasing returns by applying a higher level criterion.⁴⁵ For example, the usual models of bomber penetration of enemy defenses which are based in large part on saturation phenomena indicate that there are increasing returns to scale in penetration. Physical target damage displays strong diminishing returns, however, so that the over-all relationship between bombers attempting to penetrate defenses and the damage they achieve is likely to exhibit diminishing marginal returns.⁴⁶

We wish to emphasize the importance of a constructive approach as opposed to an analytical approach. What is at once the most fruitful and the most difficult part of the study of defense policy is the factoring out of meaningful subproblems, the construction of partial orderings in terms of relevant criteria, and the design of alternative solutions. Next comes the analytical part, the problem of relating alternative means of achievement as measured by the criteria. When this is done, the remaining computation is often trivial, or at least the easiest part of the problem. Most of the current literature on military operations research quite incorrectly gives the opposite impression.

⁴⁵ See Malcolm W. Hoag, "Some Complexities in Military Planning," The RAND Corporation, Paper P-1531, *World Politics*, July 1959, pp. 553-76.

⁴⁶ This example is used by Hoag, *ibid.* For a still higher level criterion increasing returns may reappear. For example, over a considerable range the increasing marginal disutility to the enemy of having his remaining cities and military installations destroyed may increase our deterrent power at an increasing rate.

What are the limits to this approach? Can we structure the whole defense establishment in terms of a hierarchy of criteria and semi-independent subproblems? While this would be desirable, it is not essential if we are looking for improvements instead of for that elusive grand optimum. Because of the rapidity of change and the inherent difficulty of the problems, it will be possible to make improvements as long as we can factor out and define meaningful subproblems. As we work toward greater levels of generality, the criteria become less definable and more uncertain. Political and sociological effects become more important and their relevance becomes harder to escape.⁴⁷ What is the optimum balance between threats of strategic bombing and a readiness to commit conventional ground and air forces in deterring a communist invasion in Southeast Asia? A host of intangibles and uncertainties enter into the problem. As we work toward greater levels of generality, the range of alternatives increases, and the number of different possible choices which we can make is multiplied by the number of strategies which the opponent can pursue. Even at the highest levels, however, analysis can be fruitful in providing insight and in narrowing the range of uncertainty. Moreover, as the level of generality increases, the importance of the problems increases and with it the potential gains from analysis. With or without criteria or analysis, high-level decisions are made every day. This fact should help to offset the modesty that must be inspired by the difficulty of the problems.

4. Some Suggestions for Improving Defense Organization

If anything should be clear in the complicated and ever-changing business of defense, it is that there is no panacea. Unification of the Services and elimination of interservice rivalry will not solve the problem of poor allocation. Nor will it be solved by the establishment of unified commands, by the institution of an improved budgetary process, or by reduction in the rate of turnover of managerial personnel, although these measures would help a great deal. It is unfortunate that so much of the discussion of defense organization has been in the language of total solutions, as this has, to some extent, diverted attention from the more important quest for improvements. Unified commands, output oriented budgets and many other proposals can lead to a better defense system; the standard by which

⁴⁷ See, for example, C. J. Hitch, "Operations Research and National Planning—A Dissent," *Operations Research*, October 1957, pp. 718-23.

they should be evaluated should be the ability to ameliorate rather than to solve the problems.

A. BUDGETING FOR MISSIONS AND WEAPON SYSTEMS

For much of the defense organization, the right kind of question is "how to allocate a given part of the budget in order to maximize an appropriate set of outputs." What are the general implications of this for the defense organization and budget structure? There are several. First, one basic conceptual framework brought to bear on the problem should be centered around the notion of a constrained maximum. Alternative defense budgets might be possible in the future, but at any point in time a given set of resources has been allocated. The problem should be to use those resources so as to maximize a relevant set of measures of output or military worth. This sounds so obvious that it appears to be trite. But as we have pointed out earlier, this basic idea is not a part of the approach brought to defense policy by many people.

Perhaps the most important step that must be taken in order to bring about this needed change in concepts is to identify outputs independently of inputs. Military objectives at all levels should be made explicit and, to the extent that it is possible, relevant standards of performance which relate weapons to objectives should be developed. Then different weapon systems can be considered for the various missions. For example, discussions of the operation of our existing bomber force or of plans to buy more bombers should be focused on precisely what job these bombers are intended to accomplish. The justification for buying more bombers should not be merely that it gives us more bombers, or that more bombers are needed for the defense of the United States, but rather that more bombers will contribute in a measurable way to the objectives for which we maintain strategic offensive forces, and that they will contribute more to our attainment of those objectives than, say, the extra missiles that could be bought and operated for a comparable amount of money. We discussed earlier the question of criteria for strategic offensive forces, and we observed that, among other things, we maintain strategic offensive forces in order to deter attack on ourselves and our allies, to limit damage to ourselves should war occur, and to enable us to terminate all-out war on acceptable terms. Strategic offense may be a relatively favorable case from this point of view, but these objectives do admit of some useful

quantification and of sensible discussion with people who are not military experts. In general, the criteria upon which the allocation of the defense budget is based should be discussed, distinguished from other criteria that might appear to be sensible, and the choice defended. The general problem of criteria for defense allocation certainly cannot be solved by methodology or by procedure alone, but we are convinced that explicit discussion of this problem would help a great deal.

Along with the identifying of outputs or kinds of defense effectiveness, a major contribution to the decision-making process would be made if programing and budgeting were to be made to correspond to output categories. In fact, most of the defense budget, except for research and development and overheads, should be identified with combat commands which are organized around purposes or missions. There should be budgets for general-war and limited-war forces; within the former, for example, there should be strategic offense and continental air defense. Within output subcategories, the basic input units should be weapon systems rather than the traditional equipment, personnel, installations, etc.⁴⁸ (Weapon-system budgets, of course, can be broken down into the traditional categories.) In any case, weapon-system cost accounting has proven to be essential.⁴⁹ In the absence of information about all the major costs of weapon systems such as the costs of maintenance and operation as well as the procurement cost, an intelligent decision as to whether to procure another aircraft carrier, for example, can only be made as the result of blind luck. While the existence of multiple-purpose weapon systems will provide some inevitable exceptions, it should be possible to fit into this scheme almost all of our military forces. This means a primary budget division by purposes and weapon systems rather than, for example, a budget for the Army which is then broken down into procurement of equipment, installations, and personnel categories, because these are not spanned by any reasonable set of identifiable criteria which correspond to identifiable outputs. The equipment, personnel, installations breakdown should be regarded as secondary in importance. Along with it, congressional consideration of military appropriations which is now only on the

⁴⁸ See Roland N. McKean, "Evaluating Alternative Expenditure Programs," *op.cit.*

⁴⁹ See David Novick, *Efficiency and Economy in Government Through New Budgeting and Accounting Procedures*, The RAND Corporation, Report R-254, February 1, 1954. Also, "Weapon System Cost Analysis," The RAND Corporation, Paper P-794, February 24, 1956.

personnel, equipment, and installation lines should be replaced by consideration of choices between different kinds of military objectives, by broad classes of capabilities to achieve these objectives, and by different levels of alternative weapons systems.

In the absence of such output oriented programs and budgets, it is difficult for defense officials or congressmen to know how much we are spending for example, on all limited war capabilities; within this category, on tactical air power, at the next lower level on tactical missile systems, etc. These basic quantities should be well known to anyone with an over-all responsibility for defense matters.⁵⁰

This change, which is intended to produce a closer correspondence between missions and budget categories, should work in both directions; that is, there should be a purpose or related set of purposes for each subbudget and a subbudget for each related set of purposes. If each subbudget corresponds to a set of objectives, relevant criteria can be constructed which will span a wider range of competing alternatives. For example, the Navy's ship-building budget now includes funds for minesweepers and for submarines designed to carry Polaris; the Air Force's major aircraft procurement budget includes funds for bombers and fighters. It would be better if the Navy were to have, for example, a subbudget for the Polaris *weapon system*, including not only the submarines but also the missiles, manpower, tenders, special port facilities, etc. The number of Polaris submarines should not be considered as an alternative to more minesweepers and carriers; Polaris should compete directly in the same budget with the ICBM, the land-based IRBM, and manned bombers.

Independently of these changes in budget procedure, the possibilities for improved allocations could be increased considerably if alternative allocations, in the large, of the same total budget, were constructed and tested. Also it would be desirable if budget preparation were closer in time to budget execution. The time required to prepare one budget is now very long, being of the order of two and a half years. This is largely attributable to the vast detail included in the budget, detail which can only serve to create a false impression of accuracy. The Defense Department should follow Professor

⁵⁰ Even with present budget procedures it would be possible to do cost accounting by output category. There are, of course, many uses for such a cost breakdown apart from the budgetary process.

Smithies' suggestion and adopt planning factors (statistical average cost estimates) for preparation of the whole budget, rather than the detailed accounting procedures now used.⁵¹ This would occasion no loss of significant information and it would shorten and simplify the budgetary process, thus freeing resources which might be used more profitably elsewhere.

With the budget structured in the manner suggested, it should be easier for "high-level" decisions to be made at "high levels" and "low-level" decisions to be made at "low levels." The desirability of this should be fairly obvious. At a high level, decision-makers can take into account a broader range of alternatives, and they can test the performance of alternative combinations of the systems under their purview against more general criteria.

Finally, somehow, a partial separation between the questions of budget level and allocation must be found, so that the extent to which this year's allocation can be used as an instrument to increase next year's budget can be reduced, and so that the problem of efficient allocation within a given budget will be faced directly. This will not be easy, and we do not wish to suggest that we think we have found a solution. For one thing, budget level and allocation are related intimately; the best budget level for any activity does depend upon the efficiency of allocation within that budget, and the allocation depends on the budget level. Moreover, budget levels must be decided upon somehow, and it is only natural that any agency should be represented in the process by which its budget is determined, since it knows best how the money would be used and what it would accomplish. But if an agency can bargain for more budget, it cannot be expected to act on the assumption that what it does has nothing to do with how much it receives. Doubtless, whatever is done to improve upon the existing situation will be imperfect. However, an interesting possibility, and one which illustrates the kind of idea which deserves some consideration, would be to require the commands and Services to prepare plans and budgets and to present each year, as a part of their budget submission, a five-year program based on a projection of the current budget, showing proposed expenditure year by year for the period. Such a budget would reveal the implications of current decisions for future expenditure. It would show, for example, the operating costs that will be incurred in the future if a new weapon system is procured this year. It would not be necessary

⁵¹ Arthur Smithies, *op.cit.*, Ch. XI.

that the budget for each of the five years be equal to the budget this year. For example, an agency might quite sensibly propose a large investment in the first year or two which would lead to savings later on. The point of the procedure would be to force into the open the implicit assumptions made about future expenditure and thus make them the objects of bargaining and control. Guidelines might be used which specify five-year totals and amounts of substitution permissible between years. The preparation of budgets of this nature would not be much of an extra burden if statistical cost factors (e.g., the average annual cost of operating a destroyer) were used instead of very detailed estimates. Moreover, the Services and commands already do have programs extending several years into the future. Furthermore, budgets are prepared in terms of new obligational authority required for the coming fiscal year, and not planned expenditures, and these requests involve projections over several future years anyway.

B. DECENTRALIZATION THROUGH THE USE OF BUDGETS AND PRICES

In order to reduce the volume of detailed decisions which are made centrally in the Department of Defense, consideration should be given to the idea of decentralizing much of the decision making by the granting of some spending authority to subordinate commands. We do *not* mean that these commands should be given complete authority over the spending of their budgets. As we pointed out earlier, the choices made with respect to one activity often affect strongly the level of performance of other activities. And many decisions with respect to the combat commands so directly affect the security of the country that they should not be delegated. However, it does appear that extensive spending authority should be given to the operating commands for the *current operation* of their forces and, in fact, this authority might be delegated within the commands to units as small as an air wing or a naval squadron or to still smaller units. For the most part, our military forces in peacetime engage in training activities and have outputs which are fairly specific and quantifiable. Moreover, the operation of many single units is a large one by standards of industry, often involving tens of millions of dollars annually.

In order for this spending authority to have any useful effect, it would be necessary to eliminate or modify many of the programs sent down from higher headquarters that deal not with questions of

what performance is expected of subordinate units but precisely *how*, in detail, the activities of subordinate units shall be carried on in order to attain these objectives. We believe, in general, that it is possible to set up measurable standards of performance for the current operation of subordinate units. Given these standards, unit commanders should have considerable freedom in deciding how to allocate their resources to meet the standards their superiors have set. For example, in the case of a bomber wing, the measurement of performance might include the combat readiness of bombers, the alertness of crews, and navigation and bombing skills as shown in bombing competitions, and the wing's safety record. Since such measures of performance of subordinate units must be assessed by higher commanders in any case, this would impose no additional burdens upon them, while higher staff levels would be partly relieved of the task of directing in voluminous detail such a vast organization.

In addition to having spending authority over operating budgets, limited authority over capital expenditures should be granted to operating commands. Perhaps a quite small percentage (say 5 per cent) of their capital budgets might be left to the discretion of these commands, for example, for the procurement of auxiliary equipment, for additional construction, or for additional research and development. The major part of the capital budget of combat commands should remain under the authority of those agencies which must take account of higher level criteria, including the important interactions we have discussed.

Out of their operating budgets, the combat commands should have to pay (in the sense of giving up something to get them, or getting something else for giving them up) for a broad class of supporting services. The principal source of funds for such activities as supply, depot maintenance, procurement, training, transportation, and medical services should come from the commands that use these services. No longer should most of these services be either free or of infinite cost (i.e., not available at all). Moreover, the using commands should have to pay not only for the direct cost of the supporting services consumed in peacetime but probably also for the capital cost of any excess capacity held in readiness for an emergency.⁵²

⁵² The problem of charging using commands for capacity is somewhat complicated by the fact that extra capacity may be used by different commands in different sorts of emergency. Airlift capacity might be claimed more by ground forces in one situation and by tactical air in another.

C. THE DEFENSE REORGANIZATION OF 1958

The main objectives of the President's proposal and the modified Department of Defense Reorganization Act of 1958 passed by the Congress were to facilitate the establishment of a system of unified commands and to promote more unified strategic planning, and to eliminate "harmful" interservice rivalry, especially in research and development, by strengthening the authority of the Secretary of Defense. We have commented on the second objective. What about the first one? The unified command idea has a great deal of merit. Unified commands (e.g., Strategic Air Command, North American Air Defense Command) are organized around missions. The choices that must be made in designing a force for a unified command are the kind that can be governed by a related set of criteria. These are the output oriented organizations we are seeking. They can concentrate attention on finding efficient ways of doing a relatively well-defined job. A well-designed unified command structure may, for example, be able to coordinate better the planning between the ground forces and tactical air forces meant to support them, and between the ground forces and their air-lift. The unified commands have another advantage also. It has been observed frequently enough that changes in technology have outmoded the traditional lines of separation between the Services. As circumstances and technology change, it is reasonable to expect that the present unified command structure will also become outmoded. Other missions and groups of missions will replace them. In these circumstances, the unified command system is much more flexible than the roles and missions of the separate Services. Unified commands are the creatures of the Secretary of Defense. They can be changed at his discretion without new legislation.

We have argued both for the retention of the separate Services as organizations with a good deal of autonomy able to pursue, within broad limits, improvements in their capability that will further both service and national interests in the long run, and for the unified commands which cut across service lines. In fact, we have argued that the power of the unified commands should be increased by giving them some budget authority. In effect, we believe in a mixed system which has both. In some respects, the 1958 Reorganization Act has moved the defense organization in this direction. It leaves the Department of Defense divided into an output or demand side and

an input or supply side. The Joint Chiefs of Staff and the unified commands represent the output side, the military missions. The separate Services supply the forces and weapon systems used by the commands. We believe that this kind of division has a great deal of merit, and that a mixed system which contains both unified commands and the traditional Services should be able to capture the advantages both of output oriented organizations seeking to accomplish definable missions and of competing separate services looking for ways of expanding their usefulness.

Of course, it is not surprising that this may create some problems. For example, the personal loyalties of officers to their separate services may conflict with joint planning at the unified command level. The competitive attitude which is appropriate in research and development is likely to be quite inappropriate for officers in unified commands whose job is to select a combination of weapon systems generally from more than one service. The purpose of the unified commands will be defeated if their planning staffs become interservice battle grounds. This problem is intensified by the fact that an officer's career is still in his own Service. The two ideas put forward by the President to ameliorate this—the ability of officers to transfer between Services and the making of promotion beyond the level of major general dependent on the Secretary of Defense—should help, but they are likely to leave a good deal of room for improvement.

The reorganization leaves budgeting and appropriations by Services rather than by commands, and this has the disadvantage that it leaves the commands without budget constraints within which they must do their planning. In fact, the change may have widened still further the gulf between planning and budgeting (or effectiveness and cost). "The unified commander submits his forces and his requirements to the Joint Chiefs of Staff,"⁵³ but there is no provision

⁵³ The budgetary procedure was described by General Twining in testimony before the House Armed Services Committee as follows:

Mr. Blanford. All right. Tell me who will submit the budgets for the forces assigned to unified commands?

General Twining. The Services actually put in their own budgets to supply their forces and whatever they need to carry out the unified commander's plan. The unified commander assembles his components. The unified commander submits his forces and his requirements to the Joint Chiefs of Staff.

If that is approved, then each Service gets the money to carry out its own part of the mission, just like it does now.

The Chairman. Let the committee understand whether the Service, as they do today,

so that he can and must trade forces on an equal budget basis. Nor is there provision that the separate Services, which will continue to present their own budgets, will support adequately the over-all mission-orientation of the commands.

There are several ways in which budgets could be introduced for the unified commands. For example, the Department of Defense could begin the budgetary process with guidelines sent to the Services for them to budget for those of their activities which are not in unified commands. In such a process, the forces requested of the Services by the unified commands would have to fit into the command budgets. Appropriations might be to a mixture of Services and commands, or entirely to the Services. There is especial value in appropriating funds to the separate Services for research and development so that they can develop new weapons, doctrine, and tactics and do long-run planning. The commands are too busy with recurring day-to-day crises to give adequate consideration to the future beyond the procurement of weapon systems already developed. In any case, Congress doubtless will want to see the breakdown of the defense budget by Services and it will want to be able to appropriate in such a way that the existence of the Services is preserved. Clearly, the best balance between the Services and the commands will be difficult to ascertain. There is no particular reason why the balance needs to be the same for each combat mission and for each service supporting function. However, with ingenuity, it ought to be possible to construct a mixed system which can reconcile these conflicting aims in such a way as to be a distinct improvement over the existing arrangement.

makes the request for the money, or the Joint Chiefs of Staff takes into consideration their unified commands?

General Twining. The Services will do all the budgeting, but their over-all plan is approved by the Chiefs of Staff. I am talking about the magnitude of them. But the Services do it.

Mr. Blanford. Then it is clear that it is the intent of this proposal that the budget requests for unified commands will go through the military Secretaries, that they in turn will support that budget request before the Appropriations Committees of the Congress?

General Twining. That is correct. That is my understanding.

Reorganization of the Department of Defense, Hearings Before the Committee on Armed Services, House of Representatives, 1958, p. 6,261.

COMMENT

ARTHUR SMITHIES, Harvard University

This paper is a clear demonstration of the fact that the economist has an essential role to play in deciding questions of administration and organization. Readers of the paper, including economists, may feel utterly bewildered by the complexity of the problems involved. But no one can deny that the questions raised by the authors are of central relevance, or that any discipline other than economics can provide the answers. Yet economists do not customarily find themselves members of committees to reorganize the Defense Department. Part of the reason is that, until recently, the economics profession has considered such matters beyond or beneath the range of their interests. Another point is that noneconomists fail to realize that an essential part of administration is to make rational choices among alternatives, subject to budget constraints.

I am afraid, however, that our authors have not provided us with a blueprint for the organization of the Department of Defense. Rather, they have produced an essay on the principles of decision-making that every defense official should read and consider. Perhaps that is the most important thing. Although they assert that the problem is one of organization rather than personnel, the quality of decision-making might be greatly improved if everyone, from the Secretary down, could take a graduate course at The RAND Corporation. As it is, reorganization plans seem to assume that Secretaries spring fully armed from the head of Jupiter. Since they do not, they should at least be provided with civilian and military staffs who are well-educated in the process of decision-making.

I should now like to turn to some practical difficulties that still leave me very perplexed.

1. The paper properly criticizes present procedures for concentrating on military inputs: personnel, procurement, maintenance, and operations; and proposes that the emphasis should be placed on outputs such as missions and weapons systems. But this is easier said than done.

The forces required to perform a mission are extremely hard to determine with precision. Perhaps the easiest problem is strategic deterrence of general war. The various components of a deterrent system are well known and the objective is clearly defined. But even

here the problem defies quantification. Many of the differences of opinion concerning the adequacy of the strategic force relate not to technical factors but to differences of opinion concerning the attitude of the enemy. What damage to his own territory would he regard as an acceptable price to pay for his objective? And what degree of certainty does he require that his losses will be held to the acceptable level?

When one considers limited war missions, difficulties increase. What is our mission in Southeast Asia; and what forces, in the hands of ourselves or our allies, are required to perform it with some reasonable likelihood of success? What are our requirements for mobile support forces when war can break out at any one of a number of places, or a number of them at once? Is economic aid in any sense a substitute for military aid? To what extent does our strategic deterrent deter limited attack? I have recently had occasion to consider our military problem in Asia, and have found that rational processes do not seem to yield conclusive answers. But this does not mean that the traditional emphasis on inputs is the way out of the difficulty. I am merely suggesting that whatever budgetary system is employed, there will be ample scope for the exercise of judgment and intuition.

2. The new reorganization of the Defense Department emphasizes outputs through the unified commands and inputs through the existing services, which now become supply organizations. Budgeting, however, is left with the services. This may tend to perpetuate the existing system of decision-making—despite the reorganization. On the other hand, to transfer budgeting to the unified commands would probably mean that consideration of feasibility would be unduly neglected. Interestingly enough, the problem thus posed does not seem to have received any consideration when the new arrangements were made.

Perhaps the correct answer is that budgeting must be a highly centralized operation conducted by a staff, in the office of the Secretary, which will take due account of mission requirements and supply considerations. The Defense Comptroller would be an adjunct of such a staff, rather than a high authority on strategic matters.

3. The paper does not tell us how to deal with the question of allocation between the present and the future. How much of our current resources do we put into immediate strength and how much

to strength in the next decade? How much do we spend on weapons systems that we know will be obsolete in a few years? Should we take increased risks at the present time in order to allocate more resources for research and development? How should the research and development program itself be devised with due regard for the great uncertainties of the future? I cannot think of any answer except to say that decision-making should rest in the hands of officials who are prepared to pose and answer the right questions—even though the answers must rest heavily on their own judgment.

4. Finally, the paper is confined to decision-making within a given budgetary constraint. It does not deal with how the constraint itself is determined. It correctly deplores the notions of obsolete requirements on the one hand or budget ceilings on the other, but does not present an alternative. How is the President or the Congress to decide whether the defense budget should be \$30 billion, \$40 billion, or \$50 billion? Is there any practical alternative to the adversary procedure in which the Secretary of the Treasury says that the economy cannot stand more than x billions, while the military authorities assert that the country cannot be defended for less than y billions? Can the President feasibly present anything other than a single-figure recommendation to the Congress?

One obvious answer is that budgets should be submitted in the form of alternatives. The President should have an opportunity to consider the implications of \$30, \$40, and \$50 billion budgets and to achieve his own balancing between security risks and domestic costs. But this suggestion ignores the fact that within the Defense Department the budget results from competition among unified commands or services and that outside it defense has to compete with agriculture, public works, veterans and the taxpayer. Since the future of the country is not to be ordained by an all-wise rational being, the budgetary process must contain a strong bargaining element. But this does not mean that processes of rational choice must be discarded.

I come back to an earlier point. I believe the kind of work Enthoven and Rowen are doing is invaluable. It may lead to significant changes in organization and formal procedures. But its main contribution may be in the education of the people who have to make something like the present system work.