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Roles of the Bureau of the Budget

William D. Carey

Perspectives on the Bureau of the Budget are wondrously diverse. Experts on Presidential government see the bureau as the right arm of Presidents in the decision-making ordeal. But those left holding losers' stubs in the budgetary sweepstakes take a less generous view. A well-known scientist thinks that the budget bureau "has no place in a democratic society." A distinguished political figure recently said that, while he had learned to respect the budget bureau, he had not yet learned to love it, and that if left to itself it would "reorganize its own Mother right out of Mother's Day." From a Senate committee comes the judgment that "what we need is a stronger, not a weaker, Bureau of the Budget. They are, and must always be, the President's men."

The bureau came forth from an act of Congress in 1921, the result of years of striving for reform of federal fiscal practices. Prior to that time, federal departments were left happily to their own devices in expressing their wants to the Congress, with little or no Presidential involvement. The legend is that one Treasury Department employee had the duty of packaging up the estimates each year in the "Book of Estimates." The aim of Congress was to provide for a modern executive budget in a setting of Presidential responsibility. At first the bureau was housed in the Treasury for rations and quarters, but its chief was the President's man. General Dawes was the first Director of the Budget, a two-fisted individual who imposed a reign of terror and said, when accused of taking over policy-making authority:

> The Bureau of the Budget is not concerned with policy, for that is the province of Congress and the President. Their job is to pilot the ship of state, while we shovel coal down in the stokehole. It is a humbler place. We do not give the orders, we merely see that they are carried out. If the Congress, in its omnipotence, were to pass a law that garbage should be spread on the White House steps, it would be our duty, in a nonpartisan and nonpolitical way, to see that the largest possible amount of garbage was spread on the White House steps in the most efficient and economical manner.

In 1939 the bureau became the main staff unit of the new Executive Office of the President. This followed a study commissioned by President Roosevelt to examine the Office of the President as to its capacities for effective administration of a government vastly different from what it had been in 1921, as the result of New Deal legislation, altered philosophies of government's role in a changing society, and the threat of war abroad. The President's Committee on Administrative Management called for stronger executive management through providing the President with planning, budgeting, personnel management, and general staff arms to help him get his job done—and all this through people "with a passion for anonymity."

Since 1939, Presidents have looked to the Bureau of the Budget to help them in a number of ways:

1) As a general-purpose staff, to see to it that the far-flung Executive Branch is responsive to Presidential policies and priorities.

2) To review and critically examine expenditure proposals as to merit, costs, alternatives, and timing.

3) To appraise proposed legislation in terms of its acceptability and consistency with the program of the President.

4) To come up with proposals for reorganization of executive departments and agencies in order to improve efficiency and economy.

5) To see to the coordination of government programs and policies, as an arm of the President.

6) To keep the President informed on the performance of executive department and agencies.

7) To work for the improvement of budgeting and management throughout the government. And, finally,

8) To coordinate programs and systems of data collection and reports.

That's a large order. I would be naive to claim that the bureau is able to deliver as much as we would like, consistently and well. But what drives the staff of the bureau is its awareness of the appalling scope of a President's job, and of the expectations that crowd in on him. Our role is to supply him

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with an additional margin of time and analysis that will make performance of his job possible.

The bureau and its role in government cannot be assessed solely in terms of the budgeting function. What the bureau tries to do can only be grasped in context—in the context of the Presidency. It is there that decision-making occurs. It is there that alternatives are examined and priorities worked out. Whether it be a budget bureau or some comparable machinery, any President needs an independent analytic staff which can help him find his way through the positions and counterpositions that surround every important question.

Controversy

It is inevitable that controversy touches the bureau. All the matters we deal with are by definition controversial. The government overspends or underspends. It does too much, it does too little. Depending on where you stand, space exploration is the finest expression of our technological genius and our scientific ethic or merely an expensive public entertainment. Men divide on all such questions of public policy; but public policy is what government is all about. No matter how the decisions come out, dissent is sure to follow. And it is elementary that, in the administration of power, a President must make choices and use staff machinery to help him in his analysis. If the bureau must on occasion be marched to the woodshed, we suffer it calmly as the price to be paid for the privilege of working with the President.

But it is the budgeting process that attracts the fury of those who are critical of decision-making. And the truth is that policy is very often decided on the basis of the issues that come up through budget-making channels. It is one thing to be "for" many things that are socially appealing, but it is another to back up such preferences with the necessary public investment. Policy is made by navigating precariously through a network of decision points, and the discipline of the budget system has a decision-forcing effect. Given the plurality of national goals to which we are committed in one degree or another, the budget is an exercise for relating resources to priorities with a semblance of rationality and relative justice.

Problems of Choice

One of President Eisenhower's budget directors once said that budgeting results in the uniform distribution of dissatisfaction. But, for a President, budgeting involves hard choices. It is seldom that a budget reflects what a President wants. For one thing, the budget in any given year has surprisingly little elasticity when one factors in the massive costs of defense, interest charges, veterans' benefits, and mandatory payments of various kinds. Only about one-fifth of the total expenditure budget is discretionary; the remaining four-fifths is the unseen part of the iceberg. Moreover, uncertainty always hangs over budget-making, and today uncertainty means the course of events in Viet Nam and the danger of inflation at home. The point is that any President has much less room to maneuver than is generally supposed, and his lot is never a happy one.

The budget bureau helps the President with problems of choice—the role in which it is of greatest use to him. In the purest sense, choosing well means selecting those alternatives which result in maximum gains relative to costs—because every gain entails some cost. Budgeting is not a process designed to buy consensus by making everybody just a little bit happy. When the federal budget was only $3 billion a year, the question of choice was not as important in the country's affairs. But when annual cash expenditures in the federal sector of the economy are verging on $170 billion, choice takes on a more urgent meaning.

In all this, the role of the bureau is not to apply some esoteric formula for sorting out goals and priorities on the assumption that it possesses a special wisdom as to what is best for the nation. We have no such illusions. But neither do we shut our eyes to the problems of the human condition and the need to deal with such problems. We start from the standpoint of public investment strategy; somewhat ideally, this involves examining expenditure proposals and alternatives in terms of effectiveness relative to cost. In other words, if a proposal meets the test of intrinsic merit, it does not go into the budget automatically. We would also have to be shown that it is better than other proposals for meeting the same need, and that it has an edge from the standpoint of achieving returns greater than the cost of the investment.

To be sure, this process is neither perfect in practice nor fully attainable in the present state of the art and processes of politics. In government, we have come only recently to the use of analytical techniques that have long been regarded as conventional in large private enterprise. Government probably can never be completely cold-blooded in judging the worth of social investment. As long as I care to look ahead, decision-making in government will remain a mixture of compassion and calculation. But I sense that public opinion today expects government to make its decisions and choices by a more rational process than simple reliance on good intentions and sloppy altruism. Given the prodigious costs of almost any modern governmental solution to critical problems, mistakes become conspicuous and losses become more than the system can tolerate. When these considerations are put alongside the fact that every decision to invest in a new program means giving up some alternative, the case for objectivity in making choices is strong.

Investments in Human Resources

In recent years our definition of investment has come to include the field of human resources, despite the inherent problems of measuring costs and benefits. We know that investment in education is more than socially "good"; it is economically productive. The economists can show that the rate of return on investment in elementary schooling is about 15 percent; for high school education the rate is over 11 percent; for college, better than 10 percent. These returns look good when compared with investment in the business world. Much the same story applies in medical science, where it has been shown that increased life expectancy has increased the labor force by 25 percent and the accumulated value of this increased labor output is in the range of $800 billion.

What this suggests is that we are coming to a new understanding of the returns to society of investments in human resources. These investments can no longer be scorned as handouts by soft-headed social reformers. We are acquiring a clearer grasp of the role of public expenditures in creating new assets on the books of society.

And the decision-making process in government is advancing along with

these concepts. The role of hunch and intuition is yielding to systematic analysis, though not without resistance. If we are to seriously upgrade decision-making by the thoughtful consideration of alternatives, we will have to be more careful about defining our objectives, identifying alternative strategies, working out measures of effectiveness, recognizing uncertainties, and analyzing costs and benefits. The reason is not just that these approaches illuminate the darker corners of decision-making, but that mounting demands for government services are leading to greater competition for dollars and forcing us toward priorities.

Budgeting for Science and Technology

When we come to budget for science and technology, the bureau's objective is to see that the government's investment is adequate, well-justified, reasonably well balanced, and sensibly related to what the budget can stand. But we do not start out by attempting to assemble R&D as a universe and then carve it up by disciplines. In a perfect world this might be the way to do it, but that is not our world. We view federally supported science as inherently pluralistic, and we prefer to examine it in the administrative environments which give it mission-relevance. If science were programmed as a universe, then it probably would be budgeted that way—but not necessarily for the better. So the R & D component of the federal program is not poured from a mold; it rises to the surface as needs and opportunities are identified within mission frameworks. To provide the added perspective and healthy criticism needed by these arrangements, we look to external science reviews (by the President's Science Advisory Committee, the National Academy of Sciences, and the Congress), and these inputs frequently serve to nudge the mission agencies into adjusting research priorities.

Science has no "special status" in the budget, in the sense of preferred claimancy. Advocacy therefore is as necessary for research as it is for other discretionary investments. Sometimes this advocacy is effectively built in through the imperative of a national priority, as in the case of space exploration, and in some other areas it is felt through the vigor of a highly dependent clientele. But, in the main, the case for research is made by the responsible mission agencies. They, in turn, are obliged to make choices, within their total frame of responsibilities, on how to ration their advocacy, since R & D competes with other objectives. Admittedly, from science's viewpoint this is a chancy process when left to run its own course, and it is for this reason that the President's Science Adviser has the important role of assisting the balancing process by taking part in the formulation of budgetary recommendations to the President.

We in the Bureau of the Budget do not attempt to review all the details of R & D budgets. This would be impossible, even if it were desirable. There must be a large element of confidence in the quality and responsibility of planning and project selection at the level of the supporting agencies; otherwise the system would become infested with second-guessers.

But we can review the major points of justification for science budgets, interpose challenges where the justifications display a high fog index, and focus on considerations of need, timing, and costs. We do not hesitate to question the merit or usefulness of high-cost R & D proposals. But, in general terms, the final stages of budgetary review come down to a selective process which identifies critical questions from the perspective of the total program and budget of the President. Final outcomes will be settled in part by this system of review, but they will be resolved also by taking account of such external factors as public opinion, congressional preferences, and international commitments.

I am frank to say that problems of choice are not simple to deal with in R & D. This is a highly judgmental field, partly because of the dynamics of science and also because criteria of choice are scarce. In medical research, the task is to decide how much good research in the various disease categories is ripe for support, and then trim opportunities to the available dollars. But when one moves from a discrete area and attempts choices among competing disciplinary claims, the footing becomes precarious. To put it in its worst terms, there are no objective criteria to help in making a choice between investing in a new accelerator and investing in a large-scale ocean-coring program. A decision will still be made, based on the available evidence and a liberal dose of sophisticated judgment, but it may not be the decision we would reach if it were somehow possible to compare the social costs and benefits of the alternatives.

Because rationing enters into resources allocation, even for science and technology, choices are often made at the margins. For example, years of investment may have gone into preliminary development efforts to achieve a technologically feasible advanced rocket propulsion system, yet, even when the feasibility questions have been resolved favorably, there is still likely to be an issue over whether or when to proceed with investment in the actual hardware. On one side, it will be necessary to consider the accumulated technological momentum, the state of the art, and the existence of facilities and a nucleus of skilled people with an itch to move to the next square; but, on the other side, one has to weigh the opportunity costs of massive single-purpose expenditures, alternative technical means for obtaining acceptably equivalent efficiency with more conventional hardware, and trade-offs against other requirements within a cost-limited total program level. The crunch is always painful for all parties, and the decision may be slow in coming.

As for basic research, cost-benefit analysis does not get us very far, and we prefer to budget for basic research with level-of-effort judgments bolstered by such evidence as exists as to the capacities of academic science to absorb support. We certainly do not attempt to subject basic research budgets to a project-by-project review. It is another matter, however, when one has to consider the problem of balance in basic science, and in recent years the bureau and the Office of Science and Technology have joined in making selected cross-cutting reviews of multiagency basic research support in such areas as high-energy physics, oceanography, and atmospheric science, in order to achieve as much as possible in the way of balanced planning and funding.

But the level-of-effort rule for basic science has to yield when we come to conspicuous investments such as those for the large accelerators, the Mohole, or the meson facility. These are costly enterprises. They are speculative, as all basic research must be. Disproportionate support for these "capital-intensive" efforts may mean that fewer dollars are available for other work in

basic science. Consequently, such major enterprises must be examined outside the normal level-of-effort framework. And since the economics of choice do not help much in dealing with such matters, the politics of choice may govern—such factors, for example, as national scientific posture.

From all this one can gather that budget decisions affecting science are among the hardest to make. What has to be remembered is that decisions affecting research are frequently as opportunistic as those affecting other public investments, in the sense that they are made in a bargaining process that is common ground for all problems of choice. There can be no fail-safe procedure to eliminate risk in budgeting for science.

In the folkways of bureaucracy, the role of the Bureau of the Budget tends to loom bigger than life. Political and behavioral scientists have begun to probe this phenomenon, with results that threaten to expose us as human, after all. Still, the legends persist. One is made to feel that spine-chilling rites are being practiced in the quaintly Byzantine edifice next to the White House. This is largely our own fault, for taking to heart the counsel of anonymity. We suffer in silence and bury our dead quietly. Victories go uncelebrated, defeats unrecorded. Yet there is in the bureau's character a saving streak that recalls the opening line of *Scaramouche*—he was born with the gift of laughter and a sense that the world is mad.

As this is being written, the 1968 budget is before the Congress. Though its prose is sedate, one can hardly miss the signs of ordeal that marked its preparation. Painful choices are apparent, and the ends-means squeeze starkly visible. With all this, expenditures for R & D are budgeted to increase by one-half billion dollars, to a record high of more than $17 billion. Funds for development will be smaller, while outlays for research will be significantly greater than in the current fiscal year. It may not be an affluent growth pattern, but neither does it justify gloom and predictions of doom. In the marine sciences, in urban research, in basic science, in weather research, and elsewhere, some gains have been managed. Under less trying circumstances the outcome might have been considerably better for science, but, by any reasonable measure, the aggregate level of investment is massive and growing.

But size and trend are not indicators of balance or of social returns on investment. This is precisely why it is always open season when the budget sprints across the political horizon. As a moving target it brings out the sportsman in each of us.

Mechanisms of Enzymatic Bacteriolysis

Cell walls of bacteria are solubilized by action of either specific carbohydrases or specific peptidases.

Jack L. Strominger and Jean-Marie Ghuysen

During the 1920's, Fleming worked extensively with two types of bacteriolytic agents, one present in nasal secretions and other animal tissues (*1*) and the other secreted by a penicillium mold (*2*). It is a remarkable fact that the modes of action of these two types are now known to be fundamentally similar. Each brings about a loss of integrity of the cell wall of bacteria, and, as the consequence, the organisms are unable to survive. However, these two types of agents, one an enzyme (called lysozyme by Fleming) and the other an antibiotic (penicillin), bring about their effects on the integrity of the cell wall through entirely different mechanisms. Penicillin interferes with one of the terminal steps in synthesis of the bacterial cell wall, a cross-linking reaction catalyzed by peptidoglycan transpeptidase (*3*). Its effect on wall synthesis is highly selective, and no other metabolic processes in bacteria are known to be inhibited under conditions in which cell-wall synthesis is virtually totally blocked. Inhibition of cell-wall synthesis is also the mode of action of bacitracin, vancomycin, the ristocetins, and D-cycloserine. On the other hand, lysozyme is an enzyme which catalyzes the hydrolysis of a structurally important linkage in the cell wall, and, as a result, this complex polymeric substance is solubilized (*4*). In fact, lysozyme is only one of a class of enzymes that hydrolyze bacterial cell walls. Many of these enzymes are bacteriolytic; they lyse intact bacterial cells. Although a great deal of attention has been given to antibiotics, that is, substances of relatively small molecular size which are produced by some microorganism and kill others, comparatively less work has been done on another large group of bacteriocidal substances found in nature, the bacteriolytic enzymes.

The possible presence of bacteriolytic enzymes in bacteria and in animal tissues was recognized early in this century, and interest in this group of agents was revived during the 1920's when Fleming (*1*) conducted his extensive studies of the bacteriolytic enzyme in animals and Lieske (*5*) and Gratia and Dath (*6*) carried out similar studies of the bacteriolytic agents excreted by *Streptomyces* strains. The latter were shown to be enzymes by Welsch (*7*). Indeed, Gratia attempted to produce soluble antigens through the action of these bacteriolytic agents on microorganisms. During the next decade, lysozyme was crystallized from egg white and was shown to be a glycosidase. Its natural substrate is the polysaccharide of the bacterial cell wall (*8*).

Plants, as well as animal tissues, contain bacteriolytic enzymes. These enzymes are also produced by various microorganisms under many circum-

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