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ORIGIN AND HISTORY OF PROGRAM BUDGETING

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For the next half-hour, I shall be talking about the origin and history of program budgeting as part of the Civil Service Commission's orientation and training courses for the Planning-Programming-Budgeting System (PPBS) which was introduced by the federal government in August 1965. The occasion for this can be viewed from two angles: First, the intellectual or scholastic one that claims people do a task better when given an understanding of the background and roots of the process in which they are engaged. The other, and probably the more appropriate one, is to try to deal with comments that have been made from time to time about the Planning-Programming-Budgeting System either as something brand new or something that is specifically designed for application to the military or Defense Department activities.

As I hope to indicate over the next half-hour, the program budget has a rather ancient and hoary origin and it did not start in the Department of Defense. There are two roots of this concept and method: one in the federal government itself where program budgeting was introduced as part of the wartime control system by the War Production Board in 1942; the other root--an even longer and older one--is in industry. To be honest with you, I don't really know precisely when or how the program budget was introduced in business.

In 1959, after I had been writing about PPBS for more than five years, I had a visitor who said he had only recently become familiar with my proposals, and on reading the material he thought I'd be

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interested in his experience along the same lines. He gave me a set of written documents--General Motor's Budget and Finance Procedures for the Year 1924.

The visitor was Donaldson Brown, who had retired as Chief Financial Officer of General Motors and who was until his death a member of the Board of Directors of DuPont. According to Mr. Brown, by the time that DuPont made its investment in General Motors, DuPont was already using something very much like a program budget system. And, this way of planning and budgeting was one of the major innovations in General Motors after the takeover.

Let me start by talking about the part of the origin that identifies to the federal government because this is the one in which I was closely involved and with which I therefore have a greater familiarity.

In the early summer of 1940, President Roosevelt created the National Defense Advisory Commission which was to assist our friends or "allies-to-be" in facilitating their war efforts. To do this, we undertook a variety of new or expanded production efforts and a number of new construction projects. In all of this, the building of ships and shipyards and the construction of new factories, one item of demand was common--overhead cranes.

As a result, by late 1940 the first of what was to become our World War II controls was introduced--a limitation order controlling the schedule of distribution and use of overhead cranes. This was followed over the next year and a half by a series of orders that copied the pattern of control of industrial production and distribution that had been used in World War I.

There was a limitation order dealing with aluminum as the aircraft demands made this metal in short supply. There were orders dealing with various alloying materials, as hard steel demands for military equipment increased. There were orders stopping the production of pleasure automobiles to cut back the use of materials like chromium and components such as ball bearings, and so on. The result was that even before the war had started, by the summer of 1941 we had a real traffic jam in our control system.

The military were using authority that had been given them to place priorities for deliveries of finished products such as tanks, aircraft, ships, and the like. The civilian supply agency also was authorized to place priorities on steel, copper, aluminum, and other materials for milk pails, medical and hospital supplies, and other essentials.

There were a great many priorities and these priorities soon started to outstrip the available supply. As a consequence, it became apparent that this way of doing business--separate controls for each situation--was not likely to work. In the early fall of 1941, a scheme which I developed--the Production Requirements Plan--attempted to deal with the priority and allocation problem on an across-the-board basis. Shortly after Pearl Harbor, this was made a mandatory nationwide system.

However, the Production Requirements Plan had been designed as a stopgap measure. That is, recognizing that the military did not know what was required to build their ships and planes and tanks, and did not have a schedule that could identify delivery in appropriate time periods, and did not have a way of effectively controlling the dollar volume of contracts placed, there was one essential need--to identify these fundamentals.

The Production Requirements Plan was designed to identify the material and component requirements for contracts that were being placed by the military, and probably more importantly, to measure the inventories and capacities of America's producing industry. It was an interim step on the road to a program budget in that it provided the first overall picture of the United States' needs and resources for war.

From this we learned that we could not look at one thing at a time, be it airplanes, ships, or stainless steel milk pails on the demand side; or steel, aluminum, overhead cranes, and ball bearings on the supply side. As a consequence, by early 1942, the War Production Board was looking at the total of military requirements and the total of war-essential civilian requirements in terms of a series of identifiable groupings; and, perhaps more significantly, these groups were being studied by the analytical tools then available.

The essential features of the situation can be made rather simple. Although we needed all the airplanes that we could get, all of the airplanes were not that important. At some point, roller bearings for the 2000th B-17 were less important than the roller bearings for a refrigerator in a municipal hospital. At some point, the 1000th tank of a certain type was less important than the stainless steel milk pails essential for milk to be supplied to either soldiers or civilians. As a consequence, the War Production Board learned the need for weighing and evaluating, and this led to the introduction in late 1942 of the Controlled Materials Plan.

The Controlled Materials Plan is to my mind the first program budget used in the federal government. It usually is not so identified because the budgeting was done in terms of copper, steel, aluminum, and other critical material rather than dollars, and for most people budget is associated with dollars. However, in choosing the media of exchange--copper, steel, and other critical items--we were recognizing that in 1942, dollars were less meaningful than physical resources. Currency could be created by fiat and without restraint, whereas materials of the type labelled as controlling were limited in quantity and their supply could only be increased by slow, and usually resource-demanding, expansion.

As a consequence, for the balance of World War II--that is, from 1943 through 1945--we effectively controlled the system of production in the United States and the distribution of output from that system through the Controlled Materials Plan, which was the first federal program budget. I call it a program budget because it had the following characteristics:

I. Identification of major goals

- . United States or allied combat needs
- . Essential civilian requirements
- . Other essential military or civilian demands
- . Aid to friendly nations
- . Economic warfare

II. Each major goal was identified in program objectives; for example:

A. United States Military

1. Combat theater equipment and supplies
2. Combat support
3. Zone of interior activities

III. Program objectives were further defined in program elements, for

1. Combat theater equipment and supplies
 - a. aircraft
 - (1) (further defined by type and model)
 - b. tanks
 - (1) (broken down into size and purpose categories)
 - c. automobiles
 - (1) (identified as trucks, jeeps, personnel vehicles, etc., and trucks further refined into size and use categories)

IV. Programs crossed service lines so as to identify land, sea, and air forces as well as essential non-military contributions to identified objectives.

V. There was an extended time horizon. A budget was prepared every three months or quarter and it was projected for 16 periods, that is, the next quarter and the 15 succeeding ones.

VI. Alternatives were examined and systematic analysis was made of both supply and requirements. Some times this meant resources were augmented by stopping production; the outstanding example: gold mining. This provided additional labor and equipment for other mining activities. In other cases, essential needs were met by "freezing" inventories and controlling distribution as was done in the case of passenger automobiles. In every case, the action was the result of analysis.

Our systematic analysis was not necessarily systems analysis in the breadth and depth we now identify to such studies; but under the Controlled Materials Plan we did cost-effectiveness analysis even if it did not have the sophistication which we expect today. However, in terms of the state-of-the-art of the time, I think the analytical and related methodology used in our World War II Controlled Materials Plan can be properly identified as a program budget.

The next steps in the federal development of a program budget took place in the Bureau of Reclamation, the Coast Guard, and some few other government agencies, and at RAND. I shall detail the RAND activities.

Early in its history, RAND decided that the traditional standards for choosing among preferred means of warfare of the future--for example, for aircraft, higher, faster, more payload--were not the only ones and so expanded the criteria into what is now known as weapons systems analysis. The first of these studies was completed in 1949 and in it a number of new factors were introduced--e.g., social, political, and economic--so that the study aims went beyond what the specific piece of equipment would do, and added considerations such as demands on the U.S. economy, and impact on the economy of the enemy. With the wide range of considerations in systems analysis, it was determined that there was only one way to bring this heterogeneous group together, and that was with the common denominator of the dollar.

At that time, RAND looked to the Air Staff for its data, and the dollar data were made available in the traditional form; that is, budget and financial information in terms of equipment, construction, personnel, and the like. Although there had already been some efforts in the Air Staff to develop a means for looking at weapon systems, these had not proceeded very far and as a consequence the traditional budget and financial data were something less than satisfactory for weapons systems analysis as developed at RAND.

If one wanted to do a systems analysis in which there would be a comparison between various types of bombers--for example, the proposed B-47 and B-52 and the existing B-36, B-29, and B-50-- the data just were not available. When RAND decided that it would have to engage in a more detailed analysis of the economic requirements of the proposed weapons systems, it became necessary to examine in considerable detail the available sources of information.

After several years, it became apparent that these would not provide the answers if they were maintained in the existing and traditional form. As a consequence, in 1953 there was a RAND publication¹ proposing the first program budget to be applied to the Air Force. It also suggested that the methodology could be extended to the total of military activities.

The Air Force accepted this document with something less than complete enthusiasm, and as a consequence the idea was kicked around for many years. Let me say as an aside that although the Air Force did not endorse the idea, it also did not prohibit, or in any way interfere with, RAND continuing to expose the concept. The consequence was continued study and publication at RAND of ideas which we now associate with the program budget. This led to a culmination in 1960 in two documents--one, The Economics of Defense in the Nuclear Age;² the other, New Tools for Planners and Programmers³--which were brought to the attention of persons in the incoming Kennedy Administration who generally agreed that this might be one way of facilitating the treatment, analysis, and study of one large segment of the United States budget, namely, the military components.

And, as you know, in 1961 the initial effort was launched in the Defense Department and it has continued since that time. Program budgeting in the Department of Defense has been the subject of various types of criticism. Maybe I'm prejudiced, but to me most of it sounds very complimentary.

Turning again to the historical stream, as indicated at the outset, I really don't know when the DuPont Company came up with the idea of a program budget. However, as indicated earlier, they introduced their concept into General Motors in the very early 1920s. The important thing, I think, from our point of view, is that whether we're thinking of the application in industry or in government, we all have one common objective in the Planning-Programming-Budgeting process. That is not just to identify resources for administrative purposes per se in terms like real estate, equipment, personnel, supplies, and so on.

The PPBS method is to set forth certain major objectives, to define programs essential to these goals, to identify resources to the specific types of objectives and to systematically analyze the alternatives available. I think this may be made more simple by illustrating it in automobile industry terms. For example, at General Motors it means not only dividing up between Chevrolet and Cadillac divisions and the other major lines that General Motors produces. It also means

within the Chevrolet line, identification of objectives in terms of price classes, categories of cars that they are trying to sell, and setting up specific programs for each of them. Then they calculate the resources required and the potential profits and losses under various conditions.

Now the world "potential" immediately introduces one of the major factors in the program budgeting system. That is, that we are dealing with uncertainty. In the typical budget proposal, we usually look at a relatively short period of time--that is, one year--and in handling that, we assume that we have complete confidence and knowledge about what will transpire.

As all of you know, the truth of the matter is that even within as short a span of time as a year, things happen and events do not work out exactly as planned. As a consequence, even then there is an element of uncertainty. One of the major features of the system that was introduced in Detroit was the fact that they were not planning just for next year's automobile, and had to deal with uncertainty in terms of four, five, or more years in the future.

In the current time period, next year's model or the automobile for year I is a fixed thing with only a little possibility of change. The article for the year after that or Year II, is almost a fixed thing because commitments must be made to long lead-time items as much as 18 months in advance. Even the automobile for year III is fairly well developed at this point in time and they are also planning for automobiles for years IV and V.

In other words, Detroit continuously has five model years in planning, as well as one model in production. And, they look at all of these in terms of all of the possible alternatives with respect to market conditions, the kind of competition that they will be facing, the changes in income for their customers that can be projected, and the like. And this leads to a broad range of studies or systematic analyses. In addition and on top of this, they are at the same time treating of the capital investment program, because by and large they cannot make capital investments for an automobile more close at hand than year VI. In fact, if a change requiring investment in new plant

is to be made for an earlier period of time, they must take into account the tremendous upset and additional costs that will be involved.

I hope that this rather generalized illustration of the way in which automotive planning, programming, and budgeting is done, gives you a better feel for just what is done in the system developed and used in Detroit.

Let me digress a moment, because although I didn't identify it, the concept of systems analysis, which again is closely identified with program budgeting, did not really originate in program budgeting per se. Systems analysis always has been a part of the work of competent engineers and engineering firms. Probably the greatest innovations in systems analysis were initiated in the 1920s in the Bell Laboratories. Actually, in many respects the Bell Lab's method of analysis then and today bears a close resemblance to what we called "weapons systems analysis" in the Defense Department or in other organizations such as RAND.

There is one major distinction and I think it is worth noting. That is, that the engineers (and this includes the Bell Laboratories) oriented their thinking largely, and sometimes exclusively, to the hardware or the equipment considerations.

Although they sometimes introduced economic, social, and political aspects, they treated these in a very primitive way. And I think the great significance of the change that we call weapons systems analysis today is the broadening of both the nature and content of the analysis.

In all of this, quantitative aids are of great importance, and we want to quantify as much as we can. But as has been stated repeatedly by Mr. McNamara; by Mr. Hitch, when he was Assistant Secretary of Defense (Comptroller); by Mr. Enthoven, the first Assistant Secretary of Defense (Systems Analysis); computers and quantitative methods are not decisionmakers. They are, instead, aids to the decisionmaking process. They are aids in illuminating the issues. Today, I think most of us realize that we are not talking about computers as the decisionmakers in the PPB process. In fact, I think we realize it is "Anything But."

In fact, it is recognized that as important as, and in many cases more important than quantitative considerations, are problems of a

qualitative nature for which we do not have numbers. This does not mean that analysis is not possible just because we cannot quantify. On the contrary, there are many ways of analyzing qualitative problems and it is an essential ingredient of this process that we undertake to do a substantial amount of qualitative analysis in addition to the quantitative work.

As you all know, and the reason that we are here is that in August of 1965, President Johnson said that this system which has been so successful in the Defense Department was now to be applied to all the executive Offices and Agencies of the United States Government. Even though there is a long history of program budgeting, even though it originates outside of the federal establishment, even though there are some 25 years or more of history that we can identify to the activity within the federal establishment, the truth of the matter is that the problem that we are now facing--that is, the application of the PPB concept to new areas of interest--is a new and very difficult one. And, one of the major problems is that of identifying the missions, the objectives, or the goals, not only of the federal establishment as such, but of each of the offices and agencies which make up the total of the executive department.

I think our Planning-Programming-Budgeting System offers all the advantages that President Johnson set forth in his 1965 announcement. It will be up to you and the others who are working on the problem in the federal establishment to give us as a nation the benefit of this new way of doing business.

REFERENCES

1. Novick, D., Efficiency and Economy in Government Thru New Budgeting and Accounting Procedures, The RAND Corporation, R-254, December 3, 1953. See also:

Fisher, G. H., The World of Program Budgeting, The RAND Corporation, P-3361, May 1966.

_____, D. Novick, "The Federal Budget as a Business Indicator," reprinted from Harvard Business Review, Volume 38, Number 3, May-June 1960, pp. 64-72.

Hirsch, W. Z., Integrating View of Federal Program Budgeting, The RAND Corporation, RM-4799-RC, October 13, 1965.

_____, Toward Federal Program Budgeting, The RAND Corporation, P-3306, February 8, 1966.

Novick, D., A New Approach to the Military Budget, The RAND Corporation, RM-1759, June 12, 1956.

_____, System and Total Force Cost Analysis, The RAND Corporation, RM-2695-PR, April 15, 1961.

_____, Which Program Do We Mean in "Program Budgeting?", The RAND Corporation, P-530, May 12, 1954.

_____, The Federal Budget as an Indicator of Government Intentions and the Implications of Intentions, The RAND Corporation, P-1803, October 1, 1959.

_____, "Costing Tomorrow's Weapon Systems," The Quarterly Review of Economics and Business, Volume 3, Number 1, Spring 1963, pp. 33-40.

_____, "Planning Ahead in the Department of Defense," reprinted from The California Management Review, Volume V, Number 4, Summer 1963, pp. 35-42.

Quade, E. S., Systems Analysis Techniques for Planning-Programming-Budgeting, P-3322, March 1966.
2. Hitch, Charles J., and Roland N. McKean, The Economics of Defense in the Nuclear Age, A RAND Corporation Research Study, Harvard University Press, Cambridge 38, Massachusetts, 1960.
3. Novick, D., New Tools for Planners and Programmers, The RAND Corporation, P-2222, December 1960.