INTERVIEWEE: DR. ALAIN C. ENTHOVEN (Tape 1)

INTERVIEWER: DOROTHY PIERCE

December 27, 1968

P: Today is Friday, December 27, 1968. The time is 10:30. This interview will be with Dr. Alain C. Enthoven, Assistant Secretary of Defense for Systems Analysis. We are in his offices; and this is Dorothy Pierce.

Dr. Enthoven, you were nominated and confirmed for your present position in July 1965, but you've had association with Defense-related work since becoming a staff member of the Rand Corporation in 1956. At Rand Corporation you were working on research for the Air Force. You joined the Department of Defense in 1960 in the Office of Defense Research and Engineering. In 1961 you were appointed Deputy Comptroller for Systems Analysis. In 1962, [you were] appointed Deputy Assistant Secretary of Defense for Systems Analysis. In 1965, upon your confirmation, the Defense Department established this new office of Assistant Secretary of Defense for Systems Analysis which you presently occupy. Is this background information correct?

E: Yes, it is.

P: Dr. Enthoven, who originally brought you into the Defense Department?

E: Well, back in 1959 when I was working at Rand, I felt very concerned and frustrated because I thought we were doing good studies on important problems, but the studies seemed to be ending up in the files without any perceptible actions resulting from them. For that reason and others, I felt that the organization of the Defense Department wasn't satisfactory and something ought to be done about it. I discussed this with Mr. Charles

Hitch, who was then the head of the Economics Department at the Rand Corporation and who was my immediate superior. He suggested that I ought to take a year's leave from Rand and get a job in the Pentagon and see the whole thing at first hand, which I did. So I left Rand on a year's leave in 1960 in the spring, and started work in the Office of Research and Engineering in May of 1960 for what would have been a year or so.

Then, after President Kennedy was elected, he picked Mr. McNamara as Secretary of Defense, and McNamara picked Mr. Hitch as his Comptroller. Almost immediately upon being selected as Comptroller, Mr. Hitch phoned me to ask if I would join him in the Comptroller's office to play a leading part in the management reforms that he intended to carry out. I agreed to do that, so I suppose the answer to your question really is that Mr. Hitch brought me to the Defense Department.

P: Since you did come in during the Kennedy Administration, did you have occasion to meet President Kennedy?

E: The only time that I met President Kennedy face to face was in June of 1963 when I received the President's Award for Distinguished Federal Civilian Service. It's a medal that the President presents to about five civil servants each year, and I received it that year from President Kennedy over in the Rose Garden in June. Of course, a ceremony like that is not an occasion for much conversation, but I did meet him and we spoke briefly at that time.

P: On what occasion did you first meet Lyndon Johnson?

E: Other than a handshake at a ceremony, I've really only met the President close up in a real conversation twice. I am a little obscure about the timing of one of these meetings, but I do remember both of them quite well.

One meeting--I think the first one--was in the summer of 1966. I remember Paul Ignatius, who was then an Assistant Secretary of Defense for Logistics--he has subsequently become Secretary of the Navy--Paul Ignatius and I had been making trips about once a month out to Hawaii to the headquarters of the commander of our Pacific forces to review the production of bombs--non-nuclear bombs--for use in Viet Nam because there were some indications that there might be a possible shortage. At least claims were being made that there might be a shortage, and we certainly didn't want that to occur. We wanted to be sure that, while the needs were reviewed carefully, which is why I went along, that the production was accelerated to meet the needs.

On one of our trips, I suppose it must have been in June, we got a message that the President wanted to meet with all of the assistant secretaries of Defense in the White House the next morning. So we got back on our plane and flew back to Washington and got to the meeting in time. There was the President with about six or seven assistant secretaries of Defense gathered around him. He talked to us for probably an hour and a half or so. It was a very impressive experience. The whole point that he wanted to make was he knew that there were a lot of people criticizing us and attacking us, and that we were working very long hours under considerable pressure. He wanted us to know that he really very much appreciated the efforts that we were putting in and that he wanted us to remember that through all of the trials and tribulations of getting our job done; and that he personally had very great admiration for Mr. McNamara, and for the very effective group of men that McNamara brought together.

Then he went on to explain that he thought it was very important for us to do what we were doing because it would result in the saving of a

great deal of money, and that that money could be used very productively and effectively in many domestic social programs. I remember he gave as one example a Job Corps project which had trained some young men who were previously unemployed and thought to be unemployable--trained them as underwater welders to do underwater welding in the oil drilling in the Gulf of Mexico, whereas before they had been sort of a drain on society, now they were very productive. They were earning--I forget what--$400 a week or something like that, some very substantial amount of money for young men of that amount of education. He went on to explain that he thought their whole lives and the whole society would benefit a great deal from that.

Then he talked about his views on the importance of arms control and of reaching an agreement with the Russians on the limitation of our arms. He told a rather amusing story. I don't know whether I can remember it all accurately, but I'll try to recount it as best I can--recognizing that it's only an approximate reflection of what he said. The idea was apropos of the importance of sitting down and negotiating and reaching agreement with your enemies.

He said when he was a young congressman he was helping the people in his district to get some kind of electrification project for their farms. It turned out that they needed the cooperation of some big electric company. They did a lot of groundwork and everything else to try to get this all arranged; and finally they thought they were going to bring it to a successful conclusion. They had a meeting at which he participated as one of the leaders of his constituents--a meeting with the head of the electric company. They met, and it turned out that the head of the electric company was particularly intransigent, uncooperative, and negative; and as

a result, the whole thing fell through. When it looked like the whole thing was falling through, he said that he got very eloquent and oratorical and really told the man off, and told him how wrong he was for not helping these people and so forth with what was apparently a very strong speech. Afterwards, some older man, perhaps one of his constituents, came up to him and congratulated him on that very fine speech and said to him, "There's one thing you ought to know, and that is it's an awful lot easier to tell a man to go to hell than it is to make him go there." So that was to underline the importance of negotiating a reasonable settlement with the Russians in the field of strategic arms.

The whole meeting left me, and I think the other assistant secretaries, with a feeling that the President really did care a lot about our work and knew about what we were doing; that we weren't just anonymous cogs in the huge machine as far as he was concerned, and that he really appreciated it; and also with the feeling that the work we were doing, a lot of which was aimed at giving us the most effective possible defense to meet our needs, but at the same time doing it as economically as possible, that the money saved had a lot of other important uses. I think it helped everyone come away with a broader view of the problems of the government and a more sympathetic understanding of the President's problems.

It also had the effect of reinforcing an idea that Mr. McNamara had expressed on a number of occasions. I know that several times over the years my work and that of others in the Defense Department caused us to get involved in the problems of other agencies because the particular question at hand cut across the Defense Department and the other agency. For example, work with the Atomic Energy Commission, with the Federal Aviation Agency; with Interior and others on residual oil imports, and several

agencies on balance of payments, and so forth. The general unspoken assumption, or usually unspoken assumptions, in these meetings is that what we were trying to do was to figure out what is best for the United States and what would be the best policy for the government as a whole, rather than trying to advance the interests of the Department of Defense in a narrow or parochial sort of way. Occasionally when someone at one of these meetings would come up with an idea or a proposal that was clearly based on the thought that our job was to represent the Defense Department to the President, or that something in the field of atomic energy or aviation was not our business, Mr. McNamara would answer with the phrase, "I'm a Cabinet office of the United States of America, and therefore I see my responsibilities as being to the President and to the Government as a whole and not just as a representative of the Defense Department." I thought that in this meeting with the assistant secretaries the President underlined that idea quite effectively.

I think it's a very important idea because some men in the Defense Department--in fact I'd say most people in the Defense Department, do work with the idea that their job is to advance their particular project or piece of their project or their service or their department. I've felt very clearly, as a result of statements by Secretary McNamara and also underlined by the President at that meeting, that the way we were to understand our responsibility was that we were appointed by the President to help him in doing what makes the most sense and doing the best possible job for the country as a whole in fitting in the Defense program into a sensible balanced program for the country as a whole. I think that was one of the

main things I came away with from that meeting. Would you like me to talk about the other meeting?

P: Yes, please.

E: I think that the other meeting came later, and I'm afraid that I can't tell you just when. It must have been some time during 1967. I remember that it was to my surprise reported in the New York Times afterwards. I remember receiving an invitation by telephone to come over and have lunch with the President. It struck me as an extraordinary thing. That wasn't something that happened every day. I got there--no indication of what it was all about, not that there should have been--I'm just indicating my frame of mind. When I got there, there was Harold Brown who was the Secretary of the Air Force; Zbigniew Brzezinski from the State Department; Bill Gorham and John Gardner from HEW; Francis Bator appeared from the White House. Gradually this group all assembled. Harry McPherson was there; I think Doug Cater. Who else? I forget. We were waiting for awhile and talking among ourselves and trying to figure out what was the common thread going through this group, and came to the conclusion it was young Ph.D.'s in presidentially-appointed positions in government. We couldn't figure out exactly why that was of interest to the President.

But anyway after awhile we were ushered into the Fish Room, and the President came in and greeted us very kindly; and we chatted a while. Then we all sat down. For perhaps half the luncheon or some substantial part of it--there was just a general kind of undirected chit chat about this and that going on around the government. The President questioning this man, joking with that one in a very friendly, relaxed way. Then, perhaps on toward dessert, we got to the punch line or the point of the meeting.

The President said that he felt that there was a great hostility toward him in the intellectual community--you know, the university professors, the students, etc. I'm never sure exactly what is meant by the "intellectual community," but anyway that would be one definition--people in universities and other people who engaged in research and scholarly activities. He felt that there was a great deal of hostility toward him, and that he tried very hard to get their support and understanding. He wondered if we had any thoughts or constructive suggestions on what could be done to improve his relations with the intellectuals. The point of it was not to strengthen his political support. Really the point was that he felt as President it was very important for him to unite the country and do whatever he reasonably could with respect to each of the various groups in the country to help them to feel a part of the country in contributing and recognized, rather than alienated and angry. So what did we think was the problem, and what could be done about it.

I remember I said I thought that the problem was mainly Viet Nam, and that I thought what should be done about it is a much better job of explanations of what it was all about to the American people; that he really ought to talk to the people a lot more and explain it. Then a big debate broke out. I think everyone pretty much thought that the roots of the problem were largely in the war in Viet Nam, at least everyone seemed to accept that. I don't recall anybody disagreeing with that idea. But a big debate broke out about what was the best way to go about solving the President's problem. Should it be more or less public explanation?

I remember we discussed the question of whether the President should make some special kind of appeal to intellectuals. I think part of the problem here is that differing ones of us at the lunch were thinking of

different people. I was thinking of educated professional men and women in general, the highly educated part of our citizens, and not particularly university professors. It didn't seem to me that it was terribly important for the President to specially knock himself out to get the support of university professors. Other people had a different view on that.

I remember the President replied to my suggestion by saying, well, in fact, he had been on TV an awful lot. He really surprised me. I had suggested, as an example, FDR's fireside chats, which strangely I either remember or think I remember even though I was only about fourteen years old when FDR died. But it seemed to me that my recollection was that FDR had regularly reported to the people and explained what was going on and what he was trying to do. I didn't have that impression with President Johnson. It could be just that I don't have a TV set, so I recognized that I probably wasn't a very good authority on that point.

But he replied anyway quite directly and to the point that I made that he had been on TV and on the radio a lot. He counted up in the previous few months the frequency of his appearances. I must say when he enumerated them all it did sound like he had been talking to the American people a lot. So I realized that the problem was not just in the frequency of his appearances.

I had second thoughts about the whole thing later on after the lunch was all over; I wished that we had had a few days of advance warning as to what the subject would be so that we could think about it, because it's not the kind of subject that one is apt to treat effectively off the cuff. But it didn't happen that way. At the luncheon, anyway, we just debated the issue as between more or less presidential exposure. I got the feeling at the end, and felt very sad for him, that he felt really the best thing that he could do was to withdraw and not speak

publicly very much; that every time that he spoke publicly he just further antagonized and inflamed his critics. I think then there was some of the same thought that eventually led to his decision not to run for re-election.

Then the President started talking about Vietnam and from there getting into the question of the bombing halt. He went into a soliloquy for awhile, describing the debate and deliberations that went on in the White House with respect to the thirty-seven day bombing halt. I'm afraid all these events tend to blur for me, and I'm a little hazy on the dates. It must have been the bombing halt at the beginning of 1967. He described the debate over it--the views of the different people. He said that he'd had Justice Fortas and Clark Clifford there as two men who were completely independent and detached from the whole thing and had no particular involvement, who could just sit in the corner and watch the whole debate. He described the views and arguments of the different people and the assumptions that they made, and did it very, very well. It was really a very impressive performance. I think we were all very impressed by it, and particularly impressed to realize the extent to which he obviously grasped a lot of the subtleties of the problem, and was aware of all the ins and outs and the pros and cons of each of the different issues and proposals concerning the bombing halt. I remember he said after everyone else had spoken their piece, then he called on Fortas and Clifford to comment on what they'd heard, which they did.

Well, that finished up the lunch. I remember all the men afterwards, as we walked away, were commenting on the impressive performance this particular description had been. I found it very enlightening; I certainly felt that the President was acquainted with all aspects of the problem.

As for his other problem, the one that brought on the luncheon, that is, his relations with the intellectuals, with later reflection I wish I had said that I had heard some of his public explanations of the war in Vienam, and that the speeches generally were very simplistic, filled with rhetoric and simple slogans about not letting our boys down, and things like that, which gave the viewer who was not acquainted with the President the feeling that a lot of very important subtleties were not being understood or realized. I thought it was too bad that the President in his public speeches could not have brought through more clearly the point that he thoroughly understood all the ins and outs and complexities of the problem. I think probably a part of his problem--but only a part of the problem--with the intellectuals was that they felt the Vietnam issue was a lot more complicated than they thought the President was implying in his public speeches.

But I recognize that it's a very tricky question, whether you want the President to explain all the ins and outs and pros and cons of these issues--that has tricky diplomatic implications. When you're trying to get a negotiation going, it may be that you have to pay a certain price in not explaining all of the cards in your hand to the American people because that would show them to the rest of the world as well.

Those are really, I think, the only two occasions when I had any extensive contact with the President. Oh, there have been a few other times when I've been over at the White House. For example, each year there's a White House reception, but I must be one of millions of people who the President sees each year. There's a White House reception for the leaders

in the Defense Department. I remember one year my wife and I went and perhaps half way through the reception we were standing near one of the pavilions where beef sandwiches were being served. Suddenly, to our amazement, we found the President standing there alone, without a big mob of people around him. We introduced ourselves, and he said something about wasn't it good beef. It was good beef. I'm afraid we were so tongue-tied--that must have been in 1966, though it might have been earlier actually, perhaps 1964. Anyway we were quite taken back at being in the presence of the President and couldn't think of anything intelligent or relevant to say. I remember afterwards we kind of joked about it and pictured ourselves shaking hands with and saying, "I'm Enthoven from Defense," and talking about, "I'm enjoying my job, and who are you--what department are you with?"

Then last spring, at the reception, I took my mother because my wife was tied down with the children. But my mother happened to be visiting us; and since the invitation said Dr. and Mrs. Enthoven, I figured that they didn't say which Enthoven, and she had a wonderful time. I remember we went through the receiving line. I felt very pleased when we got to the President that he remembered me and my name registered with him. When I introduced my mother, then he took quite a bit of time--given the situation--to tell her what a good job he thought I'd done. I was really very pleased and favorably surprised at the extent of his acquaintance with my work. Of course my mother was absolutely elated and overjoyed. That made it a very good evening.

I really think that's about the extent of my direct meetings with the President, which isn't very much.

P: Dr. Enthoven, have you ever been placed on call, so to speak, by the White House during a critical situation--the development of a critical situation?

E: No, I have not. My own work here has always been with respect to the future program and forces and strategy of the Defense Department so that you might say I live several years in the future in my work and don't get involved in current crises.

It has happened on occasion that--for example, during the Cuban missile crisis that the Secretary of Defense or one or another of my colleagues in the Department would call on me for a particular piece of information. For example, one of my responsibilities has been to do a lot of analysis and calculations for the Secretary of Defense on the balance of nuclear forces and what the consequences of various kinds of nuclear war would be. Those calculations and analyses generally were done for the purpose of reaching decisions about the future program, what we should do in the period from now until ten years from now with particular emphasis on the forces we would have several years from now. But occasionally, as during the Cuban missile crisis and the Berlin crises in 1960, '61, and '62, I'd bring these same techniques to bear on the current situation. But this was just a staff thing for the Secretary of Defense and for people in the Office of the Assistant Secretary for International Security Affairs. I've never been at all close to the crisis operation business.

P: Have you served or been asked to serve on any committees or task forces outside of Defense?

E: Well, not directly that I can recall. I'm always afraid with a question like that I'll be missing some or forgetting some obvious example, but offhand I don't recall. Mr. McNamara was called upon several times to participate in such task forces, and several times he asked me to take

a leading part in organizing the economic analysis to be done for the matter in question.

For example, Mr. McNamara was asked by the President to be the chairman of a Cabinet committee on the supersonic transport, which was to examine what the policy should be; what the economic viability of the supersonic transport was likely to be; and what the merits of the various financing arrangements would be. Mr. McNamara asked me to take a leading part in the organizing of an economic analysis of the prospects for the supersonic transport. I was very interested in that. It's a fascinating problem. I did quite a bit of work on it and pulled together a group of economists and others who did analyses of that, which led to the findings that only under pretty optimistic assumptions would it be the case that the supersonic transport, as then conceived, would have any chance of being economically viable. That, of course, was one of the factors that must have been considered.

Another example of such a project--Mr. McNamara was asked to lead a Cabinet committee to deal with the question of residual oil import quotas. Here the proposal was being made to further restrict the importation of residual oil. This is oil whose main market is electric power generating stations in the northeastern United States. The main competitors here were Appalachian coal and the domestic oil imported in the Northeast. The proposal which was made by the coal producers and the railroads was that the importation of residual oil into the east coast be further restricted because by doing so, that would

increase the demand for coal. It would therefore improve employment in Appalachia.

Again Mr. McNamara turned to Charlie Hitch and me as his economists to get the economic analysis done. So we got into that and worked on it a good deal. Again, I was very interested in it and welcomed it as a kind of a relief and an opportunity to do something a little bit different for awhile--to get away from the grindstone of weapons and defense and all of that.

I remember what we found was, as I recall, two very significant things when we studied the problem. The first was that this would be an extraordinarily expensive way of subsidizing employment in Appalachia. I forget now what figure we came up with, and the figure that you decided to believe would depend on what assumptions you were willing to make about certain things. But I think that we were able to show that at a minimum that each additional job in Appalachia that was created by further restriction of oil imports would have to cost the northeast electricity users at least $12,000 a year per job created. In fact, it would probably cost them many times that. The answer would depend on the particular shape of the supply and demand curve, and various other factors. But in effect then what we were able to show was that if you were trying to improve employment in Appalachia, this was a terribly expensive way of doing it when you actually looked at how much it would cost people per job. There just had to be better ways.

As I recall, the other thing that we found was that there seemed to be a good deal of evidence that much of the growth in electric power was going to be supplied by nuclear energy anyway; and that the price of nuclear generated power was still a little higher than coal or oil, but it put a sort of ceiling on both the coal and oil price. Therefore it put a limit

on how much you could expect to increase the sales of coal by limiting oil. It looked like if you just did nothing about it for a couple of years, then probably the problem would more or less take care of itself because of the growth of nuclear power. It would become an irrelevant problem. As I recall, I felt that if anything were to be done, they should increase rather than reduce the importation of residual oil on the east coast; but I think probably because the analyses indicated that the problem was going to take care of itself in a few years anyway, nothing was done about the proposal, and it, in effect, became sort of a non-study and the whole thing was forgotten.

Let's see--that's supersonic transport, oil. Another example was that Mr. McNamara was part of a group advising the President on our maritime policy. Again I was asked by Mr. McNamara to develop material. In that case, actually we had already studied within my office--a group of my economists had studied the question of maritime policy in great depth, because the Defense Department has a very direct concern because we depend upon the United States Merchant Marine both in war and in peace to transport our military supplies. How much of our own airlift and sealift--that is, owned and operated by the Defense Department--we ought to buy depends very critically on what we think is the availability of the Merchant Marine, because almost by definition the airlift and the sealift that we buy is the amount that's required to deploy and supply our troops overseas until the Merchant Marine can take over and do the job. So we'd studied it very carefully and on the basis of that work, we developed material, memoranda, for Mr. McNamara who used it as a basis for his advice to the President.

Now, as well as those three examples, my own work, as a matter of

course, has brought me to some extent into contact with the problems of the Atomic Energy Commission on the question of the development and production of nuclear weapons; and with the Maritime Commission and the Department of Transportation and the Federal Aviation Agency on questions of transportation where they relate to our own transportation needs. But I don't recall that I was ever formally appointed to a board or task force to do that sort of thing.

P: Dr. Enthoven, your career in government and non-government work has been in this area of the application of techniques of economic analysis, sometimes described as systems analysis, cost effectiveness analysis--all of these being a little bit esoteric terms in lay language. Could you describe this work in general terms for me?

E: Yes. We have a terrible problem of terminology. I've never been happy about it. I wish that we could develop some better names that would convey more clearly to the general public just what we're up to. When we talk about economic analysis, we mean simply thinking through clearly what we're trying to do, and reducing that to measurable criteria of effectiveness or usefulness or benefit; then, examination of the full range of possible alternative ways of achieving those benefits, estimating how much each of these different ways costs, and then selecting the means for achieving our objectives that achieves the most for the amount of money we want to spend, or, alternatively, that achieves the amount of the objective that we want to achieve for the least cost. That's what we mean by economic analysis.

We use the term systems analysis for several reasons. First, because we're analyzing complex problems, that is, reducing them to the constituent parts that make them up and then examining those parts and what makes them up and how do the parts relate to each other. The expression "systems" for

several reasons--one is we're working on weapons systems. But perhaps more important is the expression connotes a very important idea about this approach which is trying to look and understand the total system that we are involved in.

For example, if we are studying what our bomber program should be--how many B-52 wings we ought to buy--as a matter of course following this approach we would look at the total system. So in this case we would start by looking at our total strategic offensive and defensive forces and understanding what they're all about, and then how the bomber force relates to the total. Then we'd look at the total bomber posture of the B-52's, the B-58's, and so forth, and how they relate to each other, and then at the B-52's. We would look there at the total system--not just the airplanes but the airfields, the warning systems, the pilots, logistics, the whole system.

So the expression has become fairly widespread now in many areas--the expression "the total systems approach." What is meant by that is a serious attempt to look at the complete problem--the big picture if you like, rather than some small piece of it. We talk about the total systems approach to transportation. We mean that we're going to look not just at, say, a piece of it like how do you get the cost of shipping across the Atlantic down, but rather the total problem from the source to the user. It's important to do that because that gives you some idea of what are the most useful parts of the problem to look at. If you look at a transportation problem in its entirety from the source to the user, you may find that very large elements of cost are to be found in the trans-shipment or the interchange between one and another mode of transportation; and that the way to get the total cost down most effectively is by proving the means for interchange from one to another mode of transportation rather than by reducing the cost-per-ton-mile of one or another means of transportation.

Well, so much for the terminology. What we've been trying to do really is to apply several, perhaps five or six, basic simple ideas--to the management of the Defense Department--to apply them in a very thorough-going and systematic way. There are ideas like the following. First, that we should develop a clear understanding of what we're trying to do and reduce that to explicit criteria that relate Defense programs to the public interest, with emphasis here on the public interest. The point is not to try to manage the Defense Department by reaching a satisfactory compromise between the different vested local parochial interests, parceling out the Defense program between different services, constituencies and so forth in such a way as to reach a compromise they'd all find tolerable but in which the public interest is sacrificed, but rather to try to think through and define very clearly what is the public interest and to state it explicitly; to say to the Congress, to the American people, "This is what we're trying to do in this area. This is how we measure it. This is how we compare the alternatives." That's one idea.

Another idea is the notion that cost is relevant to deciding what we need; and therefore that we should consider our needs and costs together in a very intimate way. The point is that what is worth trying to do depends on how much it costs to do it, because the costs are simply a measure of the other things you have to give up when you embark on a particular program.

Before 1960 nobody had broken down the Defense budget by the major military missions, and the weapons and forces supporting those missions. The Defense budget was broken down by object classes of expenditure like personnel, operating costs, procurement, research and development. Our idea was while we had to continue that breakdown for various purposes if it's necessary and useful, also that we should break down the Defense budget by

the major missions or purposes of the Defense programs, such as strategic retaliatory forces, continental air and missile defense forces, tactical air forces. In each of these groups we should associate all of the dollars from whatever category with the particular mission being served. Then judgments about how much we should spend on one or another aspect of the program should be made in recognition of a variety of factors including how much it would cost because that's an indicator of how much we'd have to give up elsewhere, either elsewhere in the Defense program or elsewhere in the government.

Another basic idea has been the idea that people at the top level should explicitly consider a range of alternatives. The idea before that time was somehow that the Department was to generate a single staff solution for the Secretary of Defense; then he was to accept or reject it. Many people still have that idea, at least implicitly that the Joint Chiefs of Staff ought to come up with an agreed recommended posture of forces; and then the Secretary of Defense should rubber stamp it. Well, the Joint Chiefs did come up this year with an agreed posture of forces. But it would have cost a hundred and ten billion dollars; while last year we asked the Congress for close to eighty billion dollars, and they cut that back significantly. So there's no evidence that this country needs to spend a hundred and ten billion dollars. It's, of course, politically very unrealistic.

Well, our idea here essentially was that the Secretary of Defense should have presented to him a variety of alternatives, each one of which would be spelled out and evaluated in the round. He used to have the Joint Chiefs recommending forces, but nobody around to tell him how much those forces would cost; while the Bureau of the Budget and the Comptroller's office

were recommending budgets, but they didn't tell him what the strategy or forces were that would go with that.

Well, now what we do is to give the Secretary of Defense a range of alternatives. We tell him what are the budgets that go with the Joint Chiefs forces, and what are the forces that go with the Comptroller's budgets, and a variety of other possibilities in between, so that he can judge and consider a range of alternatives.

Another of the basic ideas is the notion of open and explicit analysis. That is that the analysis of each of these complex problems should be done in such a way that it's available to all of the interested parties. It used to be that the different branches would do their studies of their own particular needs or programs, and then they would just report their conclusions to the Secretary of Defense. In fact, I remember in 1961 the question came up whether the Secretary of Defense should require that all studies done in the department be made available to him. I recall recommending to Mr. McNamara that he not require that because that if he did, there'd be such pressure put on the people doing the studies to bias them and twist them and distort them and everything else that that would be the end of unbiased studies. But fortunately he didn't accept my advice on that point; rather he insisted that all studies would be made available to the Secretary of Defense. He said that it was my job and the job of others on his staff to review them and keep them honest. So we've had the principle that all studies should be made available to all of the interested parties in a form that would let them review them and identify any hidden assumptions or any factors with which they didn't agree, in such a way that it would be possible to bring out the disagreements and differences in a way that the Secretary of Defense could understand.

Another basic idea of the analytical approach that we have used is analysis as the servant of judgment rather than as the replacement for judgment. What I mean by that is this: you'll find in a lot of literature about analytical methods the impression that what's going on is that you grab a bunch of facts and assumptions from wherever you can and you plug them into some method of doing a calculation. Then the action begins as this machine takes over and calculates and tells you what the best answer is. Well, that's the opposite of our approach. Our idea is that analysis is not intended to tell you what the best answer is. In fact, in the problems we're dealing with there is no such thing as a best answer It would be foolish to seek one. There are a lot of bad answers, and you can identify bad ones and try to avoid them. I see our goal as being to try to avoid disaster and gross waste, rather than trying to find the best possible solution, although occasionally we'll talk about the best solution or the best program.

But the important thing is that the role of analysis here is not to replace judgment, but rather to inform and illuminate judgment by bringing out clearly what are the most important factors in a problem; and how does the outcome of the particular thing that we are interested in depend upon all the different factors that go into it, and how do they relate to each other.

For example, several years ago in consideration of the decision to go ahead with the anti-ballistic missile defense of our cities against a Russian missile attack, Mr. McNamara asked the Secretary of the Army and me to sit down and review the calculations that my office and his office had made--and anybody else's office for that matter--on the effectiveness of the anti-ballistic missile; and either to reach agreement on the whole set of

calculations or stated known disagreement. That is, if we disagreed, it should be not a difference of arithmetic but presumably a difference of judgment about what was the most probable assumption. Where we had such disagreements, to identify them and write down what our arguments and evidence was, and calculate what difference it made, and then bring them in to him so that he could understand what the issues really were. We did that; and whereas at the beginning it looked like an extraordinarily complex thing with dozens of issues and disagreements, we found through careful analysis that most of the things that people are arguing about really didn't matter very much; and that the thing that really did matter a lot was something that people hadn't been thinking about very much, and had gotten very little attention, and that was the Soviet reaction to our anti-ballistic missile defense

For example, the Army assumed it would use something called "preferential defense." The idea is that instead of putting a given amount of anti-missile defense in each city, we would concentrate the anti-missile defense between the cities. Then when the Russians shot their missiles at our cities, we would at the last minute decide to sacrifice some cities and concentrate our defense on the defense of others, and thereby save those cities and thereby save more lives.

Well, that's a theoretical notion. If you adopt that concept, you can show theoretically that you will save more lives. But it has a lot of very serious practical problems. Well, nevertheless, the proponents of the anti-missile defense were saying that we should calculate the effectiveness of the anti-missile defense on that assumption; and there was a lot of argument going back and forth on that. Well, when the Secretary of the Army and I reviewed the problem we calculated the effectiveness of

the anti-missile system with and without preferential defense, and we found that it really didn't make much difference. So we were able to drop that from further consideration.

On the other hand, as I said a moment ago, we found that the extent and the character of the Soviet reaction to our anti-ballistic missile deployment--that is, the extent to which they bought multiple warheads and what we call penetration aids--that is, devices of various sorts to confuse the defense into thinking that many things are targets and missiles that really aren't. The extent to which the Russians bought and deployed such devices was really of decisive importance in determining the effectiveness of the anti-missile system. So we ended up by writing down a table of calculations which showed how effective our anti-missile missile would be if the Russians did not react; and if they did react, if they did, in various ways.

So that the point here I'm bringing out is this was analysis as a servant of judgment. It wasn't that the computer or the calculations were going to tell us what's the best kind of anti-missile missile to have; that what the calculations were going to do were to enable us to sort out clearly what are the most important judgments that have to be made, and how important are they, so that the politically responsible officials at the top can bring their judgment to bear on the most important factors. That has been the foundation of our analytical approach.

Just one other simple idea here--at least, I think they're relatively simple--that has been a foundation of our approach has been that we should have a forward plan for the department at all times projected out into the future. The plan is not to be a rigid blueprint for the future. It's not a pair of railroad tracks that we're going to try to ride down no matter

what happens, but rather it's to be a projection of the implications of the decisions we've made so far, and a point of departure for further improvement so that when we're trying to make a comparison between some proposed improvement and what we have now, we have a clear description of what we have now, therefore a point of departure for our continuing search for improvements.

These are the main ideas that go into the systems analysis, cost effectiveness analysis, and all that.

P: Since you've been here, Dr. Enthoven, you've gone through a process of elevation of your work. Is this a reflection of a growing appreciation or application of this art of analysis?

E: Well, I think really it's something a little different, and that is the great majority of the work in my office, what I really describe as the main responsibility of my office, is not the application of analytical methods. That's one reason why I think the name "Systems Analysis Office" is not really very satisfactory. I think some time it ought to be changed. Really, the responsibility of my office is to review all aspects of requirements or needs. That is, how many soldiers do we need? How many divisions in the Army do we need? How many tactical aircraft? How many missiles? What kind of missiles? How many military personnel? How many nuclear weapons? All sorts of questions of needs and how many of all sorts of things that we need.

Really the point of my office being elevated to the level of assistant secretaryship is a recognition of the fact that the Secretary of Defense, if he is to do an effective job of shaping the Defense program, has got to have some independent staff assistance by men who can get the facts for him and advise him, and whose point of view is going to be independent of the interests of the military services.

In each area of the Defense program, we have many more proposals for increases to our forces and our procurement than are necessary or desirable. We have each year before us a recommendation from the Air Force to increase the number of Air Force tactical airwings; a recommendation from the Navy to increase the number of aircraft carriers and their tactical aircraft; and a recommendation from the Marine Corps to increase theirs; and a recommendation from the Army to buy things like armed helicopters that are close substitutes for tactical aircraft. Well, all of these people in the Services have their very strong institutional interests in their particular thing. That's good as long as it's recognized for what it is. I think it's a good thing that the Air Force recommends more Air Force tactical air.

But the Secretary of Defense has got to have some staff assistance by somebody independent of the Air Force or the Navy or the Marine Corps who's analyzing it and trying to see to it that he sees the whole picture and not just the arguments for more, but also that he sees the arguments against buying more.

For example, in the evaluation of the anti-missile missile that I described a few moments ago, naturally just because they're human beings the people in the Army--because they were in favor of their anti-missile project, enthusiastic about it--were inclined to base their case for it on assumptions that were most favorable to the anti-missile missile, such as the assumption that the Soviets would continue to do what was projected for them in the national intelligence estimates rather than reacting to our deployment of an anti-ballistic missile with further forces of their own. Now this was not even flagged as an assumption. It was just implicit in the whole thing because the Army's analysis proceeded from the

national intelligence estimates. But the trouble is the national intelligence estimates about what the Russians were going to do were based on the assumption that we weren't going to have an anti-missile missile but it was all implicit. Nobody ever flagged it or highlighted it and said, "This is an assumption that's terribly important in this whole thing."

So you could find masses of material prepared by the Army for the Secretary of Defense documenting why they thought the anti-missile missile would be very effective without ever seeing any mention of the possibility of a Soviet reaction. Rather the Army was doing what seemed perfectly reasonable and defensible and unexceptionable. That is, they were using the official national intelligence projections for the Russians when it came to what the Russians were going to be doing about this.

Well, the problem is the Secretary of Defense cannot personally sort these things all out himself. He has got to have someone help him, although in this case, interestingly enough, I think it was Mr. McNamara who put his finger on this point based on a variety of calculations that we did for him personally--put his finger personally on the point of how important the So iet reaction might be. My office was needed to develop this point and to press the Army on it and to see to it that the evaluation of the anti-missile missile, it was evaluated both with and without a Soviet reaction so that the Secretary of Defense could bring his judgment to bear on whether the Soviets were going to react. Now obviously when a question is put to you that way, most people are going to recognize it. Common sense tells you the Russians are very likely to react if we deploy an anti-missile, because they have a terribly strong incentive to do so. It doesn't cost them a great deal, but if they don't react by deploying penetration aids and such devices, then our anti-missile missile if it's effective would in

effect take away their deterrent. It would take away their power to destroy us in a retaliatory strike.

Well, the important thing about my office, then, is to have a group of men who are, if you like, on the side of the Secretary of Defense trying to help him sort out all these things; and try to see to it that the full range of assumptions relevant to the effectiveness of these various programs is brought out; and not just the assumptions that particularly appeal to the proponents of the program. So really the making of my office into the office of an Assistant Secretary of Defense was a recognition that the Secretary of Defense needs full-time professional staff assistance by a group that will be headed by a civilian that is trying to help him and help the President to make sensible decisions--tied in with the idea that I expressed earlier that our job is to help the President put together what is best for the country as a whole, rather than to represent the Defense Department.

There are all sorts of people who are pressing the narrow interests of the Defense Department, pressing for more military forces. Someone has got to work full time on analyzing and understanding these program issues, and helping the Secretary of Defense and the President to understand what are the key judgments that they need to make in order to decide it. So really my office would be better described as Office of the Assistant Secretary of Defense for the Evaluation of Force Requirements and Other Programs, or something like that. Perhaps at some future time the name might be changed to better reflect that.

P: Dr. Enthoven, you have spoken several times about Soviet reactions, and you've indicated that this is a calculable area as opposed to a value judgment. We have talked about that a little bit before, but it does raise a great controversy here as to how you--when and where this is a cut-off and a stop.

E: I don't think that you can do a calculation that is going to tell you at all definitively how they are actually going to react. But I think that you can do some calculations in the case of the anti-missile missile that will tell you what will happen to them if they don't react; and what will happen if they do react in each of various ways. That is, if you assume that they're going to react in each of various ways, then you can calculate the implications of that assumption.

When it gets to the question of how likely is it that they will react in one or another way, I don't think you can calculate that or put any kind of meaningful numerical probability. I think that is really a matter of a judgment that has to be made. The role of analysis is not to supplant that judgment, but rather to inform that judgment and to tell the person trying to make a judgment what the relevant facts are so that he knows what he is judging. But I don't think that any kind of calculation would be able to supplant that judgment.

Now, it's true that there's a great deal of concern about the arms race and Soviet reaction. Its particular relevance to the anti-ballistic missile defense is not the thought that by deploying an anti-missile defense might irritate them or something like that. I mean, some people would say to me, "Well, why do you think a Soviet reaction is such a bad thing? Are you trying to avoid hurting their feelings or something?"

The point is not that at all. The point really is that if they react as we have done by buying multiple warheads and penetration aids, then that will render our anti-ballistic missile defense ineffective. So you have to judge whether it's probable that they will react or not, because if they do react to our anti-ballistic missile defense, the net result will be that we and they will have spent a lot more money and have a lot more weapons and

undergone greater risks, and that we will be no more secure than we were before.

So it's not the fact of bringing about a Soviet reaction that is the bad thing. The bad thing is spending a whole lot of money and getting nothing for it, which is what would happen if we deployed a full-scale anti-ballistic missile defense. If it turned out to be the case that we could build an anti-ballistic missile defense that would be really effective even after the Soviets had reacted to its deployment, then I think it would be a completely different story. But the whole point of this is that we found that if the Soviets reacted in ways that were certainly within their economic and technical ability to do, then they would simply render the anti-missile defense ineffective.

P: In this type of analysis, do you build in an area to take into consideration the intangibles and, say, a margin of error of your assumptions and calculations?

E: Well, of course, you can't put an intangible into a calculation. You can only calculate when you have numbers; but what you can do and what we do do is to try to identify for each of the important factors what the range of uncertainty is, and then to show the calculation under several different assumptions. Frequently, for example, if we don't know what particular magnitude it is going to turn out to be, we will do the calculation three times with what we think is the lower limit to what it might be; the upper limit to what it might be; and what we or someone considers to be the most probable; and then display the results on the basis of those three different assumptions.

Now we can't tell the decision-maker then which is the best assumption. He is going to have to judge that for himself, but we can tell him how

important it is. For example, if the three different calculations all lead to the same answer, then what that shows is that variations in that particular factor don't make much difference. If the three different calculations lead to very different answers, then that shows that that factor makes a big difference, and that it might be prudent for the man making the decision to keep his options open with respect to that possibility; to hedge; to buy some insurance.

That highlights a very important part of this kind of analysis; and that is it's not just analysis, but it's also design. As well as analyzing the constituent parts of a problem, we try to design alternative solutions for the Secretary of Defense, including solutions that one way or another insure against the most important uncertainties.

For example, in the design of our strategic retaliatory forces, one of the critical questions is if the Soviets were to attack our nuclear forces with their missiles, would they be able to catch our bombers on the ground or not. Well, we deliberately design a strategic retaliatory force posture that has missile-carrying submarines and intercontinental missiles and underground silos just to insure against the possibility that this might happen.

Of course, the intangibles are terribly important, and people sometimes raise the question, "Doesn't all this work with numbers obscure or divert attention away from the intangibles," and I'd say, "No, quite the opposite." If the Secretary of Defense has the benefit of a very good analysis of all the numerical factors, if it's carefully laid outiin such a way as to highlight the uncertainties, if it's done in the spirit that I described, that is, analysis as the servant of judgment, then it frees him to spend his time trying to make judgments about the intangibles rather than straightening out the arithmetic.

P: Dr. Enthoven, what is your relation to the Office of Research and Engineering?

E: Well, we are in effect in the same kind of position in the organization as they are. That is, we are both staff assistants to the Secretary of Defense. Their responsibility is managing the research and development program and advising the Secretary of Defense on Science and Technology. We find that our responsibilities overlap, and we work very closely together on questions to do with the decisions to begin the engineering development of weapon systems. The reason that our responsibilities overlap is that usually the question of how many of a proposed new system you want to buy is very strongly influenced by the characteristics of the system. For example, if we want to buy a certain amount of airlift, the airlift is the important thing rather than the number of airplanes. But we would work with the Office of the Director of Research and Engineering on the question of what should the characteristics of the airplane be in order most economically to meet our requirements. In other cases we've worked with them to help evaluate whether we should go ahead with some development program recommended by the Services where we would bring into it the question of need. The Service might propose to develop a new advanced bomber. They would evaluate the technical aspects, and we would evaluate the question of whether such an airplane was needed or not. So on that basis we work with them quite regularly.

P: What do you see as the future of this type of scientific analysis as applied here in Defense?

E: Well, let me say first in answer to your question--I'm a little reluctant to use the word "scientific" because although what we're doing is very much in the spirit of scientific method, I don't want to in any way suggest that it's necessarily authoritative or a sacred cow or that something is bound to be

right just because it's an analysis. So I feel a little bit cautious about using the expression "scientific"; systematic might be a better word.

I think that it has a very good, a very strong future; I think that it's here to stay. I believe that one of the main contributions that Mr. McNamara and company--Mr. Hitch and others, myself included--have been able to make in these eight years--at least I hope it's an important and lasting contribution--has been to raise the standards of debate about Defense issues, to raise the quality of the debate, the depth in which people are expected to have done their homework and studied the issues, and to focus the debate much more on the question of what's right than who's right.

(End of tape)

INTERVIEWEE: DR. ALAIN C. ENTHOVEN (Tape 2)

INTERVIEWER: DOROTHY PIERCE

(Continuation of session)

E: I think that there are a lot of things that used to go on before we brought this analytical approach to bear on the broad program issues that simply wouldn't stand up nowadays. For example, I remember in 1961 the Navy once made a presentation to the Secretary of Defense about how many Polaris missile submarines we ought to buy. It was a very neat analysis. They started with the targets and they worked back through the probabilities and all of that, to the number of submarines required. A very nice job, but never once did it mention the existence of the United States Air Force or any of its weapon systems, even though at that time the Air Force commanded the majority of the strategic nuclear weapons.

Well, I think that nowadays that sort of thing just wouldn't happen. Rather we have a generally accepted set of analytical methods and a flow of information available to all interested parties. So the Army, Navy and the Air Force and my office and the Director of Research and Engineering and the Joint Chiefs of Staff all have access to the same pool of information. We take steps to see to it that it's authoritative and agreed upon, but where there is disagreement with an explanation. So I think that it's here to stay.

P: Is it not possible that a different Secretary of Defense with a different philosophy might place less emphasis on this and by way of going out the door of this type of systematic analysis?

E: Yes, I expect that that's altogether possible. I think if a Secretary of Defense wanted to destroy it or root it up that he doubtless could. But I really doubt that any intelligent Secretary of Defense would want to do that because it's so much in his interest to have a good clear analysis of the facts. That's really his only effective line of defense in the political arena, to be able to demonstrate that he really understands the problems well. So it would be almost suicidal for him to want to dispense with this kind of analytical help.

Now I think it's altogether possible--probable in fact--that future Secretaries of Defense will not have to put all that much emphasis on it, because during these years it has been a great innovation. It has taken a lot of drive and attention by the Secretary of Defense because it's a new thing and it has to be driven home. Hopefully in future years it will get, and need, much less emphasis simply because it will be taken for granted as a regular working part of the organization.

P: Dr. Enthoven, are there specifics that you can give me where cost effectiveness analyses have brought great changes, or perhaps I should say, what do you think is the biggest impact of this type of analysis that has been in Defense?

E: Well, I think the impact has been very large and very widespread. It's really quite difficult to sort out the influence of cost effectiveness analysis from other influences. In particular, my own work and thought has not been limited to cost effectiveness analysis. I've spent a lot of time thinking about the broad factors governing the military strategy of the United States and what would be a sensible strategy given our broad political objectives and the like. But I think that the cost effectiveness analysis has led to much more effective and more economical programs across the board.

Our analyses, for example, pointed up the need for a greatly increased airlift and sealift and indicated how much was needed and why. Our analyses had a good deal to do with identifying the potential of the use of helicopters for tactical mobility particularly in Army land forces. Our analyses have indicated the importance of protecting our strategic retaliatory forces from Soviet missile attack, and protecting our tactical aircraft from enemy air attack and mortar attack.

It's really very hard to single out a few examples, because the responsibility of my office has been across the board. We review all of the forces. Therefore, in a way it just can't be sorted out from all the other influences that have shaped the Defense program.

P: Does this systematic analysis also come to bear on determining the Defense contracts in private industry?

E: Well, you mean what the contracts are, or who gets them, or both?

P: Both.

E: My office has not been at all concerned with either of those questions. But I can say that there has been a good deal of quite important work in the contracting area, some of which is related to this. You probably ought to talk to Mr. Tom Morris, the Assistant Secretary of Defense for Installations and Logistics, who could talk on this point, but I can give you two or three examples of how these relate. One is the contracting people have done a good deal of work on the development of what are called incentive contracts that will reward contractors for giving us better products and penalize them for giving us inferior products or for higher costs. The specific terms of these contracts, of course, if they're to be done well, should depend on just what we think our needs are, and what our definition of "better" is. Is an air transport plane that can go 10 percent faster but

carry 10 percent less, is that better or worse, and so forth. So that you need criteria of what's better, and that requires analysis. Well, there's still a long way to go in the development of these incentive contracts, but that's one important area.

On the question of who gets the contracts, I don't think we've had any contribution to make there. Once the criteria are determined, there are selection boards generally within the Services. I really haven't been involved in that at all.

P: Over the last few years Mr. McNamara is certainly credited with tremendous Defense savings. How directly related is this to cost effectiveness analysis?

E: Oh, I think that the cost effectiveness analysis has been one of the major factors in the Defense savings. It doesn't show up in quite the same way that the savings in cost reduction programs show up. In the cost reduction program--which is now I think leading to savings on the order of four or five billion dollars a year--what are counted are specific savings through management improvements that can be documented and that can stand up to the audit of an independent accounting firm. This would include such things as savings from using a competitive or an incentive contract, rather than a cost-plus contract; savings from using ideas for how to make a weapon simplier or cheaper, or perhaps taking a weapon that was surplus in one service and modifying it and making it usable in another service--various ideas like this; or standardization, getting them to all use the same belt buckles, etc. My own office has been practically not at all concerned with that, although I think that's a very important thing.

But we've been concerned with what are I think probably a good deal larger savings, such as avoiding buying weapons systems that are not needed or that are not going to work. It's very hard to put a price tag on how

much has been saved that way because the question is what we didn't do rather than what we did. You could argue that the decision not to go ahead with the anti-ballistic missile defense of our cities against a Soviet attack would lead to savings of many tens of billions of dollars, if you're willing to assume that otherwise we would have gone ahead with it.

P: What relation has this analysis had on the reorganization of the Defense Department manpower-wise?

E: Well, not a great deal. The creation of this office led to a certain amount of realignment of responsibilities within the Office of the Secretary of Defense to pull together all of the responsibility for reviewing requirements into this office. But the major organizational changes have been the establishment of two or three Defense agencies like the Defense Supply Agency; the Defense Intelligence Agency; the Defense Contract Audit Agency. These are very important organizational changes, but they haven't been the product of this kind of quantitative cost effectiveness analysis.

P: Practically speaking, would the unification of the Services--could it be proved out, let me say, by that type of approach; and would it improve coordinated programs for national security?

E: Well, no. I think that the consequences of the unification of the Armed Forces, if by that you mean doing something like what the Canadians have done--having one military service where they all have a common training and uniform and what have you--I think that it would be very difficult to calculate very definitively the costs and the benefits coming from that. I think that really that that's a question that has to be evaluated on the basis of a broad judgment as to what kinds of organization make sense.

My own personal view is that there is no good reason for trying to unify the Services into a single Service. I think that we get a great many important benefits from having several different Services with different points of view and different traditions. I think that gives the Secretary of Defense a greater range of choice than he would have otherwise. It's a way of building into the institution a certain amount of competition, which I think is a very good thing. I think for that reason we don't really care much about proposals to unify the Armed Forces any more, because in effect Mr. McNamara did it in the sense that by taking charge as Secretary of Defense he produced--with the management reforms that we've talked about--he produced a unified Defense establishment without abolishing the separate military services. I think that that's the desirable thing.

We used to hear a lot about unification back in the 1950's. A very curious and wrong argument used to be made. People would say, "Well, the Joint Chiefs of Staff are bickering." I remember one of the Joint Chiefs once saying to me, "Yes, judges deliberate, and lawyers or politicians debate, but Joint Chiefs of Staff bicker." People would say they were very troubled that the Joint Chiefs of Staff were debating, or bickering, or whatever you wanted to call it; that the military experts were disagreeing, and therefore what we'd better have was unification. This is confusing symptoms with real problems and proposing, I think, a very wrong-headed solution.

There's nothing wrong with the Joint Chiefs of Staff debating with each other. These are very complex issues on which reasonable men can differ. In fact, I'm much more concerned when they're not debating than when they are. I think that if they all get together and agree on something,

it's much more likely to be some kind of compromise, because there is no single best professional solution to the problem of what should the Armed Forces of the United States be. It's just nonsense to think that it's a purely military matter, or that it can be decided in a purely professional military way. Most of the important considerations come from outside of the military establishment particularly with foreign policy, technology, economy and a lot of other questions. So I'm not at all in favor of unification of the Armed Forces.

P: Dr. Enthoven, in a very frank appraisal of systems analysis, have there been any areas over the last few years taken at the judgment of this type of approach that have led us astray or led us into an area that did not prove to be to our best interests?

E: No, I think not. I think rather to the contrary that the main unsatisfactory experiences that we've had have usually come from not enough analysis rather than too much. I think that the record has been pretty good as far as the results of our analyses. Sure, here and there you'll find places, although I think generally on minor points, where it turned out the facts were different from what we thought on one or another thing. But I'd say that the record has been really pretty good. I feel very satisfied with it.

P: Would you in your judgment and your long service in the Defense Department have any recommendations for changes in the application of systems analysis?

E: Well, I think it's a continuing thing. It has got to evolve. I'm sure that there are areas of possible improvement. I think that it's always possible to do a better job, and I would hope that there would be a continuing emphasis on quality. I think the quality of the work is very much tied in with its effectiveness in influencing decisions. I think that this analytical approach ought to be extended much more to such fields as military operations

where it doesn't come in at all now, or doesn't come in very much. I think that there are a lot of other areas still relatively untouched that need to be given a thorough going analysis. So I see the analytical approach and methods that we are using now as being still in a fairly early stage. What we were doing, let's say, three years ago appears extraordinarily primitive today. I would hope that what we're doing today will appear three or five years from now to be very primitive by comparison; that analyses will be more thorough and in greater depth.

P: Is this analysis and computerization techniques an absolute necessity to deal with increasing complexities of our defense systems, of our Defense posture and policy?

E: Let me distinguish here between the analysis and the computerization techniques, because they are two really completely separate things. They bear some relationship to each other, but not a very close relationship. I think that analysis is terribly important because technology and world conditions are changing, and some of the tried and true lessons of the past are going to turn out to be wrong and misleading if applied in the future because of changing conditions. So it's very important that we understand how conditions have changed and what the implications of those changes are for our actions.

Now, talking about computers, that's a separate matter, but I think that the use of computers is significant; but in doing these analyses, we use all sorts of things besides computers. We use pencils and papers and typewriters and secretaries. Computers are only one of the many tools that are used. But I think in those problems in which we have to handle masses of data and in which we must do repetitive calculations, computers can be very helpful because they can help us to keep track of the data, and therefore

make it easier for other people to check it and cross-check it, and because they can free us to spend our time questioning the results and questioning the calculations to see whether they make sense rather than just doing the calculations. I can remember myself in the early 1960's spending many hours just doing calculations on a slide rule, calculating the effectiveness of different forces, which I think it was important for me to do in order to understand how the different things related to each other. But many of those calculations have now long since been computerized. That's good because it frees us to concentrate our time on judging what are the most plausible, or probable, assumptions.

P: Dr. Enthoven, during Mr. McNamara's tenure due to an emphasis in this type of analysis, he achieved an image of the cold, logical, computerized man. Thinking in terms of this, have you had a problem in convincing both the public and Congress in terms of budgetary allocations and of Defense spending of the effectiveness of this type of analysis?

E: First of all, I don't think that McNamara was or is at all a cold or computerized man. I think the tendency in the press to caricature people is an unfortunate thing. If a man is very intelligent, then they automatically assume that he must be cold, and assume that he has got the defects that reflect his strengths. I just don't accept that idea at all.

Now, I think there has been a considerable problem in getting widespread public understanding of the foundations of our managerial approach and our analytical approach, but I think that's inevitable. I don't look back on it and feel that there was any great defect here. I think that inevitably--let me put it this way, the single simple most important basic idea driving the whole thing has been the idea of determining explicitly what is the

public interest, and then in quite a single-minded way pursuing it. Inevitably that's going to mean that a lot of people in the Congress and in the Services are going to see their pet programs cut back; and it's going to mean decision-making on the basis of the public interest rather than compromising with a lot of local and parochial interests. Inevitably that's going to irritate a lot of the people involved. It's the best thing for the public, but it's not necessarily at all times the best thing for this or that congressional district, or this or that service.

I think that McNamara achieved a great deal, and therefore I think his public relations were satisfactory. If you go into the business of being Secretary of Defense from the point of view that you're going to get good public relations, you have to be awfully careful that you don't do it by sacrificing the public interest.

As far as explaining about the analytical methods, occasionally I've looked at some of the speeches that Mr. Hitch and I gave in the early 1960's, and it seems to me that they're still basically right. We've been making the point for eight years now about the idea of analysis as the servant of judgment rather than as a substitute for judgment. It takes a long time to get that through, but I think that's one of the costs of doing business.

P: Dr. Enthoven, just one last question. A couple of years back Mr. Johnson did begin the application of what has been called this "McNamara approach" towards analysis and cost effectiveness for other governmental agencies, and there were several directives to this effect. How do you feel that this is applicable; and in your judgment, is it feasible?

E: Yes. I believe myself that there is no question but that the analytical

and managerial approach that we've taken here is applicable to most government agencies in the domestic field, as well as to Defense, and to some aspects of foreign affairs. Now the usefulness will be in proportion to the extent to which these problems are reduceable to numbers. But I believe that there is a very great potential. I think that there's a great potential in the field of Transportation, for example; and Housing and Urban Development; and Health, Education and Welfare.

I have been for some time now a member of the Board of Directors at Georgetown University, and we have there a university task force on plans, programs, and budgets, which is evaluating programs and looking at curricula and that sort of thing. Applying the same basic ideas that I described earlier in our interview, I think the specific way in which these principles will work out--of course, this is going to vary a great deal--but I think that broadly viewed, these principles are bound to be very effective. I think that it's a good idea to extend the application of this approach throughout the government.

On the other hand, I think it's important to recognize that these things do take a lot of time; that they take very good people who can think through the problems clearly; and they take the support of the agency head. Therefore it can't just be extended by fiat.

Let me take the last point first. I think that we were able to bring this whole thing about in the Defense Department because of the very strong and direct support of Mr. McNamara. If the military departments had thought that the programming system and the planning-programming-budgeting system and systems analysis and all that were Mr. Hitch's idea and my idea but not Mr. McNamara's idea, I think then they would have end run us and just gone right to him. It just wouldn't have worked. So that I think it's not

possible to superimpose this from the Bureau of the Budget. I think that the heads of the agencies themselves have to understand it and want it to be that way.

I think that it takes time. In the Defense Department when we started installing this system in the early 1960's, we had the benefit of at least ten years of research at the Rand Corporation where Mr. Hitch and others had been involved in this, and similar related research at other places so that we had strong research programs to draw upon. I think that that is necessary in any of the other agencies in which they might establish a planning-programming-budgeting system.

It takes years of careful research, and you need an independent research program. So that I think that the President's extending of the planning-programming-budgeting system to the other departments has to be taken more as an expression of a goal and a hope rather than an actual act of implementing a management system, because each kind of problem area requires its own specific way of carrying out the implications of these principles. There isn't a pre-cut computerized formula that can be applied to other agencies. In each agency this kind of logic has to be developed and elaborated in terms of the real problems that that agency faces. So I think that it's likely to take a number of years before we really see results in other government agencies.

P: Dr. Enthoven, have you given any other interviews for other historical projects?

E: No. In the past few weeks, I've been interviewed by a television program to do with the anti-missile missile and with a newspaper reporter asking me to reflect on some of my experiences here. But this is the only interview, I think, for a historical project.

P: Do you have any corrections or changes to make in any other areas in which you have been quoted or written about?

E: Oh, I'm sure that there are quite a few, but nothing very major. Once someone asked me if I'd made any mistakes since I'd been here, and several times I've been asked that. A couple of times I mentioned one relatively minor point, and that got headlines. So now if somebody asks, I say, "I made four mistakes. Two were the mistakes, and two were admitting them."

If I could rewrite the record, there are a few things here and there I might take back. For example, we've made a lot of progress in our techniques for estimating the costs of new weapons systems. A couple of years ago I was appearing before Senator Jackson's Committee on Government Operations. On the basis of this progress which was considerable, I said I thought that big mistakes on the costs of new weapons systems were much less likely now than in the past, only to turn around and in the next year find many weapons systems costing much, much more than we had projected; not so much because of mistakes in the techniques, but just in the fact that the techniques didn't consider a whole lot of new factors--changes in technology, changes in economic conditions and the like--which made the weapons end up costing a lot more than we thought. But that's a fairly minor point. I'd say basically I feel that if you take the record in its entirety, I'd say--if you take it in its entirety and without taking isolated things out of context, I'd say I feel pretty satisfied with the record.

P: Do you have any further comments?

E: Nothing.

P: Thank you very much.

E: Thank you.

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By Alain C. Enthoven

to the

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