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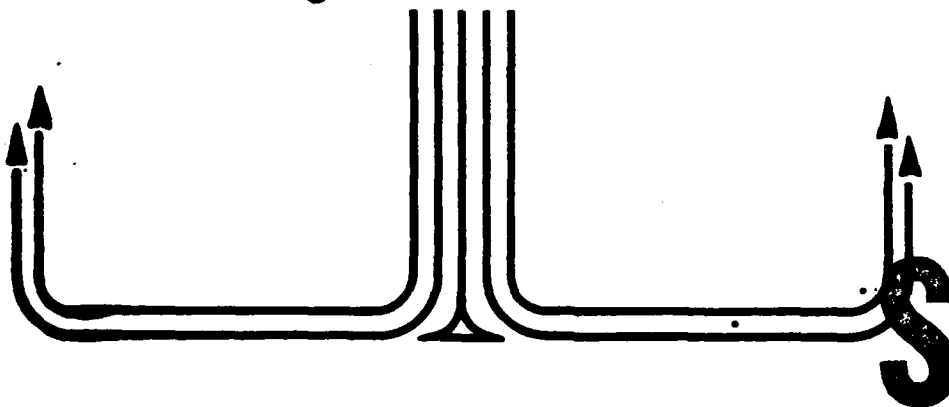
STUDENT REPORT

PLANNING AND ANALYSIS: WHERE'S THE BEEF?

MAJOR JACK E. LEONARD

88-1565

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19. ABSTRACT (Continue on reverse if necessary and identify by block number) The Air Force needs to place increased emphasis on systems analysis as it plans, inside and outside the Planning, Programming, and Budgeting System (PPBS). The current antipathy between military planners (operational judgment school) and systems analysts (quantitative analysis school) must be resolved. The operator/analyst, embodied in the mission area analysis (MAA) concept, can integrate the two schools of thought and produce meaningful analysis. In so doing, three rules must be observed. First, the analysis must be understandable (the Aunt Martha test), objective (no advocacy), and thorough (pros and cons). This is particularly true in Air Force relations with Congress where decreasing military experience among members places a premium on quality of information. The potential of systems analysis is clearly demonstrated in the continuing strategic bomber debate. In the mid-seventies, the debate centered on the procurement decision for the B-1. In the 1980's the question has been whether President Reagan's "two-bomber" approach was and is appropriate. In both cases, systems analysis played a pivotal role.				
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PREFACE

This research report, Planning and Analysis: Where's the Beef?, is meant to stimulate thought and discussion on the role of analysis in Air Force planning. Systems Analysis, as a tool for decision-makers, has enjoyed a somewhat "checkered" history in the Department of Defense. During the tenure of Secretary of Defense Robert S. McNamara, quantitative analysis was an integral (some believe overriding) aspect of planning. In fact, the Planning, Programming, and Budgeting System (PPBS) seemed to force dependence on analysis. Subsequently, John M. Collins has documented a 20-year history of civilian analysts in OSD riding "roughshod over military men."

Debate over the relative merits of operational judgment and quantitative analysis must be resolved. There are factors which argue these two approaches must be integrated for Air Force planning to have long-term effectiveness. This paper outlines a framework and working rules for conducting meaningful analysis. In addition, it provides examples to illustrate the role analysis can play in Air Force planning.

The author would like to express his appreciation to several individuals for their encouragement, assistance, and editorial skills. Colonel Marshall L. Michel III, of the Warfighting Analysis Division (AF/XOXFW), encouraged this research and formally sponsored the effort. Lieutenant Colonel Jim Sweeder, along with Majors Steve Sharkey and Craig MacFarlane (all of AF/XOXFW), made numerous suggestions which were incorporated into the final version of this paper. In many ways, this paper is a collaboration as the author spent many hours with these same individuals working to produce operationally relevant analysis. The "numeric warrior" concept was born during one such search for relevance. In another area, Lieutenant Colonel Henry Wurster (HQ SAC/XPXS) succeeded, where all others failed, in locating references for the 1986 Strategic Bomber Force Study. Also, Major Dan Mumaugh, research advisor, proved himself to be a very thoughtful and thorough editor. Finally, it would be inexcusable not to mention the support supplied by my wife, Linda. Her love, patience, and prayers were the real keys to the successful completion of this paper.

Subject to clearance, this manuscript will be submitted to the Airpower Journal for consideration. In addition, this paper will be used as part of an introductory package for personnel assigned to the HQ USAF Warfighting Analysis Division (AF/XOXFW).

ABOUT THE AUTHOR

Major Jack E. Leonard is a graduate of the USAF Academy where he majored in International Relations and received a Bachelor of Science (BS) degree in 1974. Following a tour at Fairchild AFB, Washington, which included duties as a B-52G pilot and aircraft maintenance officer, Major Leonard attended the Air Force Institute of Technology at Wright-Patterson AFB, Ohio. There, he participated in the Strategic and Tactical Sciences Program. He earned a Master of Science (MS) degree in Operations Research, graduating at the top of his class. Major Leonard was assigned to the Pentagon in 1984 as the Strategic Offense Mission Area Chairman in what is now the Warfighting Analysis Division, Deputy Director for Force Development, Directorate of Plans, Deputy Chief of Staff Plans and Operations, Headquarters USAF, Washington, DC (AF/XOXFW). In this capacity, he was involved in numerous projects dealing with strategic forces and capabilities. These included the USAF Planning Force, Zero Ballistic Missile Study, AF Future Target List, Strategic Modernization Roadmap, and the AF Bomber Study. In the area of Professional Military Education, Major Leonard has completed Squadron Officer School (SOS) and is presently attending the Air Command and Staff College (ACSC) at Maxwell AFB, Alabama. After graduation, he will return to operational flying, in the B-52G, with the 60th Bombardment Squadron, Andersen AFB, Guam.

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EXECUTIVE SUMMARY

Part of our College mission is distribution of the students' problem solving products to DoD sponsors and other interested agencies to enhance insight into contemporary, defense related issues. While the College has accepted this product as meeting academic requirements for graduation, the views and opinions expressed or implied are solely those of the author and should not be construed as carrying official sanction.

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REPORT NUMBER 88-1565

AUTHOR(S) MAJOR JACK E. LEONARD, USAF

TITLE PLANNING AND ANALYSIS: WHERE'S THE BEEF?

I. Purpose: To articulate an appropriate framework which can integrate the strengths of military planners (operational judgment school) and systems analysts (quantitative school).

II. Problem: The propensity for systems analysts in DoD to "ride roughshod over military men" has deepened institutional distrust of quantitative analysis in the Air Force. It would be unfair to say that quantitative analysis does not play a role in Air Force planning today. However, it is generally done on an ad hoc basis without an appropriate framework to ensure the analysis is operationally meaningful.

III. Discussion: The current antipathy between military planners and systems analysts is rooted in the management approach of former Secretary of Defense Robert S. McNamara. Secretary McNamara devised the Planning, Programming, and Budgeting System (PPBS) in an attempt to add more structure to the way the Services acquired weapons systems. In the view of some, the PPBS was actually designed to force reliance on analysis. The ensuing debate about the relative worth of military intuition (or judgment) and quantitative analysis has created a deep rift between military planners and systems analysts. However, there are compelling reasons to better

integrate operational judgment and quantitative analysis. One such reason is declining military experience in Congress. Just slightly more than 37 percent of the members have served in the military during combat. As a result, the Congress is relying more and more heavily on analysis to make informed decisions. In this environment, subjective argument based on experience alone simply will not suffice. The debate over how many and what kind of strategic bombers the US needs for national security is an excellent case in point. Air Force relations with Congress on this issue clearly show how timely analysis within an appropriate framework can shape the outcome of debates on military issues.

IV. Conclusions: Planning is an integral part of Air Force operations. If we don't plan we cannot expect to accomplish even the most limited combat objectives, except purely by chance. As important as planning is, it is not analysis, and without analysis planning is incomplete. So, the answer to the question, "Where's the beef in the planning burger?" is simply this: It is in systems analysis, in a process which defines goals and discovers the most efficient way for accomplishing them.

V. Recommendations: The Air Force needs to cultivate an analytical capability which is able to integrate operational judgment and quantitative analysis. If senior decision-makers use systems analysis as an aid to help them make the tough decisions then our best people will fight to "be where the action is." A special breed of analyst, chosen not only for his academic credentials but also for his operational experience can become a true "numeric warrior" in this type of environment. Such an operator/analyst would be able to provide the "synthesis" identified as lacking in much analysis done today. In the context of an appropriate framework, the analyst must ensure his work is understandable, objective, and thorough. More importantly, the decision-maker must use this capability if it is to survive and flourish. A robust systems analysis capability in the Air Force will lay the foundation upon which to build credible forces to meet future national security demands.

Chapter 1

INTRODUCTION

Systems Analysis. According to Webster, it is "the act, process, or profession of studying an activity (as a procedure, a business, or a physiological function) typically by mathematical means in order to define its goals or purposes and to discover operations and procedures for accomplishing them most efficiently." (22:1175) So, what does that have to do with the effective application of combat power? The answer is nothing and everything.

In many cases, systems analysis has absolutely nothing to do with how we develop, field, or use our military forces. That's because, for many military planners, the term "systems analyst" conjures up the image of "an 'ancient' 'Whiz Kid' from McNamara's day as Secretary of Defense applying his mysterious intellectual skills or art to the grand national problems of the times...." (40:8) In fact, some have gone so far as to draw a parallel between the shaman (a priest who uses magic) and the systems analyst:

Key roles in the analogy are played by the computer, which serves as the contemporary substitute for the chicken, and by the results it produces, which are the contemporary entrails. As the shaman sliced open his chicken and learned from the viscera that fell to the ground, so the systems analyst with the large complex computer model examines the results that the computer spews out and prognosticates wonderful things. (45:87)

This rather unflattering characterization of "whiz kids" is

understandable, at least in part, given the violence they did to the concept of "military judgment." Much of the antagonism between the military professional and the systems analyst "resulted from the debate over the relative merits of military intuition versus quantitative analysis, or systems analysis, as applied to military problems." (53:2) This controversy has been laid at the feet of former Secretary of Defense Robert S. McNamara. However, he has asserted, "I would not if I could, attempt to substitute analytical techniques for judgment based upon experience. The very development and use of those techniques have placed an even greater premium on that experience and judgment...." (19:15-16) If Secretary McNamara's view had been widely held, systems analysis should be inextricably woven throughout the fabric of the system which develops, deploys, and uses our air power assets. However, this is generally not the case.

The assertion that systems analysis has everything to do with combat power certainly isn't borne out by *current* reality, but that makes it no less true. Perhaps, E.S. Quade said it best:

Analysis offers an alternative to "muddling through," to waiting until one can see the problem clearly and then attempting to meet the situation. Delay can be hazardous; in the world today there could be a crisis or some other situation that could not be handled in this way. This is not to say that every aspect of such problems can be quantified or that analysis is without limitations, but only that it is not sensible to formulate a policy without carefully considering whatever relevant numbers can be discovered. (12:304)

Systems analysis does have broad application in the Air Force. This paper will articulate that application, particularly in the context of "planning." In order to do this, we will explore why the Air Force plans and the role planning plays in the Planning, Programming, and Budgeting System (PPBS). Then, the role of systems analysis will be examined, particularly in the context of

Air Force relations with the US Congress. This will lead, in turn, to a recommendation of how to apply systems analysis to planning. A practical example of how these rules relate to the Air Force and Congress will illustrate this application. The first step in developing this recommendation is an understanding of why the Air Force plans.

Chapter 2

AIR FORCE PLANNING AND THE PPBS

AIR FORCE PLANNING

Why does the Air Force plan? The basic reason is uncertainty. (9:208) Air Force leaders are faced with uncertainty on all sides. The price of spare parts, the unit cost of new aircraft, the effectiveness of new systems, or the severity of threats to our national security are all uncertain. A veritable alphabet soup of planning documents--IPSP, JIEP, JSCP, JSPD, JLRSA, SPA, DG, PGM, GA, AFIG, PIPD, WMP--attest to the time and effort spent trying to "nail down" these uncertainties. Through the planning process "each Service determines force objectives, force capabilities, and the resources needed to execute Service roles and missions." (20:25) However, there are some that feel the current planning system plays only at the "margins." Lieutenant General Victor H. Krulak, USMC (Ret.) voices such concerns:

As the Defense Department complex has grown, so has there also grown a tendency for that system to co-opt the initiative of the professional military. By the sheer weight of bureaucratic pressure, the nation's military leadership has been encouraged to minimize its broad and basic commitment to "support and defend the Constitution of the United States." (6:131)

Another way of dealing with uncertainty is to ignore it. Robert Shannon has noted "There is also a very strong tendency to persist with the present course of action. Programs and organizations tend to have a built-in inertia." (16:249) Of

course, there can be very good reasons to "stay the course."
This was documented by Mills and Palmer:

The military services recognize their prime responsibility as being to deter, and, if necessary, defeat attacks from adversaries against us or our allies. Because this awesome task must always be carried out within financial constraints, the people entrusted with the task tend to be risk averse, preferring to rely heavily on the "tried and true" than to invest precious resources in experimental missions. (8:103)

In dealing with uncertainty we must face the problem of resource allocation. In an uncertain world, how are defense resources allocated to realize the greatest return in terms of military capability?

The problem of planning to support effective resource allocation is difficult. "In a world of economic scarcity and political insecurity, nations face difficult policy choices. One such dilemma is deciding what portion of their resources should be devoted to national defense." (30:134) As difficult as it is for a nation to decide how much to spend on national defense, it is just as difficult for the military planner to decide how to apportion the funds he has been given. "Because the cost of research, development, and acquisition of new systems is continually rising while the Air Force budget is shrinking, decision-makers are forced to be more selective about approving requests for funds." (27:38) What this has done is force the Air Force into a position where there is "an unfortunate tendency...to be skeptical of long-range planning." (17:124) However, it is clear "[more] time and effort is needed to look beyond the current year's battle for resources." (39:11)

As anyone who has been in the Pentagon during budget time knows, the "battle for resources" is an all-consuming passion. As the saying goes, "If you ain't funded, you ain't." Unfortunately this presents a dilemma because, "Planning cannot

be done by advocates...." (26:47) In fact, in his book On Strategy: The Vietnam War in Context, Colonel Harry Summers makes mention of "the dominance of 'programming and budgeting' rather than 'planning' in the Planning, Programming, and Budgeting System (PPBS)." (18:113) The PPBS is the vehicle by which the Air Force determines what forces it needs, decides what it can afford, and monitors how the money is spent.

THE PLANNING, PROGRAMMING, AND BUDGETING SYSTEM (PPBS)

The Planning, Programming, and Budgeting System (PPBS) was introduced into DoD by Secretary of Defense Robert S. McNamara in 1961. President Lyndon B. Johnson was so impressed he directed it be introduced throughout the government in 1965. President Johnson believed, "This system will improve our ability to control our programs and our budgets rather than having them control us." (19:214) Unfortunately, even though it was the birthplace of PPBS, the Department of Defense had trouble making the system work effectively. "From the beginning of [PPBS] the Defense Department has encountered difficulties in making military planning relevant to Defense programs and the budget that emerges." (20:14) This difficulty in making planning relevant can be brought back to the antipathy between military planners and systems analysts. The adversarial relationship strains at the very fabric of the PPBS since the system "forced, and in the view of some was actually designed to force, a dependence on analysis." (12:289) As one comes full circle, the themes of military judgment and uncertainty enter back into the picture. "The military has long believed that systems analysis is self-deluding in that it attempts to quantify the unquantifiable and that military judgment alone can provide meaningful interpretation to uncertainty." (52:23) This extreme position robs military planning of the support it so desperately needs. "Planning is not analysis, although a plan may be based

on rational thoughts and actions and may be the result of a policy analysis." (12:285)

The problems with planning based on judgment alone are legion. A recent acknowledgment of the problem can be found in the Final Report of the President's Blue Ribbon Commission on Defense Management (The Packard Commission). The National Security Decision Directive (NSDD-219, 2 April 1986) which emerged as a result stressed "effective planning is a key element of PPBS." (10:C34) In a separate article, David Packard remarked, "...the Defense Department needs a more rigorous effort to match strategy with resources." (37:12) The question then becomes, "How do we fix the problem?" The answer lies in revitalizing Service involvement in planning, particularly since it is an integral part of the PPBS. If properly used, "the planning phase of the PPB system represents the long-term process in which mission needs are identified, matched with resource requirements, reviewed, and finally translated into budget proposals." (20:23)

The PPBS can still be an extremely effective tool for resource allocation. As Colonel Summers noted, PPBS has done "an excellent job in 'getting control of the lines of supply.'" (18:28) This seems in keeping with the intent of the PPBS, namely "to disjoin the procurement of hardware for national security from the seemingly random approaches by the individual Services...." (7:6) However, the PPBS still has some problems. For example, a 1980 Defense Science Board study "argued that decisions to buy weapons 'frequently appear to be driven by available technology rather than real need.'" (28:32) In another instance, the services were given greater "flexibility in choosing their programs" by reforms instituted by Secretary of Defense Weinberger in 1981. Unfortunately, the services were criticized for failing "to note the fact if they were given more authority, they would be responsible for more consistent planning...." (21:295) Again, in 1984, Vincent Puritano,

Assistant Secretary of Defense (Comptroller), addressed the problem:

[There is a] need to conduct a major review of the weapons requirements planning process in the services....Weapons requirements should conceptually flow from a full and complete analysis of national security objectives, the strategy required to achieve those objectives, and the threats to that strategy. (39:11)

As already noted, the Packard Commission echoed many of these same concerns. There are, of course, almost as many potential solutions as there are apparent problems. Yet, systems analysis seems tailor-made as "a systematic approach to helping a [decision-maker] choose a course of action by investigating his full problem, searching out objectives and alternatives, and comparing them in the light of their consequences...." (11:2)

Chapter 3

THE ROLE OF SYSTEMS ANALYSIS

Systems analysis has a critical role to play in the Air Force planning effort, inside and outside the PPBS. Alexander Cornell, in The Decision Maker's Handbook, sums it up well. He says, "The real goal of Systems Analysis is to teach decision makers to think in a special, orderly, and thorough way. It is more than formulas, figures, and computers; it is the ability to use them creatively and to rely on both quantitative methods and human judgments about problems and opportunities." (2:17) A more consistent use of systematic decision-making might address another criticism of the planning process: "it does not drive decisions." (26:46) In this light, the Air Force experience in applying systems analysis to planning provides an excellent case study.

PAST APPLICATIONS OF SYSTEMS ANALYSIS

In the late 1960's, systems analysis did receive major emphasis in the Air Force. In 1966, an Air Command and Staff College report documented courses on systems analysis taught by all three levels of Air Force professional military education: Squadron Officer School, Air Command and Staff College, and Air War College. (53:67) Two years later, the trend was continuing:

Military planning and strategy have always involved more art than science; what is happening is that the art form is changing from an ad hoc, seat-of-the-pants approach

based on intuition and experience to one based on analysis and supported by intuition and experience." (11:427) [emphasis in original]

This trend didn't last long. By 1971, "the military maintained the question of 'How much is enough' could only be answered by determining military requirements based on military judgment." (52:13-14) Why did this happen? Defense officials certainly seemed to rely on the input of military judgment. Secretary McNamara stated, "I am sure that no significant military problem will ever be wholly susceptible to purely quantitative analysis." (19:15) Alain C. Enthoven, Assistant Secretary of Defense (Systems Analysis) under McNamara, went even further. He said, "Indeed, systems analysis cannot replace judgment, because no important defense policy issue will ever be wholly susceptible to precise analysis." (3:65) The unfortunate truth of the matter, as documented by John M. Collins of the Congressional Research Service, is that for more than 20 years now civilian systems analysts in OSD have ridden "roughshod over military men." (1:70) Understandably, military leaders have developed a less than charitable attitude towards analysis. On the other hand, our continuing relationship with the US Congress argues for a return to a systems analysis approach to planning.

CONGRESS AND SYSTEMS ANALYSIS

The Congress now relies heavily on analysis in order to make informed decisions. We have come a long way since 1966 when Congress attacked DoD's use of cost-effectiveness as "[raising] the specter of a decision-maker who...knows the price of everything and the value of nothing." (44:3) In contrast, today the "tremendous congressional demand for studies and reports, places enormous demands on the DoD staff and reinforces DoD's tendency to focus on resource questions at the expense of strategic planning." (34:391) This has gone so far as to

make one writer lament, "The principle of civilian control never meant Congressional control of the military." (32:328) However, this trend is exacerbated by changes in the composition of Congress.

The face of Congress is slowly changing as the number of veterans decreases. In 1985, only slightly more than 37 percent had served in the Armed Forces during a time of conflict. (55:Table 2) Quoting a member of Congress, "Lack of military experience is detrimental to the members because it robs them of special knowledge which is not easily replaced. There is no way you can have a feel for the military unless you've worn the uniform." (55:10) There are two results. First, "Congress is not likely to develop the ability to process defense policy more efficiently and rationally...." (34:396) Second, Congressional requests for something more than subjective argument based on experience will continue to grow. (42:21) The Air Force continues to receive "highest marks" for the quality of information provided to Congress. (56:32) However, in their dealings with Congress "military leaders must maintain and strengthen military credibility...fostered through demonstrated proficiency and professionalism." (55:15) An increased use of systems analysis will do this and more. It will help the Air Force better explain and defend its programs. Above all, systems analysis needs to be applied in a systematic manner.

PROPOSED APPLICATION OF SYSTEMS ANALYSIS

Systems analysis cannot be done exclusively on an ad hoc basis; an appropriate framework must be developed. Marvin Leibstone, a retired Army colonel and editor of several international defense journals, submits, "No defense analyst worthy of that label will argue that anything other than a threat/requirements/capabilities equation should undergird strategic and tactical planning...." (33:58) A General

Accounting Office report on Measuring Military Capability takes note of the current Air Force Mission Area Analysis (MAA) effort. This division in the Pentagon was established to "assess Air Force war-fighting capabilities and identify limiting factors." (49:25) Beyond that, "the analysis suggests what we should be able to do, how well we can do it, and what we should do to improve our overall combat capability." (46:90) This is very close to a "Capabilities Programming and Budgeting (CPB) System" proposed by one author which would "focus the justification and decision making about resource requests on the capabilities to achieve the goals and mission of an agency." (38:7) This focus on the interface between planning and programming is where systems analysis could yield real dividends. The benefits of systems analysis are "sorely needed in today's complex society of ever-scarce resources and never-scarce needs." (2:36) In fact, one report asserts, "A new approach must be taken which integrates MAA into the mainstream of the decision process." (54:18) This harkens back to repeated examples which show the primary use of systems analysis as an aid for making decisions. However, it has also been noted, "The improvement of effectiveness analysis will depend mainly on the efforts of senior officers." (51:74) In other words, systems analysis needs continuing support from our senior leadership and the best kind of support is simply to ask questions. In this way, we can overcome the problem of how to recruit and build an analytical capability. (43:11) If senior decision-makers use systems analysis as an aid to help them make the tough decisions then our best people will fight to "be where the action is." A special breed of analyst, chosen not only for his academic credentials but also for his operational experience can become a true "numeric warrior" in this type of environment. An operator/analyst, more interested in "the big picture" as opposed to confidence intervals, error bars, and study plans, would be able to provide the "synthesis" identified as lacking in much analysis done today. (23:11)

This synthesis would defuse the "general impression officers seem to have [that] analyses do not weigh the professional military viewpoint properly, particularly that of the experienced operator." (51:71) Analysts of this caliber would intuitively understand "reliance on expert judgment is essential to all analysis" (12:187) because they would be experts in their operational field. As good as all this is, the answer does not only lie in the application of systems analysis to military planning problems. It is also important for the operator/analyst to be able to communicate his findings to the decision-maker. (4:13) There are two potential areas of trouble. Not unsurprisingly, they are the analyst and the decision-maker.

The analyst must speak the decision-maker's language when presenting the results of analysis. Since the operator/analyst is also an expert in the "military aspects" of the problem, this should be easier for him than for a civilian analyst. However, numbers have a tremendous capacity to bewitch and beguile even the most wary. So, there are three rules which will help the analyst produce meaningful analysis. The first rule flows from the fact that decision-makers "do not care about the numbers--they want to know the conclusion." (35:111) The analyst must subject his work to the "Aunt Martha Test." In other words, if Aunt Martha wouldn't understand the presentation of analysis and results then they're not ready to be the foundation of a decision. That's not to say decision-makers aren't smart. Rather, it's just not germane whether a Monte Carlo simulation, a hand-held calculator, or scribblings on the back of envelope produced the conclusions. What is important is whether or not the analyst knows what he's doing and whether the results make sense. Generally, "if the computer answer appears to be nonsense, it probably is." (35:110) The first rule builds credibility; the next two maintain it.

The second rule is, "Be objective." Don't be an advocate. Other folks are paid good money to do that job. The

task is to help "articulate" (or develop) the Air Force position, not "advocate" it. The pressure to "tweak" the numbers, "massage" input variables, or engage in "creative math" is tough for the advocate to resist. The third rule is, "Be thorough." In other words, identify all the pros and cons. Major General Glenn A. Kent eloquently addressed this issue in an address to the Military Operations Research Society:

Too many analyses seem constructed in the context that the purpose is to convince friendlies that the position that they already hold is a good position. The cons to the position are carefully avoided lest we shake the abiding faith in our own righteousness: "Don't put in the cons or the Chief may not buy our position"; "Don't bring up so-and-so, it will only open up Pandora's Box."...One point of the above is that even in the dirty business of advocacy it pays to be honest. (12:302)

The decision-maker himself should want the facts, as well as the pros and cons, and probably does. He must guard against the tendency to ignore analyses that run contrary to "what everyone knows." (4:10) It may be the analysis is flawed. However, if the analyst has been objective, thorough, and has applied the Aunt Martha Test, then maybe the "conventional wisdom" is incorrect. Beyond this though, Air Force leaders must understand the role systems analysis plays in both making and defending decisions. Dealings with Congress must adhere to the same three rules articulated here. The decreasing military experience in this body places the burden squarely on the Air Force to be able to persuasively articulate its position. Systems analysis has been and will continue to be a valuable tool in this regard as attested to by the continuing strategic bomber debate.

CONGRESS AND THE STRATEGIC BOMBER DEBATE

The national debate over the size and composition of the strategic bomber force provides an excellent example of how systems analysis can be applied to planning issues. In 1976, as the production decision for the B-1 approached, the debate in Congress became more heated. On 25 February 1976, portions of Quanbeck and Wood's study for the Brookings Institution, Modernizing the Bomber Force, (hereafter called the Quanbeck-Wood study) was read into the Congressional Record. (31:4378-4380) They concluded, in part, there was "no reason to produce the B-1...." (14:93) Further, they recommended the development of a standoff cruise missile carrier. This set off a flurry of activity and the Air Force produced a comprehensive critique of the study on 31 March 1976. (48:--) The unclassified version of their assessment was presented, in its entirety, to the members of Congress on 6 May 1976 by Senator Barry Goldwater (R-Arizona). (24:12748-12754) The debate seesawed back and forth until 20 May 1976 when Senator John C. Culver (D-Iowa) proposed an amendment to the DoD Appropriations Authorization Act (1977) which would postpone the B-1 production decision from November 1976 to not earlier than 1 February 1977. In addition, the President would have to certify procurement as being in the national interest. (29:14819) Following extensive debate, the amendment was passed by a vote of 44 to 37, with 19 not voting. (29:14851) After this, on 30 June 1977, President Carter cancelled procurement of the B-1. Experts on both sides of the issue had provided analysis to support their positions but the Quanbeck-Wood recommendations prevailed in the end. It is therefore of more than just passing interest to look more closely at the Air Force assessment of the Quanbeck-Wood study.

The Air Force critique of the Quanbeck-Wood study was a comprehensive rebuttal of no less than 36 specific issues raised or assertions made by the original document. It is particularly noteworthy that the critique was published less than five weeks

after the Quanbeck-Wood recommendations were entered into the Congressional Record. This is in contrast to nearly three years Mr. Quanbeck spent developing the ideas first expressed in Strategic Forces: Issues for the Mid-Seventies. (13:43-50) Even so, the Air Force position could have been stronger had the critique adhered to all three rules presented earlier.

Taking them in reverse order, the Air Force was certainly thorough. One might fault the critique for being one-sided, for not identifying both pros and cons. However, from the viewpoint of the Air Force the Quanbeck-Wood study was fundamentally flawed. This was because it assigned bombers to "a narrow 'people killing and city busting' role" which was "neither militarily sound or morally appropriate...." (29:14829) Further, on the issue of objectivity, the Air Force was defending more than just the B-1 per se. Also at risk was an exhaustive study of alternative bomber force structures completed just the previous year, the Joint Strategic Bomber Study (JSBS). (24:12747-12748) This study "found the B-1 to be about twice as cost-effective and much less sensitive to the Quanbeck-Wood type of severe threats than their preferred standoff cruise missile force." (48:29) The Air Force felt confident in basing their critique on this study since the GAO has found it to be objective and useful. (29:14828; 25:10248) So far, two of the three rules had been adhered to. However, it takes all three rules working in concert to ensure success.

Unfortunately, the Air Force failed to tie all of their observations and criticisms into an understandable package. This violated the Aunt Martha test. Each criticism was understandable when taken alone, but Congress did not have the military experience, even then, to synthesize the individual issues into a coherent whole. This was done later by Francis P. Hoerber, working for the Center for Strategic and International Studies. He supplemented the Air Force critique with observations of his own on effectiveness and cost. The Quanbeck-Wood study compared

the cost of equal effectiveness forces. As one can see (Table 1), the B-1 force was clearly the least cost-effective of the forces analyzed. However, when Hoerber's effectiveness and cost corrections were factored in, the results were quite different. Now the B-1 force had a slight edge over all others. It is interesting to speculate what the effect would have been if this graphic comparison had been available in March 1976 rather than February 1977. Of course, this example is well over ten years old and the bomber debate has moved on. .

<u>Force</u>	<u>Number and Type of Aircraft</u>	<u>Total Ten-Year Costs</u> ¹	
		<u>Quanbeck Wood</u>	<u>Hoerber</u>
1	255 improved B-52s	69.6	61.6
2	200 B-1s	71.3	59.0
3	80 CMCs ²	55.1	60.8
4	100 fast hard CMCs	59.6	62.1
5	120 high acceleration CMCs	60.7	64.3

NOTES: ¹Costs in billions of fiscal 1976 dollars.
²CMCs = cruise missile carriers.

Table 1. Bomber Study Cost Comparisons
 (14:Table 6-3; 5:Table 5)

In the first year of his administration, President Reagan made the decision to procure 100 B-1Bs by 1988. In addition, he accelerated development of the Advanced Technology Bomber (ATB) for operational deployment in the early 1990s. (15:7) This so-called "two-bomber" program has enjoyed great success. However, the B-1B has completed its initial production (100) and "the political fight over how many of each bomber to build is

centered in Congress." (41:--) In fiscal year 1986, Congress directed the Secretary of Defense to analyze future bomber force structure requirements. This has come to be known as the 1986 Strategic Bomber Force Study. Basically, this study "reaffirmed the soundness of the President's two-bomber approach for [bomber] modernization." (47:IV-9) An update to this study has been requested no later than 1 April 1988. (50:--) Of particular interest is that congressional language seems to be aimed at clarification rather than questioning of the original study. (36:H3321) This is due, surely, to the completeness of the initial effort.

The completeness of the 1986 Strategic Bomber Force Study is a testament to the relevance of the three rules articulated in this paper. A diversified team of operators and analysts worked diligently to produce an understandable, objective, and thorough piece of work. A concerted effort produced graphics and supporting documentation which presented technical analysis in operational terms geared to the intended audience. The objectivity of the work was maintained at all levels as preconceived notions were examined in light of the analysis, not just accepted as fact. A full range of issues, pros and cons, were considered and developed. As a result, the concerns of both proponents and detractors of the current two-bomber program could be dealt with. In this way, a study with lasting value to the strategic bomber debate was produced. This once again shows the soundness of producing understandable systems analysis which is objective and thorough.

Chapter 4

WHERE'S THE BEEF

Systems analysis can and should play a major role in Air Force planning. It is a valuable tool which will help leaders make good decisions. Experience alone is not enough. "We learn by experience, but not necessarily what we should--thus the cat that jumps on a hot stove learns never to jump on a cold stove." (12:333) As a supplement to experience, systems analysis will help the Air Force deal with the US Congress. Declining military experience among members mirrors the trend in the general populace (55:1) and is not likely to change. Since Congress is inextricably tied to the PPBS, through the appropriations and authorization process, better analysis support to the planning process will help us understand one another better.

The application of systems analysis to Air Force problems requires the operator/analyst who can combine operational experience and analytical ability. In the context of an appropriate framework, the "numeric warrior" must ensure his work is understandable, objective, and thorough. On the other hand, the decision-maker must trust and use this capability if it is to survive and flourish. A robust systems analysis capability in the Air Force will lay the foundation upon which to build a credible force to meet future national security demands.

In this light, the continuing strategic bomber debate provides an excellent case in point. Systems analysis has played a key role in several aspects of the decision-making process. In the mid-seventies, a Brookings Institution study recommended

cancellation of the B-1. The Air Force responded with a comprehensive critique in a very timely manner. Unfortunately, the individual critiques were never presented as a single coherent picture. Subsequent analysis, which was too late to affect the debate, provided the needed synthesis. More recently, the 1986 Strategic Bomber Force Study adhered closely to the threefold credo articulated here. The result was and is operationally meaningful analysis that is still shaping the strategic bomber debate.

Planning is an integral part of Air Force operations. If we don't plan we cannot expect to accomplish even the most limited combat objectives, except purely by chance. As important as planning is, it is not analysis, and without analysis planning is incomplete. So, the answer to the question, "Where's the beef in the planning burger?" is simply this: It is in systems analysis, in a process which defines goals and discovers the most efficient way for accomplishing them.

BIBLIOGRAPHY

A. REFERENCES CITED

Books

1. Collins, John M. U.S. Defense Planning: A Critique. Boulder, Colorado: Westview Press, 1982.
2. Cornell, Alexander H. The Decision-Maker's Handbook. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1980.
3. Enthoven, Alain C. and K. Wayne Smith. How Much Is Enough? New York: Harper & Row, 1971.
4. Goldwin, Robert A., ed. Bureaucrats, Policy Analysts, Statesmen: Who Leads? Washington, DC: American Enterprise Institute for Public Policy Research, 1980.
5. Hoerber, Francis P. Slow to Take Offense: Bombers, Cruise Missiles, and Prudent Deterrence, second edition. Washington, DC: Center for Strategic and International Studies, 1980.
6. Krulak, Victor H., Lieutenant General, USMC (Ret.). Organization for National Security: A Study. Washington, DC: United States Strategic Institute, 1983.
7. Meehan, Robert P. Plans, Programs and the Defense Budget. Washington, DC: National Defense University Press, 1985.
8. Mills, Gregory B. and John L. Palmer, eds. Federal Budget Policy in the 1980s. Washington, DC: The Urban Institute, 1984.
9. Novosad, John P. Systems, Modeling, and Decision Making. Dubuque, Iowa: Kendall/Hunt Publishing Company, 1982.
10. President's Blue Ribbon Commission on Defense Management. A Quest for Excellence. Final Report to the President. Washington, DC: Government Printing Office, June 1986.
11. Quade, E. S. and W. I. Boucher, eds. Systems Analysis and Policy Planning: Applications for Defense. New York: Elsevier, 1968.
12. Quade, E. S. Analysis for Public Decisions, second edition. New York: North-Holland, 1982.

13. Quanbeck, Alton H. and Barry M. Blechman. Strategic Forces: Issues for the Mid-Seventies. Washington, DC: The Brookings Institution, 1973.
14. ----- and Archie L. Wood. Modernizing the Strategic Bomber Force: Why and How. Washington, DC: The Brookings Institution, 1976.
15. Record, Jeffrey. Strategic Bombers: How Many Are Enough?. Published by Institute for Foreign Policy Analysis as National Security Paper 3. Washington, DC: Corporate Press, Inc., 1986.
16. Shannon, Robert E. Systems Simulation: The Art and Science. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1975.
17. Smith, Perry M. Taking Charge: A Practical Guide for Leaders. Washington, DC: National Defense University Press, 1986.
18. Summers, Harry G., Jr., Colonel, USA. On Strategy: The Vietnam War in Context. Carlisle Barracks, Pennsylvania: Strategic Studies Institute, US Army War College, 1981.
19. Tucker, Samuel A., ed. A Modern Design for Defense Decisions. Washington, DC: Industrial College of the Armed Forces, 1966.
20. White, Eston T. and Colonel Val E. Hendrix, USAFR. Defense Requirements and Resource Allocation. Washington, DC: National Defense University, 1982.
21. Wildavsky, Aaron B. and Michael J. Bokin, eds. The Federal Budget: Economics and Politics. San Francisco: Institute for Contemporary Studies, 1982.
22. Woolf, Henry Bosley, et al, eds. Webster's New Collegiate Dictionary. Springfield, Massachusetts: G. & C. Merriam Co., 1979.
23. Woolsey, R. James. The Uses and Abuses of Analysis in the Defense Environment. Washington, DC: American Enterprise Institute for Public Policy Research, 1980.

Articles and Periodicals

24. "The B-1 Bomber Program." Congressional Record, Vol. 122, Part 11 (6 May 1976), pp. 12747-12754.
25. "Brookings B-1 Study--What's Wrong with It?." Congressional Record, Vol. 122, Part 9 (9 April 1976), p. 10248.
26. Cancian, Mark F., Major, USMCR. "PPBS: Rude Awakening." Proceedings (U.S. Naval Institute), Vol. 110/11/981 (November 1984), pp. 44-52.
27. Collins, Joe E. "VANGUARD: AFSC's Formal Long-Range Planning Process." Program Manager, Vol. XVI, No. 5 (September-October 1987), pp. 38-41.
28. "Defence Procurement: A Job Too Important for Servicemen." The Economist, Vol. 298, No. 7436 (8 March 1986), pp. 31-34.
29. "Department of Defense Appropriations Authorization Act, 1977." Congressional Record, Vol. 122, Part 12 (20 May 1976), pp. 14817-14851.
30. Diehl, Paul F. and Gary Goertz. "Trends in Military Allocations Since 1816: What Goes Up Does Not Always Come Down." Armed Forces & Society, Vol. 12, No. 1 (Fall 1985), pp. 134-144.
31. "The Dubious Value of the B-1 Bomber." Congressional Record, Vol. 122, Part 4 (25 February 1976), pp. 4378-4380.
32. Englund, Jon and Stephen Aubin. "The JCS and Congress: Lessons from France and Great Britain." Comparative Strategy, Vol. 6, No. 3 (1987), pp. 305-332.
33. Leibstone, Marvin. "A Strapped U.S. Defense Budget: Can Better Be Bought For Less?." Strategic Review (Summer 1987), pp. 55-62.
34. Lindsay, James M. "Congress and Defense Policy: 1961 to 1986." Armed Forces & Society, Vol. 13, No. 3 (Spring 1987), pp. 371-401.

35. Maddox, David M. and Stephen C. Moore. "The 'Five Whats' Approach to Military MS/OR." Interfaces, Vol. 17, No. 4 (July-August 1987), pp. 108-111.
36. "National Defense Authorization Act for Fiscal Year 1988." Congressional Record, Vol. 133, No. 74 (8 May 1987), pp. H3320-H3324.
37. Packard, David. "Improving Weapons Acquisition." Policy Review, No. 37 (Summer 1986), pp. 11-15.
38. Parke, Richard L. "Capabilities Programming and Budgeting: An Improvement on PPBS." Armed Forces Comptroller, Vol. 30, No. 3 (Summer 1985), pp. 5-11.
39. Puritano, Vincent. "Resource Allocation in the Department of Defense." Armed Forces Comptroller, Vol. 29, No. 2, (Spring 1984), pp. 4-11.
40. Rusk, Richard A. and Major J. Robert Adams, USAF. "Systems Analysis in the Cost and Management Analysis World." Armed Forces Comptroller, Vol. 30, No. 1 (Winter 1985), pp. 8-13.
41. Wilson, George C. "Stealth Costs Discussed." The Washington Post, Final Ed., 4 June 1986, Sec. A, p. 16.
42. Wu, Hsiu-Kwang and Lieutenant Commander Hollis D. Arnold, USN. "Assessing Risk and Return of Military Investments." Defense Management Journal, Vol. 22, No. 2 (1986), pp. 18-25.

Official Documents

43. Novick, David. "Program Analysis Revisited." RAND Paper 4690. RAND Corporation, Santa Monica, California, August 1971.
44. Quade, E.S. "A Critique of Cost-Effectiveness." RAND Paper 5524. RAND Corporation, Santa Monica, California, November 1975
45. Strauch, Ralph E. "A Critical Assessment of Quantitative Methodology as a Policy Analysis Tool." RAND Paper 5282. RAND Corporation, Santa Monica, California, August 1974.

46. US Department of the Air Force: Air Command and Staff College. "The Greener Side of Air Force Blue." Maxwell AFB, Alabama, December 1984.
47. US Department of the Air Force: HQ United States Air Force (CV). Air Force Issues Book. Washington, DC, Fall 1986.
48. US Department of the Air Force: HQ United States Air Force (SA). "Assessment of Quanbeck-Wood Report." Washington, DC, 31 March 1976.
49. US General Accounting Office. Measuring Military Capability: Progress, Problems, and Future Direction. Report to the Chairman, Committee on Armed Services, House of Representatives. Washington, DC: Government Printing Office, February 1986.
50. US Government: Office of the Under Secretary of Defense for Acquisition (Strategic and Theater Nuclear Forces). "Report on Strategic Bomber Force Composition," memorandum. Washington, DC, 22 December 1987.

Unpublished Materials

51. Boyle, Edmund J., Lieutenant Colonel, USAF. "Effective Analysis--The Less Precise Half of Cost Effectiveness." Unpublished Research Report 3301. Air War College, Air University, Maxwell AFB, Alabama, April 1967.
52. Burke, Robert J., Colonel, USA. "National Defense--The Declining Influence of the Military in the Determination of 'How Much Is Enough' for National Security." Unpublished Research Report 4864. Air War College, Air University, Maxwell AFB, Alabama, April 1971.
53. Fox, Cecil E., Lieutenant Colonel, USAF. "Why Air Force Officers Need a Working Knowledge of Systems Analysis." Unpublished Research Report 3021. Air War College, Air University, Maxwell AFB, Alabama, January 1966.
54. Frank, Wallace B., Jr., Major, USAF. "A Management Approach for the Eighties." Unpublished Research Report 80-0770. Air Command and Staff College, Air University, Maxwell AFB, Alabama, May 1980.

55. Pace, Peter, Lieutenant Colonel, USMC. "National Security and Congress: The Impact of Declining Military Experience Among Members of Congress." Unpublished Research Report. National War College, National Defense University, Ft. Lesley J. McNair, Washington, DC, February 1986.
56. Twomey, Thomas A., Colonel, USAF and Harold J. Johnsen. "The Congress: Defense Policy in Theory and Practice." Unpublished Research Report. National War College, National Defense University, Ft. Lesley J. McNair, Washington, DC, February 1986.

B. RELATED SOURCES

Books

- Allen, Thomas B. War Games. New York: McGraw-Hill Book Company, 1987.
- Battilega, John A. and Judith K. Grange, eds. The Military Applications of Modeling. Wright-Patterson AFB, Ohio: Air Force Institute of Technology, 1984.
- Collins, Carol C., ed. U.S. Defense Spending: How Much is Enough?. New York: Facts on File Publications, 1983.
- Epstein, Joshua M. The 1988 Defense Budget. Washington, DC: The Brookings Institution, 1987.
- Hitch, Charles J. and Roland K. McKean. The Economics of Defense in the Nuclear Age. New York: Athenum, 1960.
- Huber, Reiner K., ed. Systems Analysis and Modeling in Defense: Development, Trends, and Issues. New York: Plenum Press, 1984.
- Institute for Foreign Policy Analysis. U.S. Bomber Force Modernization. National Security Paper 7. Washington, DC: Corporate Press, Inc., 1986.
- Merewitz, Leonard and Stephen H. Sosnick. The Budget's New Clothes: A Critique of Planning-Programming-Budgeting and Benefit-Cost Analysis. Chicago: Markham Publishing Company, 1971.

- Owen, Henry and Charles L. Schultze, eds. Setting National Priorities: The Next Ten Years. Washington, DC: The Brookings Institution, 1976.
- Oxenfeldt, Alfred R. Cost-Benefit Analysis for Executive Decision Making: The Danger of Plain Common Sense. New York: AMACOM, 1979.
- Prados, John. Pentagon Games: Wargames and the American Military. New York: Harper & Row, 1987.
- Russett, Bruce M. What Price Vigilance?: The Burdens of National Defense. New Haven, Connecticut: Yale University Press, 1970.
- Schoderbek, Charles G., et al. Management Systems: Conceptual Considerations, revised edition. Dallas: Business Publications, Inc., 1980.
- White, Eston T., ed. Defense Economic Issues. Washington, DC: National Defense University, 1982.

Articles and Periodicals

- "Advanced Technology Bomber and Special Access Programs." Congressional Record, Vol. 133, No. 65 (27 April 1987), pp. H2334-2335.
- "The Alternatives to the B-1." Congressional Record, Vol. 122, Part 11 (6 May 1976), pp. 12743-12747.
- "The B-1 Bomber, A Vital Weapon for National Defense." Congressional Record, Vol. 122, Part 7 (24 March 1976), pp. 7817-7821
- Cordesman, Anthony H. "The US Defence Budget Debate." Armed Forces, Vol. 5, No. 6 (June 1986), pp. 278-283.
- Dorgan, Honorable Byron L. "The Bomber Debate." Congressional Record, Vol. 133, No. 17 (4 February 1987), pp. E363-E364.
- Eisenstadt, Steven. "The Packard Reforms: A Year Later." Military Logistics Forum, Vol. 3, No. 8 (May 1987), pp. 38-43.
- Forgionne, Guisseppi A. "Effective Resource Planning Through Decision Support Systems." Armed Forces Comptroller, Vol. 31, No. 4 (Fall 1986), pp. 5-10.

- Kaplan, Fred. "Packard Report: Missed Opportunities." Military Logistics Forum, Vol. 2, No. 9 (June 1986), pp. 57-59.
- Kindness, Honorable Thomas N. "B-1B and Stealth not an Either/Or Choice." Congressional Record, Vol. 132, No. 112 (13 August 1986), p. E2865.
- Ludvigsen, Eric C. "A Budget 'Forced by Circumstances'." Army, Vol. 36, No. 4 (April 1986), pp. 19-32.
- Lyttkens, Carl Hampus and Claudio Vedovato. "Opportunity Costs of Defence." Journal of Peace Research, Vol. XXI, No. 4 (1984), pp. 389-394.
- McIlvaine, Paul J. "Defense Needs More Systems Engineering." Program Manager, Vol. XVI, No. 3 (May-June 1987), pp. 24-29.
- McNaugher, Thomas L. "Buying Weapons: Bleak Prospects for Real Reform." The Brookings Review, Vol. 4, No. 3 (Summer 1986), pp. 11-16.
- Might, Robert J. "Decision Support for Aircraft and Munitions Procurement." Interfaces, Vol. 17, No. 5 (September-October 1987), pp. 55-63.
- Moore, Molly. "'Stealth' Costs Exceeding Estimates." The Washington Post, Final Ed., Sec. A, p. 7.
- Murphy, John Edward and James Clay. "Tips for Budget Justification at Appropriations Hearings." Armed Forces Comptroller, Vol. 32, No. 4 (Fall 1987), pp. 13-14.
- Perla, Peter P. "War Games, Analysis, and Exercises." Naval War College Review, Vol. XXXX, No. 2 (Spring 1987), pp. 44-52.
- Richardson, Robert C., III. "Long Range Defense Planning." The Journal of Social, Political and Economic Studies, Vol. 11, No. 4 (Winter 1986), pp. 349-365.
- Schneickert, George D., Major, USA. "Risk Funding for Realistic Budgets." Program Manager, Vol. XIII, No. 2 (March-April 1984), pp. 29-31.
- "Senate Debate: Limitation of the B-1B Bomber Fleet to 100 Aircraft (Amendment No. 2678)." Congressional Record, Vol. 132, No. 109 (9 August 1986), pp. S10975-S10981.

Thorn, Michael E., Lieutenant Colonel, USAF. "Cost Analysis: Challenge and Response." Air University Review, Vol. 36 (September-October 1985), pp. 93-100.

Wilson, George C. "Defense: Even With Crackdown, Spending Will Crest for Years." The Washington Post, Final Ed., 9 January 1987, Sec. A, p. 21.

-----, "House Panel Seeks Data to Compare New Bombers." The Washington Post, Final Ed., 17 January 1987, Sec. A, p. 7.

Official Documents

Hill, Paul T., et al. "Obstacles to the Termination of Air Force Activities." RAND Report 3303-AF. RAND Corporation, Santa Monica, California, April 1986.

US Department of the Air Force: HQ Strategic Air Command (XPRR). "HQ SAC Operational Requirements Action Officers Handbook." Offutt AFB, Nebraska, 15 May 1986.

Unpublished Materials

Anderson, Carl A., Lieutenant Colonel, USAF. "Effectiveness Measures." Unpublished Research Report 3266. Air War College, Air University, Maxwell AFB, Alabama, April 1966.

Burns, Hugh L. Major, USAF. "Asking the Right Questions: Creative Inquiry for Air Force Leaders." Unpublished Research Report 83-0310. Air Command and Staff College, Air University, Maxwell AFB, Alabama, March 1983.

Marshall, Bruce E., Major, USAF. "The Air Staff/Congressional Interface--What Action Officers Need to Know." Unpublished Research Report 83-1560. Air Command and Staff College, Air University, Maxwell AFB, Alabama, February 1983.

Mumaugh, Daniel J., Major, USAF. "The ABCs of the PPBS--An Action Officer's Glossary." Unpublished Research Report 87-1825. Air Command and Staff College, Air University, Maxwell AFB, Alabama, April 1987.

White, Anthony N., Colonel, USAF. "The JCS Role in Planning, Programming and Budgeting." Unpublished Research Report. Air War College, Air University, Maxwell AFB, Alabama, May 1986.

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