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The failure of analytic effort is most often attributed to the difficulty in translating study efforts into the decisionmaker's actual options. A redefinition, or at least fuller definition, of the analyst's role and responsibilities can ensure that the study retain practical relevance. This definition is the decisionmaker's, the client's, responsibility.

MANAGING ANALYSIS: THE CLIENT'S RESPONSIBILITY

by

George F. Brown, Jr.

Introduction. In the space of about three decades, defense analysis has reached the stage at which it can be said that no major national security decisions are made without it.¹ The established Department of Defense decision-making processes for programming, planning, and budgeting and for systems acquisition build in a formal way upon analytic inputs. Congressional and public debates over force options (such as those regarding the B-1 bomber and the Navy shipbuilding program) have hinged upon analytic assessments of the cost and effectiveness of alternative systems. Effective analysis has become a virtual prerequisite to effective advocacy.

Despite its unyielding presence, many of the clients of defense analysis remain dissatisfied with its contributions, and few analysts or clients would have difficulty in assembling a lengthy bibliography of studies that have had

minimal effect. The analytic profession has long recognized this perceived imbalance between analytic efforts expended and policies influenced. The general topic of "providing useful analysis" has become standard in the textbooks from which analysts are educated and at the societal meetings of the analytic community.² Nonetheless, although no time series of measurements on analytic quality and use lend themselves for analysis of the analysts, casual observation suggests that the situation has not improved to a point that warrants complacency.

If defense analysis is to achieve the potential attributed to it by many clients and most analysts, active efforts will be required from all of the parties involved. Of particular importance to this transition will be the degree to which the clients of analysis take an active role in its management.

Analysis from the Analyst's Perspective. A first step towards understanding the requirement for the management of analysis requires that the client understand the professional viewpoints that have evolved within the analytic community. The following quotations suggest important dimensions of this viewpoint.

... we all base our claim to fame on the application of the *scientific method* to questions of the allocation of resources, to improvements in operational effectiveness, and to a host of other problems that we say we can help to illuminate through analysis. Thus, we pride ourselves on analytic rigor. We pride ourselves on the use of quantitative data. We associate ourselves with the scientific—as opposed to liberal arts—community. We deal in correlation coefficients, in decision trees, in conditional probabilities. . . .³

Basically, the analyst's role is to explore all facets of a situation objectively and dispassionately to help someone else make a decision.⁴

... in policy analysis, in systems analysis, or in operations research, the most used models, on the whole the most useful, and often the only type even considered, tend to resemble "scientific" models. That is, they consist of a system of logical relationships that attempt to express the processes that determine the outcome of alternative actions by means of a set of mathematical equations or by a computer program.⁵

Two primary conclusions can be drawn regarding the perspective of the analytic community: analysts generally consider themselves to be scientists, and they consider their role to be separable from that of the decisionmaker.

Although there is certainly nothing wrong with either science or the advisory capacity, these viewpoints define limits on the analytic focus when the overall management decisionmaking process is considered.

Why is the primary focus of the analyst limited? First, the education of the analyst (typically at the Masters or Ph.D. level) has been concentrated almost entirely on techniques for analyzing and solving models.⁶ Second, while the analyst is typically well versed in the nature of modeling efforts in the abstract, he is frequently not expert in terms of understanding the nature of any specific decision environment. Finally, the eventual decisionmaking and implementation processes will invariably be influenced by political, organizational, and other such factors.

The emphasis placed by the analytic community on the transition from a model to its solution can be seen in professional discussions regarding ways in which to enhance analytic contributions. Perhaps the most extensive inquiry into the subject of analytic professionalism was that conducted by the Operations Research Society of America in response to charges of unprofessional conduct on the part of the analysts involved with the 1969 debate on the Safeguard Antiballistic Missile System.⁷ A committee of six former presidents of the society was appointed to examine the question of standards of professional conduct for members of the analytic community. Their 135-page report exhaustively covered the dos and don'ts of proper analysis. Within the report a careful line was drawn regarding the roles of the analyst and the client; portions of this discussion are summarized below:⁸

[The *client*] must cooperate with the analyst to ensure that the analyst can formulate a proper description of the situation to be studied, that he has access to all appropriate data that are

24 NAVAL WAR COLLEGE REVIEW

required... The *client* must endeavor to ensure that the statement of the problem his analyst works on is correct... The *client* is responsible for the ultimate decisions... The *analyst*... must restrict his analysis to the quantifiable and logically structural aspects of the problem only... The *analyst's* job... is to analyze and help illuminate... (emphasis added)

While the report fully recognizes the importance of all of the stages of the decisionmaking process, it clearly places the burden of responsibility for the initial (problem identification and formulation) and terminal (decision-making and implementation) stages directly on the client.

A more recent examination of analytic professionalism is contained in Russell Murray's Keynote Address to the 40th Military Operations Research Society Meeting.⁹ In response to his perception of "the fairly sad public image that the analytic business bears today," Murray suggests that "the future of analysis depends on the analytic community's standards of quality control."¹⁰ He later defines this task in these terms:

Basically, the idea is to see whether the study answers the question, and whether the answer is correct. [This requires] reading the study, thinking about the assumptions and the methodology, checking the calculations, seeing if the arithmetic's correct... looking for unwarranted statistical inferences, thinking hard about whether the analyst's model is a plausible representation of the real world...¹¹

Again, this charge to the analytic community implies the role of the client in defining the question, and stops short of the stage in which the answer is translated into a decision and implementation plan.

The Client's Responsibility. From the above discussion, the two central theses of this paper emerge rather clearly:

- If analysis is to make a substantial contribution to defense policy, it is essential that (a) analytic formulations bear close resemblance to the real defense policy problems, and (b) the product of the analysis be such that it can be directly transformed into decisions and plans for implementation.

- The accomplishment of these two essential tasks depends fundamentally on the contributions made by the client.

From these two conclusions, a long (and rather standard) listing of areas for fruitful client interaction emerges. The client can and should contribute to such activities as defining the scope of the problem in terms of the variables and relationships included in and excluded from the model, specifying the ways in which effectiveness and cost are defined and measured, identifying the assumptions and constraints relevant to the situation being studied, defining the roles of time and uncertainty in the analysis, identifying and interpreting the data upon which the analysis builds, and so forth. Similarly, in his management role, the client can further enhance the likelihood of successful analysis by such actions as allowing sufficient time for the analysis to be completed, providing adequate resources, ensuring access to data and individuals within the organizations being studied, sharing the corporate memory and operational competence, continuing discussions with the analyst to allow two-way learning to occur, and avoiding the placement of political and bureaucratic obstacles for the analyst.

Certainly all of the above client activities are desirable ones, and the client who even approximates accomplishing them can be virtually assured of obtaining valuable assistance from his analysts. However, for a wide variety of

MANAGING ANALYSIS 25

reasons—the pressures of time and conflicting responsibilities, the lack of a single client responsible for the study, the distaste of some clients for getting too deeply involved in analysis, and others—it is unlikely that this utopian view of client/analyst cooperation will ever be widely achieved. While this is not to suggest that the quest be abandoned, it does suggest the need for the definition of some more readily achieved guidelines for the effective management of analysis. Two such guidelines are proposed:

Relating Analytic Contributions to Decisions. First, the analyst's responsibilities should be defined in terms of the *specific decisions* upon which the analysis is to bear, and the *specific ways in which the analysis is to contribute to making these decisions* should be identified. Such definitions should occur, for example, in the statement of the study directive from the client tasking that the analysis be performed.

This first guideline, if followed, would probably substantially eliminate the most frequently cited reason for the failure of analytic efforts, namely, the difficulty of transitioning from the study's findings to the actual options confronting the decisionmaker during the PPB cycle, the acquisition process, or in tactical operations. The client's role in providing such guidance will often be difficult; it requires that he provide an explicit answer to the question of why he wants analytic support in the first place. It requires an effort on the part of the client that goes considerably beyond the traditional statement regarding the existence of a problem; it implies that in addition to recognizing the problem the client will have pondered it long enough to have identified the types of options available to him for solving it and the factors that will affect his choice among these options. In a broad sense, this guideline suggests that the client should provide

the analyst at the beginning of the study with blank tables that the client hopes the analyst will return filled in at the end of the study.

This guideline in no way implies that the analyst should be separated from the tasks of generating alternatives and determining the appropriate measures for selecting among them. These tasks are fundamental elements of the analytical processes in which analysts are schooled, and virtually every competent analyst would consider them part of his job. Rather, it focuses attention on the criticality of the tasks necessary to facilitate the transition from the world of models to the world in which the client must operate. Additionally, this form of client guidance, if maintained and updated during the iterative and evolutionary process through which most analyses progress, can serve as a mechanism for ensuring that the study retains its practical relevance throughout.

A subsidiary benefit of this first guideline for the management of analysis is that it should be of greatest value when applied to ill-structured problems. Defense decision problems can be broadly stratified into two groupings: "clean" problems for which the potential of a "right answer" exists (e.g., how should a support budget be allocated to achieve maximum readiness, how should a search be conducted to maximize the probability of detection, or how should funds be allocated between numbers of weapons and quality of weapons to maximize overall kill probability), and "dirty" problems that will never be undisputably "solved" (should current readiness be sacrificed to allow force modernization, should localized capability be traded off to achieve flexibility and mobility, or should capabilities in one mission area be lessened to improve capabilities in some other area). If all defense problems were of the former type, the contributions of analysis would likely

26 NAVAL WAR COLLEGE REVIEW

be so well perceived that papers such as this would never be written, for it is to these types of problems that the scientific method so directly applies. Further, the tools of the analytic profession are geared directly towards these problems, and analysts can be expected to gravitate towards such problems in that they represent clear opportunities to apply their skills.

While a myriad of factors—faulty data, uncertainties, resource constraints, etc.—guarantee that problems within this class will remain challenging and important opportunities for analytic contributions, it is within the second class of defense problems that management of analysis is most critical.

These dirty problems are some of the major sources of conflict and disenchantment between analysts and clients. The analyst, on the one hand, views them as closer to art than science, sees them filled with subjectivity, politics, and other nonquantifiables, and often sees little room for the application of his tools of optimization. The client, on the other hand, frequently sees these problems as being of fundamental significance and as the ones that demand the most of his decisionmaking and advocacy skills. In short, dirty problems are often the ones for which the client most desires analytic support while simultaneously being the ones the analyst avoids.

One of the benefits of the first guideline proposed above is that it reduces this confrontation by making dirty problems appear a bit cleaner to the analyst. If the client provides the analyst a statement of the factors that he has determined to be relevant to the choice among policy options, the analyst is left with a problem amenable to scientific inquiry. Providing answers to questions such as "what is the relation between cost and effectiveness measured along certain dimensions across the following alternatives," "how does performance measured along

certain dimensions vary under each of the following sets of assumptions," and "what are the incremental changes to the following dimensions of effectiveness across the following alternatives" is standard fare for the analyst, even though none of these questions requires that a "right" answer be determined. If the client provides the analyst with guidance on what he needs to learn about dirty problems in the form of the first guideline, he is likely to obtain the quality of analytic support he needs for resolving them.

Analytic Contributions to Implementation. The second guideline for effective client management of analysis is that part of the analyst's responsibility should be in *providing guidance on the implementation of the decisions made*. Depending upon the nature of the problem being examined, such guidance could be provided concurrently with the analysis itself (e.g., if a "right" answer emerges or if the range of possibilities is not too wandering) or iteratively (after the client has selected from among the available courses of action). The analyst should recognize the existence of this eventual mandate from the very inception of the study.

This recommendation departs to a certain degree from the traditional view of the separation of the roles of the analyst and client for two reasons. First is the undisputable importance of implementation; a superb decision not implemented has little value, and a superb analysis leading to a superb decision that is not implemented also has little value. In the long run, both client and analyst should consider successful implementation an essential goal, one whose achievement is a mutual responsibility. While buckpassing on the basis of the separation of roles may be effective in the short run, the long-term perceptions of the contributions of analysis will depend upon actions successfully taken, not on what might have been

were it not for the failings of the middleman. The second reason is that implementation represents a key opportunity for valuable client/analyst information exchanges and learning. Having studied a problem, an analyst should also know many of the key factors that bear upon the implementation of proposed solutions to the problem. Many of the same factors that bear upon the analysis of policy alternatives reappear as critical to implementation; the analyst should share what he has learned about the decision environment that bears upon the implementation process. In addition, the tools of analysis can be directly applied to implementation problems in much the same way that they are applied to other management activities.

To understand why the analyst should be expected to contribute to the development of an implementation plan even though he may not be involved in the actual process itself, it is necessary to develop briefly a model of implementation. Figure I is a diagram of the ingredients of a plan for the implementation of a decision.^{1 2}

Basically, the figure suggests five principal ingredients of a plan for implementation. First, a detailed plan of action that defines the events to take place and their time-sequencing and identifies planned responses to possible contingencies must be specified. Second, the resources necessary for the accomplishment of the plan must be defined and allocated. Third, within the organization management responsibilities and work requirements must be defined and delegated among relevant groups and individuals. Fourth, the necessary information must be disseminated within the organization; included, of course, in this category is the gaining of approval of the decision, if necessary, from higher levels of authority. These four stages, when completed, enable the organization to begin the execution of the planned changes.

The fifth ingredient of the overall process of implementation is the development of a control system and, as an adjunct, an information-gathering system by which progress can be monitored and new or unforeseen problems detected. As information is gathered

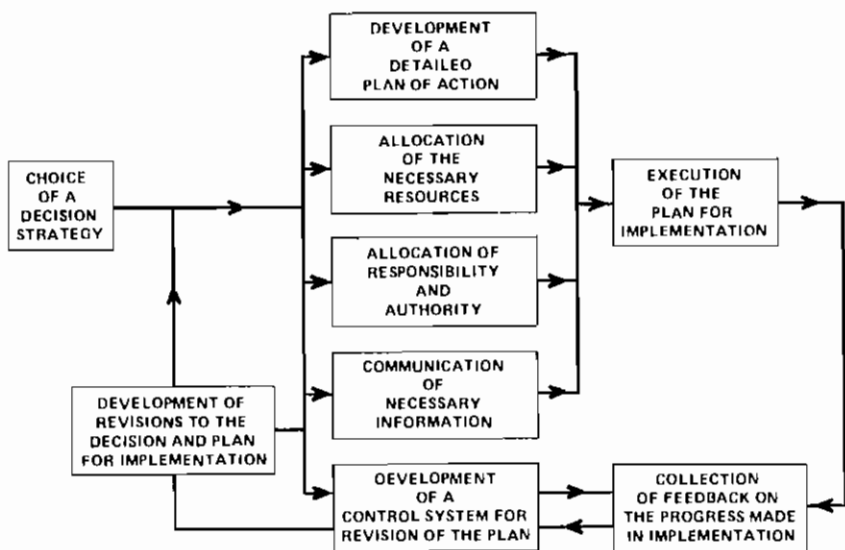


Figure 1

28 NAVAL WAR COLLEGE REVIEW

during the implementation process, such a control system allows for revisions to be made in the initial decision and/or the plan for its implementation.

Analytic methods can play a central role in the development of a plan for implementation and in the actual process of the execution of the plan. Two of the necessary ingredients for implementation, the detailed action plan and the resource delineation, often emerge directly from the analysis leading to the decision. Other quantitative tools have been developed to further assist in such tasks. Similarly, methods of analysis play major roles in both contingency planning and in the development of a management control system. An important byproduct of many studies is the identification of those factors and uncertainties that bear heavily on the quality of the decision and thus require particular scrutiny during the implementation process. The contributions of analytic methods as tools for collecting, evaluating, and summarizing information during the implementation process can also be significant. Finally, the tasks of communication and of delegation of responsibility, while obviously heavily dependent upon the organizational structure within which the implementation occurs, are often simplified as a result of the explicit nature of quantitative models and of the conclusions derived from them.

This brief development of a model of implementation suggests that analysts can make an important contribution to the success of the process for two reasons. First, during the study of the problem environment, the analyst should have naturally examined many of the factors that must be specified within the implementation plan; doing analysis should contribute to many key facets of implementation. Second, in an independent way, analysis can con-

tribute to successful implementation as many analytic tools (e.g., PERT charts, decision trees, statistical control models) are directly applicable to the component activities of implementation. Thus, in a broad sense, the second guideline presented above should convey to the client the fact that analysis can be an important element of implementation planning, one that should be relied upon as fully there as in the other areas of management to which analysis routinely contributes.

Summary. Managers in the Department of Defense play many roles. One of the most demanding of these is as a manager of analysis. While dealing with analysts and their sometimes intimidating models, mathematics, and computers can often be perplexing, it is not a role that can be easily avoided. More importantly, handled properly, analysis is a tool from which the defense manager can reap substantial rewards. This paper has proposed two guidelines for the effective management of analysis, guidelines which, if followed, should help to insure that analysis becomes a more regularly useful tool and less often an obscure burden with which the client must contend.

BIOGRAPHIC SUMMARY



Professor George Brown has been a member of the Management Department, Naval War College since 1973. He received his Ph.D. in Economics from Carnegie-Mellon University and has written

widely on operations research, financial and quantitative analysis, statistics, and management matters. Prior to joining the faculty, he was a Study Director at the Center for Naval Analysis.

NOTES

1. The origins of defense analysis are usually traced to the contributions made by the first operations researchers during World War II. These efforts were focused on such problems as convoy protection and antisubmarine warfare. Formal analytic organizations such as the Operations Evaluation Group and the Rand Corporation were established soon thereafter. From groups such as these and from academia a substantial literature regarding defense analysis soon evolved, the best contribution being Charles J. Hitch and Roland N. McKean, *The Economics of Defense in the Nuclear Age* (Cambridge: Harvard University Press, 1960). Under Defense Secretary Robert McNamara, analysis was formally imbedded into the DOD management structure with the establishment of the Office of the Assistant Secretary of Defense for Systems Analysis (now redesignated as the Office of Program Analysis and Evaluation). A detailed description of the evolution of defense analysis is contained in Ralph Sanders, *The Politics of Defense Analysis* (New York: Dunellen, 1973).

2. See, for example, E.S. Quade, *Analysis for Public Decisions* (New York: American Elsevier, 1975), chap. 17, and Garry D. Brewer, *An Analyst's View of the Uses and Abuses of Modelling for Decisionmaking* (Santa Monica, Calif.: Rand Corporation, January 1975).

3. Russell Murray, "The Analytical Profession—Its Standards and Its Future," Keynote Address, 40th Military Operations Research Society Meeting, December 1977.

4. *Guidelines for the Practice of Operations Research*, adopted by the Operations Research Society of America and published in *Operations Research*, September 1971, p. 1133.

5. Quade.

6. George F. Brown, Jr., "Defense Systems Analysis . . . One More Time," *Naval War College Review*, Fall 1978, pp. 28-34 discusses further the imperfect linkage between the training and practice of defense analysis.

7. See *Operations Research*, pp. 1167-1168.

8. *Ibid.*, pp. 1143-1144.

9. Murray.

10. *Ibid.*, p. 1.

11. *Ibid.*, pp. 5-6. An expanded view of this same author's ideas on analytic quality control is contained in "The Quest for the Perfect Study, or My First 1138 Days at CNA," (Arlington, Va.: Center for Naval Analyses, April 1977).

12. See George F. Brown, Jr., *Quantitative Methods for Making Decisions* (Newport, R.I.: Naval War College, 1974), chap. 1 for a further discussion of this model. Other discussions of the problems of implementation can be found in Jan H.B.M. Huysmans, *The Implementation of Operations Research* (New York: Wiley, 1970) and R.L. Schultz and D.P. Slevin, *Implementing Operations Research/Management Science* (New York: American Elsevier, 1975).

