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Richard F. Norford

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Systems analysis is sometimes seen as an effort to quantify with modern data processing equipment all of the factors involved in high-level decisionmaking. In reality, systems analysis includes many nonquantitative techniques which have a wide application to the problems of foreign policy and defense. In light of the fact that there is currently no Government agency which devotes extensive time to an analysis of the long-term effects of foreign policy options, it would seem that systems analysis could conceivably fill an important gap in policy planning.

SYSTEMS ANALYSIS: A MISSING ELEMENT IN FOREIGN POLICY PLANNING

A research paper prepared

by

Mr. Richard F. Norford

School of Naval Warfare

Introduction. In a Cabinet meeting on 6 March 1953, President Eisenhower commented:

Ever since 1946, I know that all the so-called experts have been yapping about what would happen when Stalin dies and what we, as a nation, should do about it. Well, he's dead. And you can turn the files of our government inside out in vain—for any plans laid. We have no plan. We are not even sure what difference his death makes.¹

This statement was prompted by the very problem with which this paper is concerned: the inadequacy of our foreign policy planning.

There are many examples that indicate the inadequacy of foreign policy

planning or, indeed, raise the question of whether there was any actual planning in the sense of attempting to evaluate the long-term consequences of possible actions. One may well question the extent to which initial U.S. policies in the Middle East relative to the Arab-Israeli situation were based on serious long-range planning consisting of systematic, explicit, and objective evaluation of alternative policies and their implications regarding U.S. interests. Another example has been pointed out by Franklin A. Lindsay in connection with the ending of colonialism in Africa. He states that in the fall of 1960 the U.S. Government required outside assistance to recruit 15 financial advisers for 15 new African states. Lindsay argues that this sudden requirement shows a lack of foresight. Proper planning would have foreseen the need and enabled the

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timely recruitment that was necessary in order to provide the advisers with an adequate background in the economic, political, and social structures of the various countries they were to advise.²

The need for improved planning in foreign affairs, and in particular long-range planning, has not been without recognition. In an article specifically concerned with planning in foreign affairs, George Allen Morgan said in 1961,

Long-range planning is in great demand today. It is widely developed in certain aspects of military and industrial planning, and many feel there should be more in foreign affairs. To a considerable extent this is justified, and not as a passing mood but as a constant imperative.³

In addition, former Secretary of State Dean Acheson said,

The central task of a foreign office should be to understand what these forces are [which form and shape the emerging future], to do what can be done to shape them favorably to our interests, and to prepare to deal with them.

This should be the task, but it is not. The principal effort goes into dealing with the overpowering present, the present, which, like the Mississippi in full flood, absorbs the whole energy and thought of those who man the levees.⁴

Although these statements are almost a decade old, the situation does not appear to have been improved significantly, as will be shown.

The above examples and statements indicate a basic need for foreign policy planning that systematically analyzes situations in anticipation of problems in the field of foreign affairs and attempts to determine the best policy for the

United States to pursue. Many will agree but will consider the expectation to be utopian. Much useful work can still be done, however, by less than perfect planning.

During World War II, analytical techniques, known collectively as operations research, were used to determine the best way to conduct various types of military operations. Following the war, these techniques were first used in attempts to "optimize" weapon system design. Later, as weapon systems became more complex, as development and procurement costs soared, and as technical alternatives proliferated, it became increasingly necessary to evaluate basic requirements and long-range objectives. Because of the newness and complexity of some system concepts, experience and intuition were not as reliable or as convincing in problems of choice as they had been in the past. However, decisions still had to be made. In addition, because of the longer development times of the newer systems, it was necessary to base decisions on events projected further and further into the future. New analytical techniques were required. The result was the development of a new discipline, systems analysis, which was derived from operations research but which was broader in scope and directed toward possible future events.

The problems involved in making foreign policy decisions are more complex than in the past, and the need for long-range planning may be even more critical in foreign policy planning than in weapon systems development. The foreign policy planner also needs a discipline or an approach to planning commensurate with his problem. Systems analysis, as it has been developed and practiced in the Department of Defense, is applicable to foreign policy planning, and its application would represent a positive step toward reducing some of the recognized deficiencies in foreign policy planning.

Systems analysis is a widely used term, but it is also widely misunderstood. It can mean many things, depending on the intent of the user. Its potential value to foreign policy planning is probably little understood by many in the foreign affairs field because of its popular conception as a highly sophisticated set of mathematical techniques for quantitative analysis. It also is often equated with cost-effectiveness and long-range programing and budgeting techniques. As a result of these misconceptions, the foreign affairs community may deny itself the benefits of systems analysis that have been realized and appreciated in other fields.

Systems analysis is, in fact, a broad concept which is applicable to many types of planning. It is also an approach to planning that brings into sharp focus those very areas where deficiencies in foreign policy planning are widely recognized. Moreover, these present deficiencies in foreign policy planning are not likely to be significantly reduced by the current approach to analysis in international relations.

This discussion is primarily oriented toward people in the foreign affairs and international relations communities who have little or no understanding of systems analysis as it has been employed in planning by the Department of Defense. Because of the assumed background, the identification of deficiencies and the discussion of the nature and purpose of current analysis in international relations are treated in relatively general terms. However, readers not intimately familiar with these fields should have no difficulty relating to the problem as it is described. Emphasis is placed on the philosophical viewpoint, although some attention is spent on instrumental aspects, particularly with regard to non-quantitative techniques.

Deficiencies in Foreign Policy Planning. "Planning is thinking ahead. Policy planning is the futurity of policy

decision, i.e., the development of policies in the light of their implications for the future."⁵ "Thinking ahead" and "policy planning" would appear to be basic functions in the foreign affairs community. However, for a variety of reasons, policy planning, and in particular long-range planning that adequately considers "implication for the future," is not satisfied by current practice.

The deficiencies that will be identified are those that can be associated with a fundamental attitude or philosophy toward planning and with the tools and techniques used in planning analysis. Deficiencies attributable to other factors, such as interagency cooperation, intradepartmental organization, budgets, and training, also have been shown to have a significant effect on planning, but their consideration is beyond the scope of this paper.⁶

Based on organizational titles, it would seem that the planning function is adequately recognized. There is the Planning Board in the National Security Council and the Policy Planning Council in the State Department. However, evaluations of the actual operations of these two organizations indicate that real planning is either nonexistent or, at best, only a part-time activity.

The National Security Council was established to "advise" the President on matters of national security. In this role it is concerned only with broad policy implications. It was never intended to be a planning body to originate and to analyze, in depth, the implications of alternative policies.⁷

The fact that the National Security Council is not fundamentally concerned with actual planning has been pointed out by a number of writers. A study by the Brookings Institution pointed out the interdepartmental nature of the National Security Council and the fact that its staff is not in a position to conduct extensive and independent planning studies. The result is that up to the time of the study in 1960, 50

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percent of the policy papers discussed by the Council involved "split" viewpoints, but did not "... present a clear confrontation of the basic alternative approaches that are involved in the major policy issues."⁸ Another evaluation states that the Planning Staff of the NSC is concerned with "planning" only as it relates to making preparations for the NSC. Furthermore, it is argued that short-range problems are of more concern to the NSC than long-range problems.⁹ In a comprehensive assessment of how foreign policy is made in the United States, Burton Sapin states that "... the primary planning role of the ... National Security Council has been to focus and occasionally to prod the efforts of the line departments."¹⁰

By contrast with the National Security Council, the Policy Planning Council of the State Department was established specifically to fill the void in long-range planning. It is a small group of senior officers (usually about 11) charged with looking at long-range trends and attempting to foresee emerging problems. However, the Policy Planning Council is limited in resources and is frequently called upon for routine duties such as speechwriting and the drafting of speeches on current policy. The result is that the Policy Planning Council is able to devote only a limited effort to the analysis of long-term problems.

The situation was summarized in the Brookings Institution study in the following words:

As a small group of able officers, its members are frequently drafted for operational duties, such as writing speeches and current policy statements. Such activities can be useful in keeping the staff in touch with current affairs, but they have considerably reduced the time available for thoughtful consideration of longer range problems, as have the

burdens involved in servicing the Department of State's participation in the National Security Council.

Thus the Policy Planning Staff devotes only a limited portion of its limited resources to the task of long-term, broadly focused consideration of major foreign policy problems.¹¹

A more recent attempt to improve the foreign affairs machinery was taken by the President in 1966 when he created three new levels of organization for planning and decisionmaking. This is a relatively recent change, and more time may be needed to make a significant impact on foreign affairs policies. However, recent criticism of the higher level, the Senior Interdepartmental Group (SIG), indicates that planning continues to be a problem. It has been stated, "To make the system work will involve giving the Secretary of State something he has never had: (a) the ability to produce alternatives to the recommendations of his line subordinates; and (b) the ability to plan systematically. . . ."¹² The same evaluation finds encouragement, however, in limited results at the next level, the Interdepartmental Regional Group. This encouragement is based on the limited experience of one Bureau in the Department of State which attempted "systematic analysis of policy alternatives."¹³ This is apparently the program that the then Under Secretary of State, Nicholas de B. Katzenbach, referred to as "experimental" in a letter to a Senate subcommittee. In discussing this program Mr. Katzenbach stated that its major weakness was "hard analysis."¹⁴

Within the last year, and subsequent to the preceding comments, there have been further organizational changes in which the senior group, at least, has been reconstituted and incorporated into the NSC system.¹⁵ The effects of

this additional change remain to be seen.

Another organization in the Department of State that would seem to be involved in planning, or at least analysis related to planning, is the Bureau of Intelligence and Research. Undoubtedly this Bureau does make both intelligence and analysis inputs into the planning that is carried on in the Department. However, it has been pointed out that "... most Bureau analyses deal with current issues."¹⁶ In this regard, although analyses of current events may be inputs to planning, they should not be misconstrued as constituting planning. Another viewpoint regarding the Intelligence and Research Bureau is that the "... 'I' appears to have run away with the 'R.'"¹⁷ It seems apparent, then, that this Bureau is not involved directly in planning nor is it concerned specifically with policy planning analysis.

In commenting on the value of the Planning-Programming-Budgeting System to foreign affairs, Mr. Katzenbach said, "As you will see, the major thrust of my comments indicate that I believe we need more systematic analysis of: -the factors... upon which policy decisions are based;-alternative courses of action and their possible consequences."¹⁸

Former Assistant Secretary of State for Eastern Affairs Mr. Roger Hilsman emphasized the failure to recognize emerging problems.

No nation is so strong that it can dictate the course of history... one suspects that even our true failures in foreign policy would not have yielded to better organization... few of our true failures are attributable to bad administration in carrying policy out. Our true failures probably lie more in failing to recognize emerging problems in time to

evolve effective policies or in meeting big, bold demanding problems with half measures, timorous and cramped.¹⁹

The Brookings Institution observed that although many people are involved in long-range planning, much of it is "unsystematic and unsustainable."²⁰

In talking about the Department of State's responsibilities concerning the foreign policy implications of proposed military policies and actions, former Deputy Under Secretary of State for Political Affairs U. Alexis Johnson indicated a need for increasing ability to analyze and assess policy implications in broader national policy terms.²¹

In discussing some of the factors that limit planning, Mr. Acheson indicated, implicitly at least, a deficiency in "quantitative appraisal."²²

A good summary of planning needs is provided by Sapin's statement of "... requirements that *any* set of national security arrangements at the presidential level should satisfy."

Crucial to the policy process are systematic policy analysis, the creative development of policy alternatives, the anticipation of situations likely to become problems if not dealt with forehandedly, and long-range programming and planning...

It is of fundamental importance that particular policies and programs be seen in relation to one another, not as a series of separate entities or episodes.²³

In summary, the preceding statements have pointed out a number of weaknesses and needs associated with foreign policy planning. These deficiencies are not unique to foreign policy planning but, nevertheless, they do exist.

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Applicability of Academic Analysis to Foreign Policy Planning. The biggest division in the analysis field is between the traditional and the scientific schools. The approach to analysis employed by the traditionalist school is basically one of contemplation. It emphasizes the value of wisdom enhanced by experience. The analysis process has been described as a constant appraisal of facts in the mind until by some logic an interpretation is developed. Although a highly disciplined mental process may be employed, the shortcoming of this approach is that no one else will be able to duplicate the procedure with other assumptions. Thus it is clear that reputation must play an important role in the traditionalist school.²⁴ In earlier and less complex days this process may have been adequate, but it certainly seems open to criticism today. No one can be expected to master all of the disciplines and the related data that are now available. Furthermore, many of the new disciplines have been shown to have a significant but hitherto unknown, and even unsuspected, bearing on problems of a social and political nature. Recognition of this weakness in the traditionalist approach is, no doubt, the very reason for the emergence and rapid growth of the scientific school.²⁵

The scientific school began to take on perceptible dimensions in the mid-1950's with the advance of decision-making and systems theories. Since then it has added concepts from other disciplines such as communications, economics, psychology, sociology, anthropology, and operations research. Although growing rapidly, the scientific school is still small compared to the total effort in the international relations field.

Work in the scientific school can be categorized a number of ways. Two of the usual types of methodologies are behavioral and normative analysis. The former method basically describes the situation as it is and attempts to predict

future events. Normative analysis, on the other hand, seeks to describe how the situation should be in the light of stated goals and objectives. Effort has not been divided evenly between these two areas. Indeed, the fact that the scientific school is often equated with the behavioral analysis shows where the preponderance of the effort has gone.

Behavioral analysis has been labeled both "empirical" and "descriptive" because the effort to date has been to develop empirical data of a descriptive nature. The longer range objective is to use the data describing past behavior to predict likely future behavior in international relations.²⁶

Mathematical techniques are being used in behavioral analysis in order to develop empirical relationships. Statistical techniques, in particular, have been important in analyzing existing numerical data. In addition, new efforts are being devoted to the quantification of historical materials previously treated as facts and considered to be incompatible with quantitative analysis. Game theory is being widely employed to analyze conflict situations. Simulation techniques are also being employed to study both the actions and the interactions of states.²⁷

Applications of a technique known as factor analysis constitute another example of activity in the scientific study of international relations. Factor analysis is used to identify patterns of variation in data in terms of independent variables, which are often referred to as dimensions. A form of "factor analysis" may be performed mentally by the traditionalist school, but it will necessarily be quite limited in comparison to the systematic approach of factor analysis utilizing modern data processing equipment.

The growth of behavioral analysis has also been accompanied by a number of different approaches and theories intended to describe international behavior from a variety of viewpoints. An

approach of particular interest is called "systems analysis." When the term "systems analysis" appears in the literature associated with international relations, it usually is in the sense introduced by Morton A. Kaplan in *Systems and Process in International Politics* in 1957. However, Kaplan and most others in the field have conceived of systems analysis in a significantly different context than has the Department of Defense. Conception has, quite naturally, been shaped by overall goals, which, in the case of international relations studies, have been concerned with the description of systems and the development of theories of international behavior. In Kaplan's words, "It is the thesis of this volume that a scientific politics can develop only if the materials of politics are treated in terms of systems of action."²⁸ His primary concern is the analysis of international systems with theoretical development being the objective.

David Easton sheds more light on the social scientist's concept of systems analysis in the preface to his book concerned with an empirically oriented theory of political science. He says that he seeks to present "... a framework for the analysis of political systems. . . . It is a form that can best be described as a systems analysis, . . . that will make possible the analysis of political life as a system of behavior."²⁹

In recognition of some confusion in the conception and application of systems analysis, Oran R. Young uses the term "systemic" to make a distinction between "... 'systems analysis,' a loose phrase referring to a variety of techniques for the manipulation of data, and serious approaches to analysis based on systemic perspectives. . . ."³⁰ Although a distinction needs to be made, it should be recognized that the choice of "loose" to describe systems analysis and "serious" to describe systemic perspectives is merely a reflection of Young's own area of interest.

Of the recognized figures in the field of international relations, the writings of Charles A. McClelland indicate the best appreciation of the different aspects of systems analysis. He recognizes systems analysis as a methodological tool and as a strategy. He acknowledges its successful application to complex problems in other fields and implies a belief that sooner or later the complex problems in international relations must also be attacked on a systems analysis basis.³¹

Another important aspect of McClelland's writings is a recognition of the need to do more normative inquiry in addition to behavioral studies. It is in this regard that he seems to clearly recognize the problem-solving capabilities of systems analysis and the need for its application in this context to problems of international relations.³²

The discussion of the behavioral school has shown that its main preoccupation can be characterized by the word "descriptive." Behavioralists have employed empirical methods to turn historical facts into data which have then been analyzed in attempts to explain why certain events happened as they did. Work has been devoted to both research and to theory building and has increased rapidly. However, behavioral analysis still constitutes only a small part of the total analysis effort. In the words of McClelland, when compared to all the work in international relations, the contributions of the behavioral approach are like "... 'islands' of research . . . [that] float in a 'sea' of wisdom."³³

Normative analysis is directed specifically toward change; its purpose is to improve. It "... is concerned with how people *should* act in order to achieve better (or best) results."³⁴ It will, of necessity, require some prediction of future trends and forces and possibly even certain types of events. This is the capability that is being developed, or at least attempted, in the present work of

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the behavioralists. The present lack of such capabilities helps to account for the low level of interest in normative study.

The traditionalists would maintain that their discipline has historically provided the background and training necessary for planning and can continue to do so in the future. Furthermore, it seems fair to say that many of them believe that "wisdom based on experience" is not only necessary, but is also the *only* way to analyze complex problems in international relations and to do foreign policy planning. On the other hand, the traditional approach is the one that has been applied up to now, and it has not been able to satisfy all planning needs. It may be argued that many existing planning deficiencies are traceable to organizational problems or to other factors already acknowledged. Nevertheless, it seems clear that the traditional approach alone cannot overcome all the recognized planning deficiencies. This is particularly true of the need for hard analysis designed to systematically define, create, and evaluate all feasible alternatives to broad and complex problems in such a way that areas requiring value judgments are clearly identified.

The scientific school has not argued that its approach can replace wisdom and experience in planning analysis but that it can enhance planning by providing a better understanding of past behavior and by providing some means for predicting future behavior. Although behavioral analysis may, to an increasing extent, be able to provide specific correlations, trends, understanding, and predictive theories, it is not characterized by an overall approach or philosophy that makes it directly suitable for planning analysis. Work concerned with normative analysis is commensurate with planning in the sense of trying to determine how people should act or things should be done in order to achieve certain results. However, norma-

tive analysis does not appear to be imbued with a philosophical approach that can fulfill all of the deficiencies of present foreign policy planning.

What Is Systems Analysis? Systems analysis cannot be described in a meaningful way by a simple, short definition. It means different things to different disciplines. However, it is probably safe to say that during the past decade the most popular association of the term "systems analysis" has been with the process of weapon systems development and evaluation. Although employed in the defense industry prior to 1961, it was in that year that former Secretary of Defense Robert McNamara formally instituted it in the Department of Defense. But even this association does not clarify what systems analysis is and how it has been employed by the Department of Defense and the defense industry in general.

Some people seem to consider systems analysis as providing a scientific technique for decisionmaking, while others appear to denigrate it as being merely "... a loose phrase referring to a variety of techniques for the manipulation of data..."³⁵ Each of these viewpoints is probably based more on an emotional reaction than on a true understanding of systems analysis. Such an understanding requires both a philosophical and an instrumental orientation, and both aspects are considered herein. In continuing, it should be noted that all future references to systems analysis will be in the Department of Defense context unless specified otherwise.

Questions have been asked concerning what systems analysis is and what it is not, where it begins and where it stops, what is claimed for it and what is not, and so forth. This situation is illustrated by a remark made by Dr. Alain C. Enthoven, former Assistant Secretary of Defense for Systems Analysis, and the man who inaugurated the

Systems Analysis Office in the Department of Defense:

Hardly a week goes by that I don't read some fantastic description of systems analysis in the Pentagon. The more I read about it in the public press, the more I get the feeling I must not be doing it. According to some accounts, the essence of systems analysis is the application of computers and fancy mathematics to reduce all issues to numbers with lots of attention to cost and none to effectiveness, and with a complete lack of interest in military judgment or anyone else's judgment.³⁶

What, then, is systems analysis? Dr. Enthoven has probably had more practice answering that question than anyone else, and he is in the best position to describe its functions in the Department of Defense. For these reasons several of his statements are quoted at length in the next few pages. On one occasion Dr. Enthoven said,

... systems analysis is just one name for an approach to problems of decision making that good management has always practiced. The essence of systems analysis is not mysterious, nor particularly complicated, nor entirely new, nor of special value only to Defense planning. Rather, it is a reasoned approach to highly complicated problems of choice characterized by much uncertainty; it provides room for very differing values and judgments; and it seeks alternative ways of doing the job. It is neither a panacea nor a Pandora's box.

Decisions must be made by responsible officials on the basis of fact and judgment. Systems

analysis is an effort to define the issues and alternatives clearly, and to provide responsible officials with a full, accurate, and meaningful summary of as many as possible of the relevant facts so that they can exercise well-informed judgment; it is not a substitute for judgment.³⁷

A more formal description is provided by E.S. Quade and W.I. Boucher of the Rand Corporation:

... a systematic approach to helping a decisionmaker choose a course of action by investigating his full problem, searching out objectives and alternatives, and comparing them in the light of their consequences, using an appropriate framework—in so far as possible analytic—to bring expert judgment and intuition to bear on the problem.³⁸

Both of these descriptions probably raise the same rhetorical question posed and answered by Dr. Enthoven:

You might object, "But you're merely describing disciplined, orderly thought; why call it 'systems analysis'?" Most labels are imperfect; this one is no exception. We use the phrase "systems analysis" to emphasize two aspects of this kind of thinking. . . .

There is nothing mysterious about this kind of thinking. Informed men . . . have been pointing out the need for such an approach for years. We are doing it, and we have given it a name.³⁹

The preceding statements provide a good overall description of systems analysis. They were quoted at length because it would be difficult to improve on them. They present the picture of

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systems analysis as it has been conceived and practiced by analysts in the defense industry.

In pursuing an understanding of systems analysis, an attempt will be made to examine (1) its fundamental nature, (2) its main elements, and (3) what it is *not*.

Fundamental Nature. Six adjectives describe the fundamental nature of systems analysis. They are systemic, analytical, systematic, explicit, objective, and normative.

- Systemic refers to the systems orientation. Systems analysis entails a conscious effort to consider problems or situations as part of larger and broader problems and situations. The systemic perspective is used to provide a general framework for unifying and understanding heterogeneous phenomena.

- The analytical nature of systems analysis indicates the emphasis placed on reducing complex problems to their component parts. This permits each component to be studied by methods appropriate to it. Furthermore, the influence of each component on the total problem or on the system can be evaluated.

- Systematic describes the orderly, methodical side of systems analysis. As Charles Hitch said, the "... alternative is unsystematic or piecemeal consideration of problems."⁴⁰ The systematic approach inherent in systems analysis attempts to include all aspects of a problem in a methodological procedure. Compared with other types of analysis, and contemplative analysis in particular, the systematic approach is, in some respects, more tedious. Nevertheless, it runs less risk of neglecting some aspect of the problem or some alternative that may eventually provide a better choice. The systematic approach leads to explicit treatment of such aspects of analysis as alternatives, uncertainty, and value judgment.

- Emphasis on being explicit characterizes another component of the nature of systems analysis. Dr. Enthoven actually uses the term "open and explicit" to describe in the Department of Defense:

An analysis is "open and explicit" if it is presented in such a way that the objectives and alternatives are clearly defined, and all of the assumptions, factors, calculations, and judgments are laid bare so that all interested parties can see exactly how the conclusions were derived, how information they provided was used, and how the various assumptions influenced the results.⁴¹

- Systems analysis is also, by its very nature, as objective as possible. This really implies an attempt to eliminate purely subjective treatment of problems. It does not mean that analysis should attempt to be completely objective and independent of values. Rather, objective analysis actually aids value judgment by helping to pinpoint exactly where such value judgments are necessary.

- Finally, systems analysis as practiced in the defense industry is normative. Although "normative" is not a familiar term in systems analysis, it is used here to indicate a particular and significant characteristic which Yehzekel Dror has described in the following words: "As developed in 'systems analysis' and 'systems engineering,' the normative approach tries to use, explicitly or implicitly, general systems theory concepts and frameworks in order to improve the operations of a given system or to redesign new and better systems."⁴² Emphasis is on "improve," which is the primary reason for utilizing systems analysis.

Primary Elements of Systems Analysis. In a methodological sense,

systems analysis consists of five main elements, each of which is present in every analysis of choice.⁴³ In briefly reviewing these elements it will be clear that they are basically the steps in a "classical" rational process. However, it will be noted that systems analysis emphasizes two elements (cost and model) not treated explicitly in other formulations of rational analysis.⁴⁴

- Systems analysis was developed to analyze complex problems involving choice and to help establish long-range policies. The first step is to define the problem. This will often require some analysis in order to clarify objectives before attempting to solve the problem.

- The search for, and evaluation of, alternative approaches or policies for accomplishing or pursuing objectives is a fundamental element of systems analysis. The determined and systematic approach used to search for alternatives is one of the factors that helps systems analysis to create alternatives in addition to being a means of evaluating "obvious" alternatives.

- Cost should be interpreted broadly to mean whatever price has to be paid to achieve the objective by a particular alternative. Costs other than money include resources, manpower, morale, and ideology, to name a few.

In addition to the direct cost of achieving an objective, there is the important concept of "opportunity cost." This concept recognizes the fundamental limitation of resources of all types. Whenever resources are applied to the accomplishment of one objective, they are necessarily unavailable for other objectives. Thus the opportunity lost (which is known as the opportunity cost) is another way of measuring the cost of achieving an objective.

Many formulations of the elements of planning or of rational choice do not explicitly mention cost. On the other hand, explicit treatment of cost in the broad conceptual sense is one of the strong points of systems analysis.

Conscious treatment of both direct and opportunity costs often results in a redefinition of objectives or an intensified search for other alternatives as costs reach unacceptable dimensions.

- In simplest terms, any framework used to compare and evaluate the consequences of alternative policies and objectives may be thought of as a model. In this context a collection of mathematical equations, either computerized or not, a verbal description such as a scenario, or a graphical representation such as a trade-off curve or a map are all models. Models may also include people as in military and political simulations. In each case, however, the model is "... a representation of reality which abstracts the features of the situation relevant to the question being studied."⁴⁵

Explicit treatment of the model (or models) is another aspect of the systems analysis approach that makes it different when compared with the "classical" steps in the planning or analysis process. As Quade points out, models in the sense defined above are necessarily involved in all types of analysis. However, when they are only implicit they are more likely to be inadequate. The explicit model performs the function of enhancing review and permitting various experts to bring their judgments to bear on the problem within a specific framework of reference and analysis. Without an explicit model to provide precise communication, the various participants in an analysis are not able to make judgments in as firm a context. Moreover, an explicit model provides a precise means of reevaluation and change as a result of feedback of information.⁴⁶

- Criteria provide the means for ranking alternatives and for indicating the most promising alternative within the limitation of the analysis. In any complex problem, alternative solutions or policies can usually be ranked by a number of criteria, some of which are quantifiable. Systems analysis will use

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quantifiable criteria whenever possible in an attempt to provide objective measures of choice. This does not mean, however, that nonquantifiable criteria are ignored. All criteria pertinent to the choice that must be made should be evaluated.

A number of misconceptions exist regarding the nature of systems analysis. Although the previous section specifically discussed the nature of systems analysis, it still did not confront a number of widely held misconceptions.

Systems analysis is not the same as scientific research. However, it does attempt to use the method of science in the sense of objectivity, explicitness, being reproducible, and treating quantitative aspects quantitatively. The objective of systems analysis is to recommend or to help a decisionmaker make a choice, while the objective of science is to understand. Actually, systems analysis is more like engineering than science. In the same way that engineering uses the results of science, systems analysis uses appropriate theories, data, and techniques from many disciplines in its problem-solving applications.⁴⁷

Accusations have been made that systems analysis attempts to replace judgment in matters of choice. It may be true that certain managers have allowed the results of systems analysis studies to override sound expert judgment, but that is not a fault of systems analysis. Rather, it represents poor judgment by the manager.

If used properly, systems analysis is an aid to judgment, not a substitute. It can be used to clarify those areas where judgment is necessary. In the words of Charles J. Hitch, "Systems analysis should be looked upon not as the antithesis of judgment but as a framework which permits the judgment of experts in numerous sub-fields to be combined—to yield results which transcend any individual judgment."⁴⁸

In pursuit of objectivity, systems analysis quantifies those aspects of a

problem that can be quantified. However, there are many aspects of complex problems that cannot be acceptably quantified at present. This does not imply a limit to the usefulness of systems analysis because it is not just a collection of mathematical techniques. Rather, it simply means that other approaches to inquiry are required.⁴⁹

The need for nonquantitative techniques has long been recognized, particularly for problems of long-range planning. Some techniques suitable for this purpose are discussed in the section dealing specifically with instrumental aspects of systems analysis.

Just as systems analysis is not synonymous with quantitative analysis, it is not synonymous with the use of computers. Computers have been used extensively in some aspects of weapon systems analysis, but to equate systems analysis to computer usage implies a basic misconception. Computers have a number of potential drawbacks for systems analysis. There is the danger of spending an undue proportion of time in developing a computer program while neglecting serious analysis of both input and output data. There is a tendency of trying to "fit" problems to available computer programs. There are also the dangers of losing a "feel" for the problem and of "letting the computer do the thinking." There are, no doubt, other dangers.⁵⁰ Nevertheless, there are many obvious functions such as high-speed calculation and data storage that computers can do well. In addition, computers make feasible the application of new analysis techniques such as Monte Carlo simulations and numerical methods of problem solving. Computers do have many useful applications in systems analysis, but it should be remembered that their use is not an inherent part of systems analysis.

Considerable confusion arises concerning the relationship between systems analysis, cost-effectiveness, and the Planning-Programming-Budgeting

System (PPBS). The relationship is really very simple. PPBS is a management technique implemented in the Department of Defense for the formulation and review of large, complex programs. It consists of three main parts: (1) a budgeting format relating planned expenditures over some period of time to specified objectives; (2) a management information system to keep track of vast amounts of data in terms of specific programs; and (3) systems analysis as the overall analytical technique for evaluating the programs at all levels. Evaluation includes determining priorities between and within programs and comparing alternative ways of accomplishing specific objectives. Cost-effectiveness is a concept invented as a result of systems analysis. It is a special technique that is employed, when appropriate, to evaluate and compare alternative systems. Basically it is employed to compare the cost of systems having equal effectiveness or to compare effectiveness when costs are equal.

Thus, PPBS is an overall approach to management; systems analysis is the general analytical approach employed by PPBS; and cost-effectiveness is a particular concept that was invented by systems analysis to aid in a certain type of analysis. With this perspective it is clear that systems analysis is not synonymous with either PPBS or cost-effectiveness.

The systems analysis function involves both quantitative and qualitative considerations. It follows that instruments suitable for both types of considerations are necessary. However, as pointed out previously, systems analysis is not a fixed set of analytical techniques, and therefore a detailed discussion of specific techniques is not essential to understanding its nature and applicability to foreign policy planning. This is particularly true of quantitative tools which are obviously available in great numbers and degree of sophistication and which have a generally recog-

nized utility in systems analysis. On the other hand, the availability and potential utility of nonquantitative techniques is not obvious. Therefore several techniques are discussed in general terms in this section in order to provide a better appreciation of the capability of systems analysis to be applied to other than quantitative analysis.

The term "nonquantitative techniques" is used here to refer to analysis techniques that are not fundamentally dependent on explicit quantitative analysis. Three specific techniques are discussed: scenarios, alternative futures, and Delphi. In the case of scenarios and alternative futures, quantitative factors may be used, but the final objective is to arrive at a qualitative description of a state of the world, a particular situation, or sequence of events. Delphi may or may not have as its objective the determination of an agreed upon numerical value. However, even when a numerical result is desired, the process itself is nonquantitative. Rather, it depends on qualitative considerations and subjective appraisal as opposed to objective quantitative analysis. The purpose in briefly discussing these three techniques is to convey the idea that the systems analysis approach continues to be systematic even when "straightforward" quantitative techniques are not suitable.

A scenario is a hypothetical sequence of events. Its purpose is to aid thinking. It can serve as either a stimulant or a disciplinary device. It is used to describe in detail how a situation might come about and to show what alternatives are available to each actor at each decision point. When prepared in detail, scenarios have a number of advantages.^{5 1} They add realism to a problem and help the analyst to take into consideration and to keep track of a wide range of factors that would often be neglected without an explicit description of both qualitative and quantitative factors. Psychological, economic, political, military, and cultural factors can all be

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included and their interaction shown. This often indicates the futility of trying to arrive at a single quantitative measure of the utility of a policy; also, it helps to show where value judgments are necessary.

A scenario is a particularly useful device for using and combining expertise. An expert can write a scenario within which an analysis is conducted, or several experts can use a scenario as an explicit frame of reference. On a step-by-step basis, the experts can define probable decision points which can then be developed into a multibranched scenario to evaluate in detail each alternative.⁵²

"Alternative futures" is a term used by Herman Kahn and Anthony Wiener in *The Year 2000* to describe various possible world contexts in the future.⁵³ An alternative future is a model of how the world might look at some particular date. It is based upon combining trends and forecasts of economic, cultural, scientific and technical, demographic, political, and other factors. As was done in *The Year 2000*, the concept is to project what is considered the most likely context and then to show variations or alternatives. The alternative futures concept is not the same as forecasting; it goes beyond forecasting. It is the systematic combination of forecasts in many areas into specific and explicit contexts that is the distinguishing feature.

An alternative futures as an aid to analysis has all the advantages discussed for scenarios. It should not be confused with a scenario; an alternative future is static while a scenario describes a dynamic situation. The two concepts can be combined, however, by using the alternative futures as a basis for building scenarios. The scenarios would indicate likely decision points or future situations that will require decisions.

Another concept that has resulted from the quest for a more systematic means of combining expert judgments is

the so-called Delphi technique. E.S. Quade has described it as follows:

The Delphi technique attempts to improve the panel or committee approach in arriving at a forecast or estimate by subjecting the views of individual experts to each other's criticism in ways that avoid face-to-face confrontation and provide anonymity of opinions and of arguments advanced in defense of these opinions. In one version, direct debate is replaced by the interchange of information and opinion through a carefully designed sequence of questionnaires. The participants are asked not only to give their opinions but the reasons for these opinions, and, at each successive interrogation, they are given new and refined information, in the form of opinion feedback, which is derived by a computed consensus from the earlier parts of the program. The process continues until further progress toward a consensus appears to be negligible. The conflicting views are then documented.⁵⁴

One of the drawbacks during development has been the time-consuming procedure involved with the use of questionnaires. However, as noted by Quade, this problem could no doubt be overcome by the use of multiple-access, time-sharing computers. Although still under development at the Rand Corporation, the technique is considered particularly promising for the investigation of political and social problems.

Applicability of Systems Analysis to Foreign Policy Planning. In 1961 Defense Secretary Robert McNamara recognized a need for more and better planning to assist in making difficult choices; he appreciated the potential of

systems analysis for meeting the need; and he inaugurated a determined systems analysis approach to defense planning. It is significant that the formally established Office of the Assistant Secretary of Defense for Systems Analysis has been continued under the two succeeding Defense Secretaries, Mr. Clark Clifford and Mr. Melvin Laird.

Although it is not possible to prove the value of systems analysis to foreign policy planning, it is possible to reason its applicability. Some degree of applicability should already be apparent, in at least a general sense, based on the discussion in preceding chapters. Nevertheless, the following discussion confronts the issue directly in terms of congruence of purpose, inherent relevance, and capability to be applied.

The futuristic orientation of policy planning has always been readily accepted (at least as a goal if not a fact). Systems analysis, on the other hand, has not been so clearly associated with a futuristic orientation, and, indeed, much systems analysis effort is concerned with near-range rather than long-range problems. However, this is also true of policy planning as previously noted. Regardless of where the bulk of the effort has been placed, the fact remains that systems analysis has been used extensively in long-range planning in the Department of Defense during the sixties. As stated by Dr. Enthoven, the purpose of systems analysis is "... to provide decision-makers with a full, accurate, and meaningful summary of the information relevant to clarify defined issues and alternatives."⁵⁵ Therefore, and this is the significant point, when systems analysis is employed for long-range planning, its *basic* purpose is the same as that of policy planning as defined by the Policy Planning Council: "... the development of policies in the light of their implications for the future."⁵⁶ Congruence of purpose, therefore, is a consequence of application and, in the context being

discussed, obtains whenever systems analysis is applied to planning problems.

Probably the most commonly expressed reservations regarding the capability of systems analysis to be applied in a meaningful sense to foreign policy planning are concerned with the scope of quantification. The value, and even wisdom, of quantitative analysis in the fields of international relations and political science is the focus of considerable debate. Much of the criticism appears to be reactionary and protective of the traditional approach.⁵⁷ Some see quantitative analysis as a waste of time, but not necessarily harmful.⁵⁸ Others see it as constituting a real threat to our understanding of significant qualitative factors.⁵⁹

It seems that much of the criticism results from shortsightedness. No doubt there have been some poorly conceived mathematical models built and some bad analysis based on "quantifying the unquantifiable"; no doubt some investigators have become so mesmerized by their models that serious analysis has suffered; but these failings should not obscure the real value of quantitative analysis.

Quantitative considerations are inherent in all types of policy analysis in terms of ratio, interval, or ordinal scales of measurement. Therefore, the question is not whether or not to have any quantitative analysis but, rather, how much? There are no simple answers to such a question. Dr. Enthoven said that systems analysis attempts to quantify that which is quantifiable.⁶⁰ But this does not answer the question of what is quantifiable. Professor J. David Singer predicts:

Within a decade, almost every graduate school in the country will have some faculty who have been trained in scientific method, and assertions to the effect that 'you can't quantify diplomatic variables,' or 'international

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politics are too complicated to be treated scientifically' will sound as absurd as they now do when said of biology, psychology, or economics.⁶¹

Professor Singer belongs to the "scientific school" and can be expected to have that viewpoint. Nevertheless, it has often been possible to convert a "qualitative" property of one era into meaningful quantitative terms in another era.

Many people who believe that quantitative analysis is not applicable to international affairs readily admit its utility in defense planning. This results from a conception that defense analysis involves relatively straightforward calculations involving factors having known numerical values. Although this is true of many problems, it is not the general situation. This thought implies a lack of real understanding of just how far systems analysis has advanced in the Department of Defense. Many problems are now attacked that have highly subjective elements in them. This is particularly true of deterrence and counter-deterrence studies. For example, the allocation of resources between strategic offensive forces and active and passive defensive capabilities depends on subjective appraisal of enemy intentions (as well as estimated capabilities) regarding a first strike as opposed to a second strike. Another highly subjective element is the possibility of a period of mutual constraint or metered exchange of weapons in a nuclear war as opposed to an all-out spasmodic exchange. These and other subjective elements enter into all studies of this type with the result that straightforward "solutions" are never found. Nevertheless, in the process everyone gains new insight into the problem. This fulfills the fundamental purpose of systems analysis whether or not a final and agreed upon quantitative answer is obtained.

Just as systems analysis has been capable of application to problems in

defense planning that have involved highly subjective elements, so it can be applied to problems in foreign policy planning. Meaningful insight into complex problems can still be provided even when relatively simple quantitative "answers" are not practicable. Not only are some techniques already available for systematic analysis of nonquantitative variables, but others are being developed. Application would accelerate the development process. Indeed, a characteristic that has distinguished the systems analysis approach is the readiness to understand and to employ techniques developed in many diverse disciplines and to devise new techniques when necessary. The result is that systems analysis is capable of being applied to problems of foreign policy planning as well as defense planning; applicable analysis tools are available, and, in addition, new tools of planning analysis can be adapted or devised when necessary.

Summary and Conclusions. Systems analysis, as it has been developed and utilized in the Department of Defense for planning, is applicable to foreign policy planning and its application would represent a positive step toward reducing some recognized deficiencies in foreign policy planning. Based on the statements of recognized authorities in the international affairs community, it is clear that such deficiencies do exist in the planning of foreign policy. There is a lack of hard, sustained, and systematic analysis that provides adequate consideration of alternatives, adequate clarification of issues, and an examination of the systemwide impact of policies. In addition, foreign policy planning has been deficient in timely anticipation or recognition of emerging problems.

Examination of the analysis being performed in the academic field of international relations shows that it is not characterized by the basic approach necessary to significantly reduce the

noted deficiencies. The predominant portion of the analysis is of the traditional contemplative type which is rooted in history, logic, and philosophy. While undoubtedly vital to foreign policy planning, this is essentially the approach used today in the foreign affairs community, and it has been shown to be inadequate (but not inappropriate).

Most of the remaining academic analysis is in the behavioral branch of the so-called scientific school. It relies heavily on quantitative techniques to develop empirically supported descriptions of the behavior of various aspects of the international system. This work is capable of providing increased understanding and sharpening the intuition with regard to certain types of problems; but, so far it has had little direct application to future problems and planning. There is also a very small effort in the scientific school concerned with normative analysis which is concerned with how international actors should perform in order to achieve certain results. So far, this effort has not been very significant. In general, work in the scientific school is suitable for supporting planning but does not represent an approach to planning which is capable of offsetting existing planning deficiencies.

Systems analysis was discussed in terms of its purpose, its philosophic approach to planning, and its instrumental nature. All three are important to an understanding of systems analysis and to an acceptance of its applicability to foreign policy planning. It was argued that when it is directed toward the analysis of a future objective with the expectation of doing something about it in the present, the purpose of systems analysis is congruent with that of policy planning. Systems analysis was also shown to be inherently relevant to the needs of foreign policy planning by virtue of its emphasis in those specific areas in which present planning is

deficient. In addition, it was shown to be capable of being applied to qualitative as well as quantitative problems. Therefore, since congruence of purpose, relevance to needs, and capability to be applied are all different ways of defining applicability, it follows that systems analysis is applicable to foreign policy planning. Furthermore, because of the direct relevance of its fundamental characteristics to the needs of foreign policy planning, it also follows that its application would represent a positive step toward reducing the existing deficiencies.

The key to the contribution that systems analysis has to offer to any type of planning is its fundamental nature. The very act of engaging in systems analysis represents a determination to emphasize those characteristics that collectively constitute the process that is systems analysis. In particular, it represents a determination to clarify issues and objectives and to find and evaluate alternative means of accomplishing objectives. It means a determination to evaluate alternative objectives and policies in terms of the broadest possible implications; it means consideration of

BIOGRAPHIC SUMMARY



Mr. Richard F. Norford graduated from the University of Maryland in 1960 with a degree in aeronautical engineering. He has since done considerable graduate work in that field and has earned a master's degree in international relations from The George Washington University. A professional engineer, Mr. Norford has worked since 1966 in the Systems Analysis and Engineering Department of the Naval Air Development Center at Johnsville, Pa. He took leave of this post for 1 year in order to attend the School of Naval Warfare at the Naval War College during the academic year 1969-1970.

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the total cost of each alternative and the opportunities precluded by the allocation of resources to a particular alternative; and it means systematic evaluation of qualitative as well as quantitative facets of a problem. In all of these factors the basic difference between systems analysis and the traditional rational process of analysis is a matter of emphasis. Systems analysis emphasizes the systemic, systematic, objective, and explicit treatment of problems far more than any other form of analysis. Its objective, however, is the same: to help the decisionmaker. Judgment based on wisdom and experience is still re-

quired in the analysis process itself and in the use that is made of the analysis by the decisionmaker.

The analogy of systems analysis to engineering is useful for perspective. Engineering is not science, but it uses the results of science; it is not synonymous with quantitative analysis, but it uses mathematics where applicable; and, finally, engineering analysis is not a substitute for judgment and intuition, but neither are they sufficient without engineering analysis. The applicability of systems analysis to foreign policy planning should be thought of the same way.

FOOTNOTES

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25. For further discussion of the traditional school and the characteristics contrasting it with the scientific school, see *ibid.*, p. 3-5; Morton A. Kaplan, ed., *New Approaches to International Relations* (New York: St. Martin's Press, 1968), p. 1-17; and Morton A. Kaplan, *Macropolitics* (Chicago: Aldine, 1969), p. 51-56.
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It is easy for persons who do not have the terrible responsibility of ultimate decision to call any prestige interest a vital one.

Bernard Brodie, Strategy in the Missile Age